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, Farm Management; 145, Land Economics and Farm Appraisal; 156, Agricultural Economic Measurements; 175, Economics of Natural Resources.

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, Fossil Man; 153, Living Races of Man.


Art: All History of Art courses numbered from 150 through 188 which are to be offered. But in certain courses enrollment may have to be restricted because of limited classroom facilities.

Bacteriology: 105, The Biology of Infectious Disease.

Botany: 115, Plants in Relation to Man.

Business Administration: 150, Industrial Relations.

City and Regional Planning: 110, Introduction to City Planning; 111, Introduction to Housing; 121, Urban Aesthetics.


Comparative Literature: 160, Western Literary Crosscurrents in Twentieth-Century China.


Dramatic Art: 120, Dramatic Theory; 125, Dramatic Literature of Western Civilization (125A, Greek and Roman Dramatic Literature; 125B, Dramatic Literature of Western Europe from the Middle Ages to 1600; 125C, Dramatic Literature of Western Europe from 1600 to 1700; 125D, Dramatic Literature of Western Europe and the United States from 1700 to 1900; 125E, Dramatic Literature of Western Europe and the United States from 1900 to the Present); 145, History of the American Theater; 150A, History of Theater.


Entomology and Parasitology: 100, General Entomology; 117 Helminthology; 124, Economic Entomology; 126, Medical Entomology; 133, Biology of Aquatic Insects.

Forestry: 121, Forest Economics.

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: 119, The Arid Lands; 121A, Geography of Eastern North America; 121B, Geography of Western North America; 130, Geography of the Tropics; 131, Geography of California; 140, Transportation Geography; 141, Economic Geography: Primary Production; 142, Economic Geography: Industrial Localization; 153, Natural Resources, Population, and Conservation; 155, Urban Geography; 176, Relations Between Nature and Culture. And all of the foreign-area regional survey courses in the 120 and 130 series.

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.


Linguistics: 100, Elementary Phonology and Grammar; 120, Principles of Historical and Comparative Linguistics.


Music: 127A, Introduction to Opera; 127B, The Symphonies of Beethoven; 127C, Introduction to Contemporary Music; 127D, Bach and Handel; 127E, Mozart and Haydn; 127F, Symphonic Literature of the Nineteenth Century; 127G, Masterworks of Choral Literature; 141, Advanced Uni-
versity Symphony Orchestra; 142, University Chamber Band; 143, Advanced University Concert Band; 145, Advanced Repertory Chorus; 146, Advanced Chamber Music Ensemble; 148, Advanced Piano Ensemble; 149, Collegium Musicum.


Paleontology: 170, History of Paleontology.

Philosophy: 101, Philosophical Theories.

Physical Education: 120, Sports in American Society; 140, Community Recreation.

Physics: 132, Modern Physics.

Physiology: 102, Physiology of Human Development; 105, Physiology of the Aging Process; 107, Environmental Physiology.

Plant Pathology: 120, Plant Diseases.


Scandinavian: 100A–100B–100C, History of Scandinavian Literature (100A, From 1300 to 1800; 100B, From 1800 to 1890; 100C, From 1890 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.

Slavic Languages and Literatures: 130A–130B, Survey of Russian Literature and Intellectual Trends; 131, Russian Literature (1880–1917); 132, Russian Literature since 1917; 133A, the Russian Novel to 1850 and Its Relations to West European Literatures; 133B, The Russian Novel 1850–1880 and Its Relations to West European Literatures; 133C, Dostoevsky; 133D, Tolstoy; 133F, Chekhov; 134, Russian Folklore; 135, The Russian Drama from the Seventeenth Century to the Twentieth; 140, Survey of Western and Southern Slavic Literatures; 143, Introduction to Modern Slavic Literary Theory; 150, The Reformation and Counter-Reformation in Polish Literature; 153, The Polish Novel; 154, Polish and Russian Romanticism; 155, Mickiewicz; 156, The Polish Theater; 158, Polish Philosophical Writers of the Twentieth Century; 159, Contemporary Polish Poetry and Fiction; 161, Czech and Slovak Literatures of the Nineteenth Century; 180A, Survey of Russian Culture to 1800; 180B, Survey of Russian Culture from 1800 to the Present; 182A–182B, Survey of Polish Culture; 185, Survey of Hungarian Culture; 188, The Slavic-Speaking World.


Sociology: Many upper division courses in Sociology have no specific prerequisites although preparation such as that provided by the appropriate lower division course is generally desirable.

Speech: 118, Symbolism: Expressive Functioning of Signs; 119, Analysis of Communication Content; 121A–121B, Speech and Society; 123, Freedom of Speech; 135, British Public Address during the Eighteenth and Nineteenth Centuries; 137, American Public Address during the Eighteenth and Nineteenth Centuries; 139, Modern Spokesmen; 141A–141B, Classical Rhetoric; 147, Modern Rhetoric; 149, Comparative Discourse.


Courses of Instruction
Fall and Spring Semesters, 1964–1965

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 normally open to freshmen and to sophomore students, but may be taken by more advanced students.

(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 may be permitted to register in upper division courses when they have met the general prerequisites of the department offering the courses and have completed the prerequisites named for a specific course. 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, or the Committee on Courses of Instruction of the Berkeley Division 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. 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, XD, XL, XR, XSB, XSF. 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, 145 Mulford Hall)

Committee in Charge:
David L. Brink, Ph.D., Lecturer in Wood Chemistry, Berkeley.
Clinton O. Chichester, Ph.D., Professor of Food Science and Technology, Davis.
Walter G. Jennings, Ph.D., Associate Professor of Food Science and Technology (Chairman of the Executive Committee), Davis.
William E. Thiessen, Ph.D., Assistant Professor of Chemistry, Davis.
David H. Volman, Ph.D., Professor of Chemistry, Davis.

Graduate Course
(Concerning conditions for admission to graduate courses, see page 165)

201A-201B. Research in Agricultural Chemistry. (1-6; 1-6) Yr.
The Staff (Mr. Brink in charge, including all members of the Graduate Agricultural Chemistry Group)

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.
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.
Loy L. Sammet, Ph.D., Professor of Agricultural Economics (Chairman of the Department).
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.
James N. Boles, Ph.D., Associate Professor of Agricultural Economics.
Norman R. Collins, Ph.D., Associate Professor of Agricultural Economics.
Irving J. Hoch, Ph.D., Associate Professor of Agricultural Economics.
Michael F. Brewer, Ph.D., Assistant Professor of Agricultural Economics.

Gerald W. Dean, Ph.D., Associate Professor of Agricultural Economics, Davis.
J. Edwin Faris, Jr., Ph.D., Associate Professor of Agricultural Economics, Davis.
Kenneth R. Farrell, Ph.D., Lecturer in Agricultural Economics.
Davis McEntire, Ph.D., Lecturer in Agricultural Economics and Professor of Social Welfare.
Eric Thor, Ph.D., Lecturer in Agricultural Economics.

Letters and Science List. Courses 25, 100A, 100B, 112A-112B, 120, 175 are included in the Letters and Science List of Courses. For regulations governing this list, see page 91.

Departmental Major Advisers: Mr. Brewer, Mr. Hoch.

The Department of Agricultural Economics offers two curricula, one in Agricultural Business Management and another in Agricultural Economics.

The Major in Agricultural Business Management: To obtain a B.S. degree in this major, the following five items must be satisfied: 1. General University requirements. 2. College of Agriculture requirements (see page 65). 3. Agricultural Business Management Curriculum requirements: (a) General—Accounting, 3 units. Anthropology, geography, history, philosophy, political science, psychology, or sociology and social institutions, 12 units. Bacteriology, botany, geology, physics, physiology, or zoology or additional chemistry or mathematics, 7 units. Business law, 3 units. Chemistry, 5 units. English and/or speech, 6 units. Mathematics, 3 units. Principles of economics, 6 units. Statistics, 3 units. (b) Agriculture—Agriculture (other than agricultural economics and botany), 8 units. (c) Electives (restricted)—Additional upper division work in agricultural economics, economics or business administration, 24 units. 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), 44 units. 5. Certain courses or their equivalents are required for the curriculum and, where applicable, may be used toward satisfaction of 3 above. For details, see the Announcement of the College of Agriculture, Berkeley, available without charge.

All students must have at least a grade C average in all upper division courses required for the major. Those who do not maintain such an average may be required to withdraw from the major at any time.

The Major in Agricultural Economics: To obtain a B.S. degree in this major, the following five items must be satisfied: 1. General University requirements. 2. College of Agriculture requirements (see page 65). 3. Agricultural Economics Curriculum requirements: (a) General—Accounting, 3 units. Analytic geometry and calculus and/or linear algebra, 6 units. Chemistry, 5 units. English and/or speech, 6 units. Physics, 3 units. Economics, 9 units. Statistical methods, 3 units. (b) Agriculture—Agriculture, other than agricultural economics, 8 units. Upper division agricultural economics, 18 units. (c) Electives (restricted)—Anthropology, geography, history, philosophy, political science, psychology, or sociology and social institutions, 12 units. Bacteri-
ology, botany, geology, physiology, zoology; or additional chemistry, mathematics, and physics (beyond that specified in 3a), 10 units. 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), 41 units. 5. Certain courses are required for the major and, where applicable, may be used in partial satisfaction of 3 above. For details, see the ANNOUNCEMENT OF THE COLLEGE OF AGRICULTURE, BERKELEY, available without charge.

All students must have at least a C average in all upper division courses taken in agricultural economics. Those who do not maintain such an average may be required to withdraw from the major at any time.

Honors. Information concerning honors may be obtained from the Dean’s Office, College of Agriculture.

Lower Division Courses

25. Comparative World Agriculture. (3) II.
Survey of world agriculture, stressing principal agricultural regions and interrelations among physical environment, agricultural growth, and population. Tenure, credit, land reform problems, development of backward regions.

Upper Division Courses

100A. Economic Analysis in Agriculture. (3) I.
Prerequisite: Economics 1A–1B, or the equivalent.
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. Sammet
Prerequisite: course 100A or the equivalent.
Application of economic principles to problems of agriculture: 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. Hoch
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. Mr. Thor
Prerequisite: Economics 1A or 1B.
Farmers’ credit needs, methods of financing the agricultural industry, agencies supplying agricultural credit.

112A–112B. Rural Sociology. (2–2) Yr. Mr. McEntire
Comparative rural social organization and institutions; social change in the rural environment; social aspects of agrarian reform and agricultural development. 112A focuses primarily on the United States. 112B is concerned mainly with foreign countries.

120. Agricultural Policy. (3) I. Mr. Fuller
Prerequisite: Economics 1A–1B.
Analytical and historical treatment of economic problems, governmental policies and programs affecting American agriculture.
130. Agricultural Marketing. (3) I.  
Mr. Collins  
Prerequisite: Economics 1A or 1B.  

140. Farm Management. (4) II.  
Lectures and laboratory. Prerequisite: junior standing.  
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.  
Utilization of agricultural land, economic rent, land appraisal, political and economic problems of land development, land settlement, land policies, relation of population growth to 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. Lee  
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  
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. Brewer  
Organizational and operational problems and policies of agricultural cooperative associations.

175. Economics of Natural Resources. (3) I.  
Mr. Brewer  
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. Hoch 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. Hoch 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 165)

200A–200B. Economics of Agricultural Production and Consumption.  
(3–3) Yr.  
Mr. Hoos, Mr. Bressler  
200A. Mr. Hoos.  
200B. Mr. Bressler.  
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.

* Not to be given, 1964–1965.
210A–210B. Quantitative Methods in Agricultural Economics. (3–3) Yr.  
210A. II. Mr. Lee.  
210B. I. Mr. Boles.  
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. Hoch  
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  
Political economy of agricultural policy; defining problems and policy objectives; economic analysis of policy objectives, program alternatives for their achievement, and program results.

222. National and World Policies for Agriculture. (2) II.  
Mr. Fuller  
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. Hoch  
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.  
Mr. Collins, Mr. Clarke  
A seminar on the literature, current research problems, and methods of analysis in agricultural marketing.

240A–240B. Farm Management Research. (3–3) Yr.  
Mr. Dean, Mr. Faris  
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.  
Mr. Brewer, 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.  
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.  
The Staff (Mr. Fuller in charge)

299. Special Study for Graduate Students. (1–4) I and II.  
The Staff (Mr. Fuller 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.
The Giannini Foundation

The Giannini Foundation of Agricultural Economics was established in 1928 through a gift from the late A. P. Giannini “to study and make better known the economic facts and conditions upon which the continued solvency and prosperity of California’s agricultural industry must necessarily rest.”

The Foundation conducts research in such fields as natural resources, farm management and production, land economics and conservation, marketing, agricultural statistics and prices, agricultural prices and commodity studies. It is an integral part of the Division of Agricultural Sciences. Although it is housed in Giannini Hall on the Berkeley campus, many of its staff members are resident at Davis.

Appointments in the Giannini Foundation are held by most members of the Department of Agricultural Economics, and the Director of the Foundation is also Chairman of the Department. Some members of the School of Forestry staff and members of the Agricultural Extension Service also hold appointments in the Foundation.

AIR SCIENCE

(Department Office, 47 Harmon Gymnasium)

William J. Davitt, Colonel, U.S.A.F., Professor of Air Science (Chairman of the Department).

Gayle M. Bennett, Major, U.S.A.F., Associate Professor of Air Science.

Glenwood J. Anderson, Captain, U.S.A.F., Assistant Professor of Air Science.

Norman J. DeBack, Jr., Captain, U.S.A.F., Assistant Professor of Air Science.

Lower Division Courses

The lower division courses in air science, together with electives (see page 41), meet requirements established by the Regents for military training in the first and second undergraduate years. Lower division courses consist of two hours of instruction and one hour of laboratory weekly for two semesters, and one hour of laboratory weekly for two additional semesters. Enrollment is limited to students who are physically fit for military service and who are between 14 and 23 years of age at time of initial enrollment. Uniforms are provided by the government and must be returned in good condition.

1A. Air Science 1. (% I and II. The Staff (Mr. DeBack in charge)

One section meeting per week. Application of leadership techniques through military drill and command.

1B. Defense of the United States. (2) II. The Staff (Mr. DeBack in charge)

Introduction to factors of national power, armed forces as an instrument of national policy, Air Force missions and functions, U. S. world commitments.

21A. World Military Systems. (2) I. The Staff (Mr. Bennett in charge)

Comparative study of free world and communist air forces and trends in development and employment of military power.

21B. Air Science 2. (% I and II. The Staff (Mr. Bennett in charge)

One section meeting per week. Application of leadership techniques through military drill and command.

† To be taken concurrently with an elective course. See page 42.
Upper Division Courses

Students who have successfully completed the basic courses or have received credit in lieu thereof may apply for the advanced course. Students selected 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 instruction and one hour laboratory weekly for the junior and senior years. The student may expect that at least one additional hour weekly 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.

Prerequisite:

1. Upper division standing in the University.
2. United States citizenship.
3. Age at anticipated date of graduation and commissioning not to be more than 26½ years.
4. Agreement to accept a commission in the United States Air Force, if tendered.
5. Selection by chairman.
6. Successful completion of prescribed screening tests.
7. Execution of 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.

Students are required to attend summer training, of four weeks' duration, upon completion of Air Science 131A and 131B. Students attending 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), each student is furnished an officer-type uniform, which becomes his personal property upon successful completion. During this two-year period, each student also receives a monetary allowance totaling approximately $600.

Successful completion of the advanced course and attainment of a bachelor's or higher degree qualify the student for appointment and commission as a Second Lieutenant, Air Force Reserve. A limited number of distinguished graduates are eligible for appointment as Second Lieutenants, Regular Air Force. Qualified A.F.R.O.T.C. graduates are encouraged to apply for graduate education under Air Force auspices.

Qualified graduates may be appointed to flight training schools (pilot or
have recently graduated. Students with command, navigation, or damage control background will be more able to complete the pre-requisites for this course. For further information, if you are a regular Air Force officer or graduate of the regular Air Force Academy, consult the Department of Air Science, 47 Harmon Gymnasium.

131A. History and Development of Aerospace Power. (3) I. The Staff (Mr. Anderson in charge)
Prerequisite: course 21A and 21B, or equivalent.
A survey course of the nature of war; development of air power in the United States; mission and organization of the Defense Department Air Force concepts, doctrine and employment.

131B. Space Operations. (3) II. The Staff (Mr. Anderson in charge)
Prerequisite: course 21A and 21B, or equivalent.
A survey course concerning space operations, and the future development of aerospace power. Includes the United States space programs, vehicles, systems, and problems in space exploration.

141A. Air Science 4. (3) I. The Staff (Mr. Davitt in charge)
Prerequisite: course 131A and 131B, or equivalent.
Leadership laboratory, orientation in meteorology and navigation, and seminar on commissioned service for graduating seniors.

141B. Air Science 4. (3) II. The Staff (Mr. Davitt in charge)
Prerequisite: course 131A and 131B, or equivalent.
Military aspects of world political geography; the Air Force officer; leadership laboratory.

142. Air Science 4. (3) I. The Staff (Mr. Davitt in charge)
Prerequisite: course 131A and 131B, or equivalent.
Global relations of special concern to Air Force officers, emphasis on international relations, seminar on commissioned service for graduating seniors.

ANATOMY AND PHYSIOLOGY

ANATOMY
(For courses in physiology, see page 499.)

(Office, 4551 Life Sciences Building)

C. Willet Asling, Ph.D., M.D., Professor of Anatomy (Vice-Chairman for Anatomy).

Herbert McLean Evans, M.D., D.med. h.c., Docteur h.c., D.Sc., LL.D., Professor of Anatomy, Emeritus, Morris Herzstein Professor of Biology, Emeritus, and Director of the Institute of Experimental Biology, Emeritus.

Miriam E. Simpson, Ph.D., M.D., Docteur h.c., Professor of Anatomy, Emeritus.

Edward S. Evans, Ph.D., Associate Professor of Anatomy.

Herbert H. Srebnik, Ph.D., Assistant Professor of Anatomy.

Marian C. Diamond, Ph.D., Lecturer in Anatomy.

Robert A. Schooley, M.A., Associate in Anatomy.

Letters and Science List. All undergraduate courses in anatomy are in-
cluded in the Letters and Science List of Courses. For further information concerning this list, see page 91.

**Departmental Adviser:** Mr. C. W. Asling.

**Lower Division Courses**

25. General Human Anatomy. (3) II.  
Mr. Asling  
Lectures and laboratory. Prerequisite: Physiology I, 1L (recommended) or Zoology 1A  
or Biology 11A–11B. Enrollment limited to one hundred sixty students.  
Prepared human dissections, models, and microscope slides.

**Upper Division Courses**

101A–101B. Histology and Microscopic Organology. (3–3) Yr.  
Mr. E. S. Evans  
Lectures and laboratory. Prerequisite: Zoology 1A–1B, Chemistry 8, and Zoology 100  
(may be taken concurrently) or other advanced work in mammalian biology.  
Tissues and organs of the body, including histophysiologic and histochemical aspects  
with special attention devoted to human structure.

103. Neuroanatomy. (4) I.  
Mrs. Diamond  
Lectures and laboratory. Prerequisite: junior standing with major in animal biological  
sciences.  
The structure, functional relationships, and development of the human nervous system.

104A–104B. Essentials of Human Anatomy. (3–3) Yr.  
The Staff (Mr. Asling in charge)  
Prerequisite: upper division standing with major in an animal biological science (or, with  
consent of the instructor, in a behavioral science plus one of the following: Biology 11A–  
11B, Physiology 1, 1L, or Zoology 1A).  
Lectures and laboratory exercises on dissection and microscopic study of the adult  
human body and its development.

105A–105B. Systematic and Regional Human Anatomy. (3–4) Yr.  
Mr. Srebnik  
Lectures and laboratory. Prerequisite: Zoology 100 or other advanced work in mammalian  
biology; consent of the instructor.  
Dissection, X-ray, and surface anatomy of the human body, with special reference to  
the functional capacities of the structures examined.

199. Special Study for Advanced Undergraduates. (1–5) I and II.  
The Staff (Mr. Srebnik in charge)  
Prerequisite: restricted to senior honor students, with consent of instructor.

**Graduate Courses**

(Concerning conditions for admission to graduate courses, see page 165)

210. Physiological Anatomy of Reproduction. (2) I and II.  
Two hours per week.  
Informal conferences and demonstrations. Outside reading required.

211. Haematology. I and II.  
Credit up to a maximum of 12 units awarded according to work completed.  
Informal conferences and demonstrations. Outside reading required.

213. Original Investigation. I and II.  
The Staff (Mr. Asling in charge)  
Credit up to a maximum of 12 units awarded according to work completed.
214. Anatomy for Advanced Students. I and II.

Credit up to a maximum of 12 units awarded according to work completed.
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.
- J. Desmond Clark, Ph.D., Professor of Anthropology.
- Elizabeth F. Colson, Ph.D., Professor of Anthropology.
- George M. Foster, Ph.D., Professor of Anthropology and Curator of Mexican Anthropology.
- Robert F. Heizer, Ph.D., Professor of Anthropology, Curator of North American Archaeology, and Coordinator, Archaeological Research Facility.
- Dell H. Hymes, Ph.D., Professor of Anthropology.
- 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.
- Sherwood L. Washburn, Ph.D., Professor of Anthropology and Curator of Primatology.
- Ronald L. Olson, Ph.D., Professor of Anthropology, Emeritus.
- Gerald D. Berreman, Ph.D., Associate Professor of Anthropology.
- Eugene A. Hammel, Ph.D., Associate Professor of Anthropology and Acting Director, Lowie Museum.
- Alan Dundes, Ph.D., Assistant Professor of Anthropology.
- Nelson H. H. Graburn, Ph.D., Assistant Professor of Anthropology.
- John A. Graham, Ph.D., Assistant Professor of Anthropology.
- Laura Nader, Ph.D., Assistant Professor of Anthropology.
- Melvin L. Perlman, Ph.D., Assistant Professor of Anthropology.
- Herbert P. Phillips, Ph.D., Assistant Professor of Anthropology.

David B. Eyde, A.B., Acting Assistant Professor of Anthropology.
Albert B. Elsasser, M.A., Lecturer in Anthropology for the spring semester.
Anna Hadwick Gayton (Anna Gayton Spier), Ph.D., Professor of Decorative Art and Curator of Textiles, Museum of Anthropology.
F. Clark Howell, Ph.D., Visiting Professor of Anthropology.
Margaret Lantis, Ph.D., Lecturer in Anthropology.

‡ Appointment in the Miller Institute for Basic Research in Science, fall semester, 1964.
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 91.

Departmental Major Advisers: Consult Department Office.

The Major. Required: Anthropology 1, 2A–2B, Linguistics 35, Anthropology 125A, and a one-semester course from each of the following groups: (A) 151, 152, 153; (B) 103, 106, 107, 111; (C) 101A, 101B, 105A, 105B, 115, 139, 143A, 143B, 147; (D) 120, Linguistics 100. Also required are additional elective courses so that a total of 24 units of upper division courses in anthropology are completed.

Substitutions may be permitted among these additional elective courses of not more than 6 units in allied subjects approved by the department.

Honors Program: Students admitted to the honors program will include in their major program H198 (3 units) and will write a senior thesis under the direction of a member of the staff (199, 3 units).

Lower Division Courses

1. General Anthropology: Physical and Biological Factors. (3) I and II.
   Three lectures and one section meeting per week.
   I: Mr. Washburn, II: Mr. Turner.
   Mr. Washburn, Mr. Turner
   Facts and problems of human evolution, fossil man, race and race differences.

2A–2B. General Anthropology: Cultural Factors. (3–3) Yr.
   Lectures and one section meeting per week.
   2A. Prehistory and cultural growth. Mr. Graham.
   2B. Structure and dynamics of culture. Mr. Berreman.
   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.

   Mr. Eyde

Upper Division Courses

General prerequisite: junior standing or courses 1, 2A–2B.

   Mr. Graburn, Mr. Potter
   Survey of primitive, folk, and complex societies. Either half of the course may be taken independently.

103. Culture Growth. (3) I.
   Mr. Patterson
   Archaeological theory and cultural process, illustrated by the origin and development of civilization in the Old World and the New.

   Miss Colson, Mr. Patterson
   Native peoples and cultures of the New World.
   105A. Central America, Mexico, and North America. Mr. Heizer.
   105B. South America. Mr. Rowe.
   Either half of the course may be taken independently.
106. Archaeology of North America. (3) II. Mr. Graham
Prehistory of North American Indians; prehistoric culture areas; relations with historic Indians.

*106L. Archaeology of North American Laboratory. (2) I. Mr. Graham
Lecture and laboratory. Prerequisite: 106 (preferably taken concurrently). Enrollment limited to 15 students.

107. Archaeology and Society. (3) II. Mr. Heizer
Archaeological research methods and their uses in the study of man's past.

110. Prehistory Laboratory. (2) I. Mr. Clark
Prerequisite: consent of the instructor. Descriptive and analytical methods used in classification and discussion of prehistoric cultural material.

111. Prehistory. (3) II. Mr. Clark, Mr. Howell
Prerequisite: course 2A. Origin, development, and distribution in space and time of the prehistoric cultures of the Old World.

*115. Peoples of Southeast Asia. (3) I. Mr. Phillips
Races, languages, and cultures of Indonesia, the Philippines, and the adjacent mainland.

116. Peoples of the Circumpolar Regions. (3) I. Miss Lantis
A survey of Arctic cultures.

118. The Nature of Culture. (3) I and II. Mr. Phillips, Mr. Potter, Miss Colson, Mr. Dundes
I: Mr. Phillips, Mr. Potter; II: Miss Colson, Mr. Dundes. Advanced level introduction to cultural anthropology. Not open for credit to students who have taken 2B.

119. Problems in Culture and Personality. (3) II. Mr. Phillips
Relationships of cultural, social, and personality factors in human behavior; personality in representative societies; techniques for studying culture-personality relations.

120. Language and Culture. (3) II. Mr. Hymes
Prerequisite: Linguistics 35. Language and thought; classification of languages; linguistic aspects of culture; language, nation, and state.

121. Folklore. (3) I. Mr. Dundes
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. Mr. Graburn
Economic behavior in non-industrial societies; its social and cultural setting, and its modern changes.

123. Politics and Law in Non-Industrial Societies. (3) I. Miss Nader
Comparative survey of the ethnography of law and politics and anthropological concepts relevant to their analysis.

124. Primitive Religion. (3) II. Mr. Eyde
Comparative survey of religion and magic.

125A. Comparative Society. (3) I and II. Miss Nader, Mr. Perlman
Prerequisite: course 2B or 118 or consent of instructor. Theories of social structure; functional interrelationships of social institutions. Primary emphasis on non-Western societies.

* Not to be given, 1964–1965.
125B. Kinship and Social Structure. (3) II.
Prerequisite: course 125A.
Comparison of kinship and family types throughout the world; techniques of kinship and structural analysis.

Mr. Graburn

125L. Ethnographic Analysis Laboratory. (2) II.
Prerequisite: course 125B (may be taken concurrently) and consent of instructor.
Genealogical, structural, and comparative analysis of ethnographic data. Enrollment limited to 12 students.

Mr. Hammel

126. Invention and Technology. (3) I.
Origin, history, and spread of fundamental inventions; illustrative material from the Museum of Anthropology.

Mr. Clark

128. Art and Culture. (3) II.
Graphical and plastic arts and their relations to culture in nonliterate societies; illustrative material from the Lowie Museum of Anthropology.

Mr. Bascom

130. The Forms of Folklore. (3) II.
A worldwide survey of the major and minor forms of folklore with special emphasis upon proverbs, riddles, superstitions, games, songs, and narratives.

Mr. Dundes

137. Indians of California. (3) II.
Origin and relationships of the natives; prehistoric remains; shell mounds. Tribal divisions; arts; customs; industry; beliefs.

Mr. Heizer

138. Indians of Western North America. (3) I.
Tribes, culture types, and culture history of aboriginal peoples west of the Rocky Mountains.

Mr. Dundes

139. Africa. (3) I.
Races, languages, and cultures of Africa.

Mr. Perlman

141. Mexico and Central America. (3) I.
Achievements of the Aztecs, Mayas, and their predecessors.

Mr. Graham

142. Peoples of the Andes. (3) II.
Inca culture and its antecedents; a survey from the earliest times to the present.

Mr. Rowe

143A–143B. Peoples of India. (3–3) Yr.
143A. Development of Indian cultural traditions.
143B. Social organization and social trends.

Mr. Mandelbaum

147. Peoples and Cultures of the Pacific Islands. (3) I.
The peopling of the Pacific; Oceanian races and cultures.

Mr. Eyde

149. Culture of the Near East. (3) II.
Cultures of the contemporary Near East, with special emphasis upon Arab populations.

Miss Nader

150. Physical Anthropology Laboratory. (2) II.
Prerequisite: course 151, or 152, or 153 (may be taken concurrently). Enrollment limited to twelve students; primarily for majors in anthropology and the life sciences.
Descriptive and analytical techniques and methods applicable to the study of intra- and intergroup resemblances and differences.

Mr. Turner

151. Primate Evolution. (3) II.
Prerequisite: course 1 or equivalent.
A consideration of the major groups of primates with emphasis on the evolution of behavior.

Mr. Washburn

151L. Primate Evolution Laboratory. (2) II.
Lecture and laboratory. Prerequisite: course 151 (preferably taken concurrently). Enrollment limited to twelve students; primarily for majors in anthropology and the life sciences.

Mr. Washburn

* Not to be given, 1964–1965.
152. Fossil Man. (3) I.  
Prerequisite: course 1 or equivalent.  
Origin and relationships of the extinct forms of mankind.  
Mr. Howell

153. Living Races of Man. (3) I.  
Physical characteristics distribution, and relationships of the living races of mankind.  
Mr. Turner

154. Primate Social Behavior. (3) I.  
Survey of the social behavior and organization of monkeys and apes; their relevance to the evolution of human behavior and social groups.  
Mr. Phillips

160. Contemporary Civilization. (3) I.  
An application of anthropological principles of analysis and interpretation to contemporary civilization.  
Mr. Phillips

161. European Peasant Societies. (3) II.  
Representative groups considered in modern and historical perspective, stressing especially rural-urban relationships and the dynamics of change.  
Miss Lantis

162. Anthropology in Modern Life. (3) II.  
Anthropological theory and data applied to problems in such fields as medicine, agriculture, education, and international technical aid programs.  
Mr. Pettitt

163. Culture Change. (3) I.  
Contemporary theories of culture change, especially those resulting from contact (acculturation); illustrative materials from anthropological sources.  
Mr. Pettitt

170. The Transmission of Culture and the Socialization of the Individual. (3) II.  
Methods and problems in the transmission of culture from generation to generation and of the socialization processes of the individual.  
Mr. Pettitt

182. Cultures of the Far East. (3) I.  
China, Korea, and Japan as seen from an anthropological perspective.  
Mr. Potter

191. Contemporary Latin-American Culture. (3) II.  
Emphasis on Iberian-Indian assimilation, African influences, development of folk-peasant societies, and the concept of "national" cultures.  
Mr. Foster

195. Field Course in Archaeological Method. (2) I.  
Lectures 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.  
Mr. Heizer

196. Archaeological Method. (2) II.  
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. Advanced field investigation, and guidance in preparation of materials for publication.  
Mr. Heizer, Mr. Elsasser

197. Advanced Survey of Anthropology. (3) I.  
Prerequisite: senior standing or consent of the instructor. Historical survey of anthropological theories, methods, and findings. Intended primarily for major students.  
Mr. Hymes

H198. Preceptorial and Reading Course. (3) I and II.  
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.  
Mr. Phillips, Mr. Patterson

199. Special Study for Advanced Undergraduates. (2–3) I and II.  
The Staff

* Not to be given, 1964–1965.
**Graduate Courses**

(Concerning conditions for admission to graduate courses, see page 165)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>204A–204B</td>
<td>Fundamentals of Anthropological Theory</td>
<td>(3–3) Yr.</td>
<td>Mr. Perlman and staff; Mr. Mandelbaum and staff</td>
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Prerequisite: graduate standing. Theory and research in social anthropology.

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<tbody>
<tr>
<td>205</td>
<td>Recent Developments in Anthropology</td>
<td>(2) I</td>
<td>Mr. Hammel</td>
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</table>

*206. Proseminar. (2) I.*

Introduction to research. For new graduate students in anthropology.

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<tr>
<th>Course Code</th>
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<th>Instructor(s)</th>
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</thead>
<tbody>
<tr>
<td>207A–207B</td>
<td>History and Theory of Anthropology</td>
<td>(2–2) Yr.</td>
<td>Mr. Hymes, ---</td>
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Prerequisite: consent of instructor.

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<th>Course Code</th>
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<th>Credits</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>210A–210B</td>
<td>Aspects of Culture Structure</td>
<td>(2–2) Yr.</td>
<td>Mr. Dundes</td>
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</table>

Prerequisite: consent of the instructor. Concepts and problems in such major phases of culture as religion, economics, law, art, and folklore.

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<th>Credits</th>
<th>Instructor(s)</th>
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<tbody>
<tr>
<td>215</td>
<td>Ethnological Field Techniques</td>
<td>(2) I</td>
<td>Mr. Berreman</td>
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Prerequisite: consent of the instructor. Techniques of interviewing and data collecting; preparation for field expeditions; practice in work with informants.

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<th>Course Code</th>
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<th>Credits</th>
<th>Instructor(s)</th>
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<tbody>
<tr>
<td>216</td>
<td>Problems in Archaeological Method</td>
<td>(2) II</td>
<td>Mr. Heizer</td>
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</tbody>
</table>

Techniques of analysis of archaeological data; critical review of excavation data and analytical results; continental perspective of Far Western prehistoric cultures.

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<tr>
<th>Course Code</th>
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<th>Credits</th>
<th>Instructor(s)</th>
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</thead>
<tbody>
<tr>
<td>217*–217B</td>
<td>Dynamics of Culture and Society</td>
<td>(2–2) Yr.</td>
<td>Mr. Phillips</td>
</tr>
</tbody>
</table>

Prerequisite: consent of the instructor. Problems in culture change and stability.

*218H. Culture and Personality: the Psychological Approaches. (2) II.*

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<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
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</thead>
<tbody>
<tr>
<td>220</td>
<td>Concepts and Problems in Linguistic Anthropology</td>
<td>(2) II</td>
<td>Mr. Phillips</td>
</tr>
</tbody>
</table>

Prerequisite: consent of the instructor. Continuing and new problems in the study of language and speech as this concerns anthropology. One or more topics such as language taxonomy, lexicostatistics, semantics, verbal art, structural method, functions of speech.

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<tr>
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<th>Credits</th>
<th>Instructor(s)</th>
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<tbody>
<tr>
<td>223</td>
<td>Law and Anthropology</td>
<td>(2) II</td>
<td>Miss Nader</td>
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To acquaint the student of anthropology and law with the range of data that is pertinent to the study of law and society.

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<th>Credits</th>
<th>Instructor(s)</th>
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<tbody>
<tr>
<td>225</td>
<td>Kinship and Social Structure</td>
<td>(2) II</td>
<td>Miss Colson</td>
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</table>

Prerequisite: consent of the instructor. Systematic treatment of ethnological data and concepts concerned with kinship and the social structuring of human societies.

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<tr>
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<th>Instructor(s)</th>
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</thead>
<tbody>
<tr>
<td>235</td>
<td>Problems in the Culture History of South America</td>
<td>(2) I</td>
<td>Mr. Patterson</td>
</tr>
</tbody>
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<th>Course Code</th>
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<th>Credits</th>
<th>Instructor(s)</th>
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</thead>
<tbody>
<tr>
<td>237</td>
<td>Cultural Problems of Western North America</td>
<td>(2) II</td>
<td>Miss Lantis</td>
</tr>
</tbody>
</table>

Work on problems of tribal distribution and cultures.

*Not to be given, 1964–1965.*
239. Problems in African Society and Culture. (2) I and II.
Prerequisite: consent of the instructor.
Miss Colson, Mr. Perlman

242. Problems in African Prehistory. (2) II.
Prerequisite: consent of the instructor.
Mr. Clark, Mr. Howell

243A—243B. Culture Problems of India. (2—2) Yr.
Prerequisite: consent of instructor.
Mr. Mandelbaum.

247. Problems in Oceanian Anthropology. (2) II.
Mr. Eyde

253. Concepts and Problems in Physical Anthropology. (2) I.
Mr. Turner, Mr. Howell

254. Primate Social Behavior. (2) I.
Prerequisite: course 154 or consent of instructor.
Analysis of primate social behavior, with particular emphasis on field studies.
Mr. Washburn

261A—261B. Problems in Acculturation. (2—2) Yr.
Mr. Graburn, Mr. Potter
Prerequisite: consent of the instructor.
Processes and results of culture change originating in the contact of distinct ethnic groups.

Miss Lantis
Prerequisite: consent of the instructor.
The use of anthropological theory, technique, and data in professional fields such as public health, social welfare, education, and international development programs.

269. Factors in Material Culture. (2) II.
Miss Gayton
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. Graham

291. Seminar on Contemporary Latin America. (2) II.
Mr. Foster
Problems in the culture and society of modern Latin-American countries.

298. Special Study. (3) I and II.
The Staff (Mr. Hammel in charge)
Prerequisite: advanced graduate status; consult graduate adviser for details.

299. Directed Research. (2—6) I and II.
The Staff (Mr. Hammel in charge)
Anthropology Seminar. (No credit) I and II.
The Staff
Weekly meetings for the presentation of original work by faculty, graduate students, and visiting anthropologists. Graduate students are expected to attend.

Museum of Anthropology
The Robert H. Lowie Museum is a major research facility which functions as an integrated component of the Department of Anthropology, and it serves a number of other departments as well. Members of several departments serve as curators, and the Museum's collections are used for teaching and research over a wide range of scholarly disciplines. Founded in 1901 as the Museum of Anthropology, it was renamed in 1959 when it was moved to its new quarters in Kroeber Hall.
The 400,000 catalogued items include 200,000 archaeological and ethnological specimens from California, 85,000 from other parts of the America's,

* Not to be given, 1964-1965.
40,000 from Oceania, 35,000 from Europe, Asia, and Africa, and 10,000 entries of human skeletal material.

The Museum's collections and research facilities are available for study in archaeology, ethnography, physical anthropology, and related subjects by graduate and undergraduate students and by visiting scholars. Qualified students in anthropology and other departments are encouraged to use its resources under faculty supervision for independent, original research. The Museum's exhibition hall is utilized for instructional and educational purposes, particularly in connection with class work. The exhibits are open to the public without charge daily, except Monday, from 1:00 to 5:00 p.m.

Those interested in the Museum facilities may address the Director, Robert H. Lowie Museum of Anthropology, 103 Kroeber Hall.

The Archaeological Research Facility

The Archaeological Research Facility replaces the University of California Archaeological Survey and constitutes a subunit of the Department of Anthropology. Its purpose is to provide means and facilities for research in archaeology, with no restriction as to area, for advanced students and staff. The files of the former Archaeological Survey are now under the supervision of the Archaeological Research Facility.

ARCHITECTURE

(Department Office, 1 Architecture Building)

E. Michael Czaja, M.Arch., Professor of Architecture.
Vernon A. DeMars, A.B., Professor of Architecture.
Joseph Esherick, B.Arch., Professor of Architecture.
Donald L. Foley, Ph.D., Professor of City Planning and of Architecture.
Michael A. Goodman, M.A., Professor of Architecture.
Sami Y. Hassid, Ph.D., Professor of Architecture.
Henry J. Lagorio, M.A., Professor of Architecture.
Martin Meyerson, M.C.P., Professor of Urban Development.
Corwin R. Mocine, A.B., Professor of City Planning and of Architecture.
James L. Prestini, B.S., Professor of Architecture.
Donald P. Reay, M.Sc., Professor of Architecture.
Jesse Reichek, Professor of Design.
George P. Simonds, M.A., Professor of Architecture.
Raymond W. Jeans, M.A., Professor of Architecture, Emeritus.
Stafford L. Jory, Gr.Arch., Professor of Architecture, Emeritus.
Howard Moise, B.S., M.Arch., Professor of Architecture, Emeritus.
Warren C. Perry, B.S., Professor of Architecture, Emeritus.
William W. Wurster, A.B., Professor of Architecture, Emeritus.
Kenneth H. Cardwell, A.B., Associate Professor of Architecture.

* In residence spring semester only, 1964–1965.
Charles W. Moore, Ph.D., Associate Professor of Architecture (Chairman of the Department).
Donald E. Olsen, M.Arch., Associate Professor of Architecture.
Claude Stoller, B.Arch., Associate Professor of Architecture.
Harold A. Stump, A.B., Associate Professor of Architecture.
Christopher W. J. Alexander, Ph.D., Assistant Professor of Architecture.
Ezra D. Ehrenkrantz, M.Arch., Assistant Professor of Architecture.
Donlyn R. Lydon, M.F.A., Assistant Professor of Architecture.
Richard C. Peters, M.F.A., Assistant Professor of Architecture.
Patrick J. Quinn, M.Arch., Assistant Professor of Architecture.
Sim H. Van der Ryn, B.Arch., Assistant Professor of Architecture.

Theodore Bernardi, A.B., Lecturer in Architecture.
John E. Burchard, S.M., Visiting Professor of Environmental Design for the fall semester.
Norma D. Evenson, Ph.D., Acting Assistant Professor of Architecture.
John S. Fisher, M.Arch., Acting Assistant Professor of Architecture.
William B. Gilbert, Lecturer in Structural Design.
Norman M. Klein, B.Arch., Lecturer in Architecture.
Roslyn Lindheim, B.Arch., Lecturer in Architecture.
William H. Liskamm, M.Arch., Lecturer in Architecture.
Gerald M. McCue, M.A., Lecturer in Architecture.
George Matsumoto, M.A., Lecturer in Architecture.
Amos Rapoport, M.Arch., Acting Assistant Professor of Architecture.
Horst W. J. Rittel, Lecturer in the Science of Design.
Ulrich C. Roth, M.U.D., Acting Assistant Professor of Architecture.
Henry Sanoff, M.Arch., Lecturer in Architecture.
Karl V. Steinbrugge, B.S., Lecturer in Structural Design.
Richard R. Whitaker, B.Arch., Lecturer in Architecture.
Charles D. Wiley, M.Arch., Lecturer in Architecture.

Letters and Science List. Courses 121, 122, 126, 127, 128 are included in the Letters and Science List of Courses. For regulations governing this list see page 91.

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, 127, and 128 are presently established.

Credit in courses 11, 12, 13 will be allowed up to a total of 5 units; but in no semester will more than 1 unit each be allowed in any one of these courses.
Lower Division Courses

1. Design. (3) I and II.  
   The Staff (Mr. Prestini in charge)  
   Six hours per week.  
   Tools and materials: line, plane, color, texture, tone. Visual and physical structures in two and three dimensions.

2. Design. (3) I and II.  
   The Staff (Mr. Prestini in charge)  
   Six hours per week. Prerequisite: course 1 or the equivalent.  
   Continuation of course 1; space, scale, form, environment, motion, light. Basic needs of man relative to architecture.

3. Design. (3) I and II.  
   The Staff (Mr. Peters in charge)  
   Six hours per week. Prerequisite: course 2.  
   Elementary design of buildings.

4. Design. (4) I and II.  
   The Staff (Mr. Olsen in charge)  
   Eight hours per week. Prerequisite: course 3 or 23.  
   Design of buildings. Continuation of course 3 with increasing scope of problems.

5. Introduction to the Professions of Architecture, City and Regional Planning, and Landscape Architecture. (2) I. and II.  
   Mr. Cardwell  
   Lectures on the environmental design professions, with introduction to the professional responsibilities of the architect, landscape architect, and city planner.

6. Descriptive Geometry. (2) I and II.  
   Mr. Van der Ryn  
   Four hours per week. Prerequisite: solid geometry.

7. Shades, Shadows, and Perspective. (2) I and II.  
   Mr. Fisher  
   Four hours per week. Prerequisite: course 6.

11. Graphics. (1) I and II.  
    The Staff (Mr. Czaja in charge)  
    Three hours per week.  
    Freehand drawing and rendering in pencil, crayon, charcoal.

12. Graphics. (1) I and II.  
    The Staff (Mr. Czaja in charge)  
    Three hours per week.  
    Painting and rendering in color.

13. Graphics. (1) I and II.  
    The Staff (Mr. Czaja in charge)  
    Three hours per week.  
    Freehand drawing and rendering in black and white.

23. Design. (5) I and II.  
    Mr. Quinn  
    Twelve hours per week. Prerequisite: courses equivalent to 1 and 2. Open only to transfer students.  
    Courses 2 and 3 combined to prevent delay in graduation.

Upper Division Courses

The general prerequisite for upper division courses is third-year standing.

101. Advanced Design. (5) I and II.  
    The Staff (Mr. Lagorio in charge)  
    Eight hours per week. Prerequisite: course 4, 7; Engineering 18A-18B. Engineering 18B may be taken concurrently.  
    Architectural design and theory; building structure as it relates to visual design.
102. Advanced Design. (5) I and II. The Staff (Mr. McCue in charge)
Eight hours per week. Prerequisite: course 101.
Architectural design problems of increasing complexity.

103. Advanced Design. (6) I and II.
The Staff (Mr. Goodman, Mr. Bernardi in charge)
Eight hours per week. Prerequisite: course 102; City and Regional Planning 100.
Architectural design problems of large scope.

104. Architectural Design. (7) I and II. The Staff (Mr. Simonds in charge)
Prerequisite: fifth-year standing; courses 103, 151, 152, Civil Engineering 126 and 127. Required concurrently: courses 105, 106, and 153.
Design (exterior and interior) of a large fire-resistive building and preparation of working drawings. Students work in teams of two.

105. Detail and Color Study. (1) I and II. The Staff (Mr. Simonds in charge)
Prerequisite: fifth-year standing. Required concurrently: courses 104, 106, and 153.
Studies of the building designed in course 104. Students work in teams of two.

106. Structural Design. (5) I and II. The Staff
Prerequisite: fifth-year standing, courses 103, 151, 152, Civil Engineering 126 and 127. Required concurrently: courses 104, 105, and 153.
Structural design and calculations for the building designed in course 104, and preparation of working drawings. Students work in teams of two.

107. Fifth-Year Design Preparation. (2) I and II.
The Staff (Mr. Stoller in charge)
Prerequisite: completion of all required courses through the fourth year, or faculty approval.
Preliminary study, conferences, and research necessary to provide a program for course 108 in the following semester.

108. Fifth-Year Design. (8) I and II. The Staff (Mr. Stoller in charge)
Prerequisite: course 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. Stump, Mr. Goodman
Development, planning, and esthetic qualities of the single-family dwelling.

121. Architectural History. (3) I.
Prerequisite: course 4 for architecture students. No prerequisite for others.
Ancient and Medieval periods.

122. Architectural History. (3) II.
Prerequisite: course 4 for architecture students. No prerequisite for others.
Renaissance and Modern periods.

126. Architectural History—American. (3) I.
Miss Evenson
Prerequisite: courses 121 and 122 or the equivalent. Open to other students with consent of the instructor.
Architecture of the North American continent from colonial times to the present day.

127. Architectural History—Nineteenth and Twentieth Centuries. (3) II.
Miss Evenson
Prerequisite: courses 121 and 122 or the equivalent. Open to other students with consent of the instructor.
Architecture, principally European, from the French Revolution to the present day.
128. Architectural History—Oriental. (3) II.  Mr. Moore, Mr. Lyndon
Prerequisite: course 121 and 122 (or equivalent) for architecture students. Open to other students with consent of the instructor. Detailed investigation of selected architecture of the Near and Far East.

131. Building Materials. (2) I and II.  Mr. Stoller
Prerequisite: consent of the instructor. Enrollment limited. 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. Architectural business relations, contracts, legal aspects of practice, and specification writing.

133. Proseminar in Architecture. (2) I and II.  
Prerequisite: fifth-year standing or consent of the instructor. Papers on subjects relating to architecture presented and discussed in seminar meetings. For candidates for the degree Bachelor of Architecture only.

134. Architectural Research. (2) II.  Mr. Foley
Prerequisite: fourth-year standing and consent of the instructor. Open to qualified students from other departments. Approach to research bearing on architectural design problems.

151. Architectural Mechanics. (3) I.  Mr. Liskamm
Prerequisite: Physics 2B, 3B, and course 101. Heating, ventilating, air conditioning, and plumbing of buildings.

152. Architectural Mechanics. (3) II.  Mr. Peters
Prerequisite: Physics 2B, 3B, and course 101. 151 not prerequisite to 152. Lighting, electrical work, acoustics and sound control of buildings.

153. Architectural Mechanics. (1) I and II.  
Prerequisite: fifth-year standing and courses 151 and 152. Required concurrently with courses 104, 105 and 106. 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. Moore in charge)

199. Special Study for Advanced Undergraduates. (1–5) I and II.
The Staff (Mr. Moore 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 165.

201. Seminar in Architectural Research. (2) I.  Mr. Hassid
Required for all graduate students. Research methods and problems. Appraisal of 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 proposed by the instructor, or the student.

* Not to be given, 1964–1965.
203. Architectural Design and Research. (2) II. Mr. Esherick
Required of all candidates for the Degree of Master of Architecture.
Review of development of theses; exchange of content of theses.

204. Seminar in Architecture. (2) II. Mr. Hassid
Prerequisite graduate standing.
Topics related to theory and practice. Presentation by instructors and guests, discussion
of student reports.

298. Special Study for Graduate Students. (1-6) I and II.
The Staff (Mr. Moore in charge)

Required Courses in Other Departments

City Planning for Architects and Landscape Architects (City and Regional
Planning 100 and 100L).
First-Year Reading and Composition (English IA, IB) or First-Year Reading,
Writing, and Speaking (Speech IA, IB).
General Physics Lectures (Physics 2A-2B).
General Physics Laboratory (Physics 3A-3B).
Introduction to Mathematical Analysis (Mathematics 3A, 3B).
Elements of Framed Structures (Civil Engineering 124, 126, 127).
Plane Surveying (Engineering 21).
Principles of Landscape Architecture (Landscape Architecture 100).
Sculpture (Art 14A, 142A or 142B).

ART

(Department Office, 238 Kroeger Hall)

Darrell A. Amyx, Ph.D., Professor of Art and Curator of Ancient Mediter-
nanean Art, Museum of Anthropology.
Jean V. Bony, Agrégé, Professor of Art.
Herschel B. Chipp, Ph.D., Professor of Art.
John C. Haley, Professor of Art.
Walter W. Horn, Ph.D., Professor of Art.
* Karl Kasten, M.A., Professor of Art.
* Erle Loran, Professor of Art.
James McCray, M.A., Professor of Art (Chairman of the Department).
Richard O'Hanlon, Professor of Art.
† Felix Ruvolo, Professor of Art.
Jacques Schnier, M.A., Professor of Art.
Otto J. Maench, Ph.D., 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.
† Glenn A. Wessels, M.A., Professor of Art, Emeritus.

† Appointment in the Institute for Creative Arts, fall semester, 1964-1965.
§ Recalled to active service, fall semester, 1964-1965.
† Appointment in the Institute for Creative Arts, fall semester, recalled to active service,
Chiura Obata, Associate Professor of Art, Emeritus.
Elmer N. Bischoff, M.A., Associate Professor of Art.
Sidney Gordin, Associate Professor of Art.
Juergen Schulz, Ph.D., Associate Professor of Art.
David H. Wright, Ph.D., Associate Professor of Art.
Wilfrid Zogbaum, Associate Professor of Art.
Guitty Azarpay, Ph.D., Assistant Professor of Art.
René-Yvon Lefebvre d’Argencé, Licencié ès Lettres, Assistant Professor of Art.
Robert Hartman, M.A., Assistant Professor of Art.
Harold Paris, Assistant Professor of Art.
Boyd G. Allen, M.A., Instructor in Art.
Svetlana Alpers, M.A., Instructor in Art.

Alfred Frankenstein, Ph.B., Lecturer in Art.

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 91.

Departmental Major Advisers: Painting: Mr. Bischoff, Mr. Hartman, Mr. Ruvolo, Mr. Wessels; History of Art: Mr. d’Argencé, Miss Azarpay; 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: Art 2A, 2B, 14A, and 6 units chosen from courses 1A, 1B, 1C, 1D. The painting and sculpture majors also require Art 3 and 2 units selected from Art 4 or Art 14B. Recommended for majors in history of art: History 4A–4B. (Art 2A is prerequisite to Art 2B and Art 3; Art 2A and 2B are prerequisite to Art 4; Art 14A is prerequisite to 14B.)

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 enter study in the history of art will need German and French for their work and are urged to develop their knowledge of these languages as early as possible.

Honors Program in the History of Art. Qualified students (with a minimum grade-point average of 3.0, both overall and in the major) who wish to enter the honors program in the history of art should consult with their major adviser at the beginning of the senior year concerning enrollment in the honors course (H-196) and other requirements.

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 in the Department of Art during Registration Week. The department reserves the right to deny admission to applicants who enroll in courses for which they lack adequate preparation.

Transfer Students. All transfer students, undergraduate and graduate, are required to take either Art 2A or Art 120, depending on their previous art training, during their first semester in residence. In painting and sculpture, admission to graduate seminar courses will be based upon a review of work done under at least three members of the regular faculty. See pages 60 and 165.

Lower Division Courses

1A. History of Ancient Mediterranean Art. (3) I. Mr. Amyx
Lectures and weekly section meetings to be arranged.
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. Horn
Lectures and weekly section meetings to be arranged.

1C. History of Medieval, Renaissance, and Modern Art—Emphasis on Architecture and Sculpture. (3) I. Mr. Allen
Lectures and weekly section meetings to be arranged.
The art of India, China, and Japan.

2A. Form in Drawing. (2) I and II. Mr. Allen, Mr. Hartman, Mr. McCray, Mr. Ruvolo

2B. Form in Color. (2) I and II. Mr. Allen, Mr. Hartman, Mr. Ruvolo

3. Composition in Life Drawing. (2) I and II. Mr. Allen, Mr. Bischoff, Mr. Hartman, Mr. McCray

4. Materials of Painting. (2) I and II. Mr. Allen, Mr. Wessels

10. An Introduction to Art. (2) I. Mr. McCray
Lectures, illustrated with lantern slides. Open to nonmajors.

14A–14B. Elements of Sculpture. (2–2) Yr. Beginning each semester. Mr. O’Hanlon, Mr. Gordin, Mr. Paris, Mr. Schnier, Mr. Zogbaum, Mr. O’Hanlon, Mr. Gordin, Mr. Paris, Mr. Schnier, Mr. Zogbaum,
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, 14A, and either 4 or 14B.

The various courses in Group A differ in content, use of materials and type of subject matter, 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 for credit.

104A–104B. Advanced Drawing and Painting. (2–2) Yr.  Mr. Haley

105A–105B. Advanced Drawing and Painting. (2–2) Yr.  Mr. Loran

106A–106B. Advanced Drawing and Painting. (2–2) Yr.  Mr. McCray

107A–107B. Advanced Drawing and Painting. (2–2) Yr.  Mr. Hartman

108A–108B. Advanced Drawing and Painting. (2–2) Yr.  Mr. Kasten

109A–109B. Advanced Drawing and Painting. (2–2) Yr.  Mr. Ruvolo

111A–111B. Advanced Drawing and Painting. (2–2) Yr.  Mr. Bischoff

112A–112B. Advanced Drawing and Painting. (2–2) Yr.  Mr. McCray

113A–113B. Advanced Drawing and Painting. (2–2) Yr.  Mr. Wessels

114A–114B. Advanced Drawing and Painting. (2–2) Yr.  Mr. Bischoff

115A–115B. Advanced Drawing and Painting. (2–2) Yr.  Mr. Paris

120. Advanced Drawing and Composition. (2) I and II.  Mr. Bischoff

Required of transfer students in painting and sculpture. Open to nonmajors who have completed the equivalent of prerequisites stated for Group A and Group D.

123. The Human Figure. (2) I and II.  Mr. Bischoff, Mr. McCray

Principles of space drawing and composition using recognizable form.

128. Mural Composition. (2) I and II.  Mr. Haley

Prerequisite: 6 units of upper division painting courses. Limited to ten students.

129A–129B. Practice in the Graphic Arts. (2–2) Yr.  Mr. Paris

Group B: Theory and Criticism

132. Picture Analysis. (2) I.  Mr. Pepper

Prerequisite: course 2A–2B, 14A, and 6 units of Art History. Theory concerning value in painting and other visual arts, and its relation to studio practice. Given primarily for art majors.

* Not to be given, 1964–1965.
§ Approved for one offering only, 1964–1965.
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.

*153. Aegean Art. (2) II.  Mr. Amyx
Prerequisite: course 1A.
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
Prerequisite: course IA.
From the Geometric Period to the beginning of the Roman Empire.
154A is not prerequisite to 154B.
154A. From 1100 to 450 B.C.
154B. From 450 to 30 B.C.

159. Roman Art. (3) II.  Mr. Wright
Prerequisite: course 1A.
The art of Italy and the Roman Empire from the Early Iron Age to the period of Constantine.

160A–160B. History of Chinese Art. (3–3) Yr.  Mr. d’Argence
160A: II.
160B: I.

162. The Art of Japan. (3) II.  Mr. d’Argence
From prehistoric times to Hokusai.

163. The Art of India. (3) I.  Miss Azarpay

164. The Art of Greater Iran. (3) II.  Miss Azarpay
Prerequisite: consent of instructor.
The art of Iran from the Late Bronze Age to the Arab Conquest; the art of the Steppe peoples.

166. The Art of the Ancient Near and Middle East—Pre-Persian Cultures. (3) I.  Miss Azarpay
Prerequisite: consent of instructor.
From the Neolithic Period to the Rise of Achaemenid Persia.

172. Byzantine Art. (3) I.  Mr. Wright
Emphasis on the Middle and Late Periods.

173A–173B. Romanesque and Gothic Art—Emphasis on Architecture and Sculpture. (3–3) Yr.  Mr. Bony

175A–175B–175C. Medieval Art. (3–3–3)  Mr. Bony, Mr. Horn
One part is not prerequisite to another.
175A. Early Christian and Early Byzantine Art. I.
Mediterranean roots of medieval art.
175B. Germanic and Celtic art. II.
Northern roots of medieval art.
175C. Medieval Art. II.
Carolingian renaissance to the end of the thirteenth century.

* Not to be given, 1964–1965.
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.

177. The Renaissance of Northern Europe. (3) II.  
Mrs. Alpers  
Art in Northern Europe from Van Eyck to Brueghel.

178A–178B. Baroque Art. (3–3) Yr.  
Mrs. Alpers
178A is not prerequisite to 178B.  
178A. Southern Baroque Art.  
178B. Northern Baroque Art.

*179. Italian Renaissance Architecture. (3) I.  
Mr. Schulz  
Architectural planning and architectural theory in Italy from 1400 to 1600.

Mr. Chipp, ---
183A is not prerequisite to 183B.  
183A. Art of the nineteenth century.  
183B. Art of the twentieth century.

183D. Picasso and Cubism. (3) I.  
Mr. Chipp
Prerequisite: course 183B and consent of instructor.  
The development of cubism in painting, sculpture, and architecture. Limited to 25 students.

*184. Eighteenth-Century Art and Architecture in Europe. (3) II.  
Mr. Frankenstein

Group D: Sculpture

General prerequisite for Group D sculpture courses: courses 2A, 2B, 3, 14A, and either 4 or 14B. The various courses in Group D differ in content, use of materials and type of subject matter, depending upon the 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 for credit.

§140A–*140B. Advanced Sculpture. (2–2) Yr.  
Mr. Schnier
§141A–141B. Advanced Sculpture. (2–2) Yr.  
Mr. Zogbaum
§142A–142B. Advanced Sculpture, the Human Figure. (2–2) Yr.  
Mr. Gordin, Mr. O’Hanlon, Mr. Paris, Mr. Schnier, Mr. Zogbaum  
Open to advanced architecture and landscape architecture majors who have had Art 14A.
§143A–143B. Advanced Sculpture. (2–2) Yr.  
Mr. Paris
§144A–144B. Advanced Sculpture. (2–2) Yr.  
Mr. Gordin
§148A–148B. Advanced Sculpture. (2–2) Yr.  
Mr. O’Hanlon

Special Study Courses

190. Senior Proseminar in the History of Art. (3) I and II.  
Mr. Schulz, Mr. Wright  
Lectures, discussions, and reports. An introduction to research techniques.

* Not to be given, 1964–1965.
§ Approved for one offering only, 1964–1965.
H196. Special Study for Honors Candidates in the History of Art. (1-4) I and II. The Staff (Mr. Schulz in charge)
Prerequisite: senior standing and qualifying scholarship record (minimum 3.0 overall, and 3.0 in all courses taken in the department).
May be repeated for credit.

198. Special Studies in Painting or Sculpture. (1-4) I and II.
The Staff (Mr. McCray in charge)
Restricted to honor seniors for selected projects. Staff approval required.

199. Special Study for Advanced Undergraduates in the History of Art. (1-4) I and II.
The Staff (Mr. Schulz in charge)
Restricted to senior honors students.

Graduate Courses
(Concerning conditions for admission to graduate courses, see page 165)
General prerequisite for graduate courses in painting and sculpture: at least a B average in the undergraduate major in art. Also, admission to graduate seminar courses will be based upon a review of work done under at least three members of the regular faculty.

201A–201B. Form in Painting. (3–3) I and II. Mr. Haley, Mr. Ruvolo
Experimental studio work emphasizing various aspects of form. Group criticism.

220A–220B. Seminar in Painting. (3–3) I and II. Mr. Hartman, Mr. McCray
Emphasis upon original works; group discussion and criticism. Ancillary topics of a contemporary or historical nature will be introduced.

240A–240B. Form in Sculpture. (3–3) Yr. Mr. O’Hanlon, Mr. Schnier
Experimental studio work emphasizing various aspects of form. Group criticism.

245A–245B. Seminar in Sculpture. (3–3) Yr. Mr. Gordin, Mr. Zogbaum
Emphasis upon original works; group discussion and criticism. Ancillary topics of a contemporary or historical nature will be introduced.

254. Seminar in the History of Ancient Art. (3) II.
Mr. Amyx
May be repeated for credit.

260. Seminar in the History of Oriental Art. (3) II.
Mr. d’Argencé
May be repeated for credit.

273. Seminar in the History of Medieval Architecture and Sculpture. (3) I.
Mr. Bony
May be repeated for credit.

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.
May be repeated for credit.

283A–283B. Seminar in the History of Modern Art. (3–3) Yr. Mr. Chipp
May be repeated for credit.

*284. Seminar in the History of Modern Architecture. (3) II.
May be repeated for credit.

* Not to be given, 1964–1965.
298. Special Study for Graduate Students. (1-4) I and II.
   The Staff (Mr. McCray in charge)
   Restricted to exceptional projects. Staff approval required.

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—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).
Seminar in Classical Archaeology (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. The gallery presents a regular program of loan exhibitions dealing with both historical periods and modern art, drawn from a variety of sources, such as the major circulating agencies, museum collections, and private sources. Exhibitions are scheduled continuously throughout the calendar year. Those interested in the gallery’s activities may address Professor Herschel B. Chipp, Chairman of the Art Exhibition program of the Committee on Arts and Lectures, at the Department of Art.

The Worth Ryder Art Gallery was established in 1960 in memory of the late Worth Ryder, artist and Professor Emeritus. It is located in Kroeber Hall as an adjunct to the teaching functions of the Department of Art, and provides a continuous program of contemporary painting and sculpture exhibitions.

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 and Director of the Radio Astronomy Laboratory.
Sturla Einarsson, Ph.D., Professor of Astronomy, Emeritus, and Director of the Leuschner Observatory, Emeritus.
Leland E. Cunningham, Ph.D., Associate Professor of Astronomy.
Ivan R. King, Ph.D., Associate Professor of Astronomy.

*George Wallerstein, Ph.D., Associate Professor of Astronomy.

Eugene R. Capriotti, Ph.D., Acting Assistant Professor of Astronomy.

Paul W. Hodge, Ph.D., Assistant Professor of Astronomy.

C. Robert O’Dell, Ph.D., Assistant Professor of Astronomy.

Hyron Spinrad, 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 91.

Departmental Major Advisers: Mr. Henyey, Mr. Weaver.

The Major. Physics 4A-4B-4C, or the equivalents; Mathematics 1A–1B, 2A–2B, or the equivalents; 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 107A–107B, 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 H195 during his senior year, and in this course he shall prepare an acceptable paper on some subject which he shall choose in consultation with a staff member.

Lower Division Course

1. Introduction to General Astronomy. (3) I and II.

Mr. Spinrad, Mr. Hodge, Mr. Phillips, Mr. King

Three lectures and one discussion section per week.

General facts and principles of the science of astronomy. Not intended for advanced physical science majors.

Upper Division Courses

101. Current Problems in Astronomy. (3) I and II. Mr. Weaver, Mr. King

Prerequisite: Physics 4A, 4B, 4C, Mathematics 1A–1B, 2A–2B.

Introduction to the principal fields of modern astrophysical research. Differs from former course 7A–7B in that selected topics are discussed from a more advanced viewpoint. Intended primarily for majors in the physical sciences and engineering.

105A–105B. Astronomical Computations. (3–3) Yr. Mr. Cunningham

Prerequisite: Mathematics 2B or equivalent, 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.

107A–107B. General Astronomy. (3–3) Yr. Mr. Hodge
Prerequisite: Physics 4A, 4B, 4C; Mathematics 3A–3B, 4, or 1A–1B and 2A–2B.
The facts and principles underlying all branches of astronomy. Laboratory and observ­ing problems are included.

117A–117B. Introduction to Astrophysics. (3–3) Yr. Mr. Spinrad
Prerequisite: Mathematics 2B, Physics 121 (these may be taken concurrently).
Astronomical spectographs, spectral classification and its interpretation, line broadening, opacity in stellar atmospheres, composition of stellar atmospheres, stellar masses from visual, spectroscopic and eclipsing binaries. Photoelectric photometry, especially of clusters and interpretation of cluster photometry in terms of stellar evolution.

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

Graduate Courses
(Concerning conditions for admission to graduate courses, see page 165)

*204. Spherical and Positional Astronomy. (3) I. Mr. Cunningham
Prerequisite: course 107A–107B or its equivalent.
Spherical coordinate systems, precise determination of latitude and longitude, funda­mental and relative star positions, proper motion, parallax. Laboratory exercises are included.

205. Utilization of Electronic Computers in Astronomy. (3) II. Mr. Cunningham
Prerequisite: consent of instructor.

206. Astronomical Dynamics. (3) II. Mr. King
Prerequisite: Physics 105A–105B.
Basic applications of the theory of gravitation to the solar system, double and multiple stars, clusters, and the Galaxy.

207A–207b. Physical Foundations of Astrophysics. (4–4) Yr. Mr. Capriotti

208. Interstellar Matter. (3) I. Mr. O’Dell
Prerequisite: Physics 112, 115.
The observational data and physical theories of neutral and ionized interstellar gas and dust. H I and H II regions, interstellar lines, scattering and polarization. Distribution of interstellar matter.

215A–215B. Orbit Theory and Practice. (3–3) Yr. Mr. Cunningham
Prerequisite: course 105A–105B and Physics 105A–105B (may be taken concurrently), or consent of instructor. May be taken by qualified seniors.
Various orbit methods, reduction of observations, special perturbations, introduction to general perturbations.

217A–217B. The Physics of Stellar Atmospheres. (3–3) Yr. Mr. Henyey
Prerequisite: course 117A–117B.

*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. Galactic Structure. (3–3) Yr. Mr. Weaver

* Not to be given, 1964–1965.
219. Solar System Astrophysics. (3) II.
Prerequisite: course 117A–117B.

Prerequisite: Physics 105.

220A–220B. Stellar Structure. (3–3) Yr.
Prerequisite: course 117A–117B and 207A–207B, or the equivalent.
The physics of the stellar interior, energy sources, stellar evolution, and pulsation.

228. Problems in Extragalactic Astronomy. (3) II.
Mr. Hodge
The structure, composition, and space distribution of external galaxies. The local group and its use for establishing the distance scale. The red shift and its relation to cosmological theories.

Prerequisite: consent of the instructor.
Application of atomic and molecular spectroscopy to the spectra of astronomical sources.

245. Satellite Theory. (3)
Prerequisite: consent of instructor.
The motion of natural and artificial satellites. Practical determination of their orbits and perturbations.

Prerequisite: consent of the instructor.
Mr. Phillips, Mr. Wallerstein
Advanced topics in astronomical spectroscopy: spectra of Wolf-Rayet stars, novae, Cepheid variables, spectrum variables, late-type stars, comets, planets, night sky, interstellar matter.

292. Seminar. (1–3) I and II.
The Staff (Mr. Henyey in charge)

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)

Leuschner Observatory
The Leuschner Observatory is equipped with a 20-inch parabolic reflecting telescope, two transit instruments and several small refractors. Most of the instruments are intended for the instruction of advanced students in connection with courses given by the Astronomy Department. The 20-inch reflector can be used either with a photoelectric photometer, a small stellar spectograph or a double slide photographic plateholder. The photoelectric photometer has been regularly used by graduate students and members of the staff. The Observatory is also well equipped with various laboratory instruments needed to analyze the observational material obtained at the telescopes.

* Not to be given, 1964–1965.
**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 dissertation.

**Radio Astronomy Laboratory**

The Radio Astronomy Laboratory, a unit under the Department of Astronomy, builds and operates telescopes for making astronomical observations in the radio wavelength range. No courses are offered by the Laboratory; it is not a teaching organization. The research facilities are available to students and faculty members of the University of California. In particular there are many opportunities for graduate students to carry on research that will lead to the Ph.D. degree.

The Radio Astronomy Laboratory operates the Hat Creek Radio Astronomy Observatory north of Lassen National Park. At the Observatory there are two fully steerable paraboloids, one of aperture 33 feet, the other of aperture 85 feet. There are available receivers for these frequencies: 8000 Mc/s, 1667 Mc/s, 1420 Mc/s. The last two of these are low noise devices, are tunable, and are for observing the OH radical and neutral hydrogen. The current 8000 Mc/s receiver will soon be replaced by a maser. Current research at the Laboratory is primarily in the fields of structure and dynamics of the galaxy, with some work in lunar and planetary radio astronomy.

The personnel of the Laboratory are in both the academic and non-academic categories. The Laboratory is, in large part, supported by grants and contracts.

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**BACTERIOLOGY**

(Department Office, 3573 Life Sciences Building)

Michael Doudoroff, Ph.D., *Professor of Bacteriology and Molecular Biology.*
Sanford S. Elberg, Ph.D., *Professor of Bacteriology and Immunology.*
Jacob Fong, Ph.D., *Professor of Bacteriology and Immunology (Chairman of the Department).*
Stewart H. Madin, D.V.M., Ph.D., *Professor of Bacteriology, Experimental Pathology, Public Health, and Director of the Naval Biological Laboratory.*
Roger Y. Stanier, Ph.D., *Professor of Bacteriology and Molecular Biology.*
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 and Immunology.*

*Absent on leave, 1964–1965.*
Alvin J. Clark, Ph.D., Assistant Professor of Bacteriology and Molecular Biology.
Benjamin W. Papermaster, Ph.D., Assistant Professor of Bacteriology and Immunology.

Kenneth B. DeOme, Ph.D., Professor of Zoology.
Robert J. Heckly, Ph.D., Lecturer in Bacteriology.
Mary Human, M.A., Lecturer in Bacteriology.
Adelien Larson, A.B., Lecturer in Bacteriology.

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 91.

Departmental Major Advisers: Mr. Stanier, Mr. Doudoroff.

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; Bacteriology 198; Biochemistry 102 or 100A–100B; Biochemistry 102L or 101A; and at least two 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 145; Virology 100A; Genetics 104; Soil Science 111; Plant Pathology 126.

The following courses are strongly recommended as electives, particularly for those students who contemplate graduate work: Botany 100; Zoology 101, 102, 107, 107C; Zoology 114 or 115 or Genetics 100; Genetics 104; Soil Science 111; Plant Pathology 126; 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.

Honors Program. All honor students majoring in bacteriology are eligible to enroll in the honors program. Students enrolled in the program must take at least four units of honors courses (H195 and/or H197), and must pass an oral examination at the end of their last semester. Graduation with honors may be recommended for those who maintain their standing as honor stu-
Students throughout their last four semesters, who satisfactorily complete the honors courses, and who pass the comprehensive examination. The honors program adviser will help plan each honor student's Honors Program individually, and his approval of their programs will be required. The honors program adviser is authorized to exempt such students from requirements concerning specific courses or sequences of courses in the major program. Students interested in enrolling in the program should consult the honors program adviser, Mr. Fong.

**Lower Division Courses**

1. **General Bacteriology.** (3) II.
   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.
   Morphology, physiology, biochemistry, and ecology of bacteria, with emphasis on non-pathogenic types.
   Primarily for students majoring in biological science.

2. **A Survey of Bacteriology.** (2) II.
   Mr. Doudoroff, Mr. Papermaster
   Two lectures per week. Prerequisite: Chemistry 1A. Course 4 must be taken concurrently.
   Primarily for students not majoring in biological science.

4. **Laboratory Course in General Bacteriology.** (2) II.
   Mr. Papermaster
   Two three-hour laboratory periods per week. Prerequisite: Chemistry 1A. Either course 1 or 2 must be taken concurrently.

**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. Doudoroff
    Two lectures and three three-hour laboratory periods per week. Prerequisite: course 1 or 2; course 4; Chemistry 5; Biochemistry 102 or the equivalent.
    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
    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.
    Pathogenesis of bacterial and other microbial infections of man.
    Evidence of immunization against tetanus, diphtheria, and typhoid fever is required at registration.

102. **Immunology.** (2) II.
    Mr. Elberg
    Prerequisite: course 101.
    Specific and nonspecific reactions in immunity; basis of individuality in terms of antigen-antibody reactions, transplantation immunity, and hypersensitivity.

102C. **Immunology Laboratory.** (2) II.
    Mr. Elberg
    Two three-hour laboratory periods per week. Prerequisite: course 102 (may be taken concurrently).

103. **Immunchemistry.** (4) I.
    Mr. Heckly
    Two lectures and two three-hour laboratory periods per week. Prerequisite: Chemistry 8 or 12.
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.
Dynamic aspects of relationships of living organisms which result in infectious diseases.

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 laboratory course in animal virology, with emphasis on studies of the biological activities of viruses.

107. Bacterial Genetics. (2) I. Mr. Clark
Prerequisite: an elementary bacteriology course, or consent of the instructor. An elementary course in genetics is recommended.

H195. Independent Study. (2–4) I and II. The Staff (Mr. Stanier in charge)
Open to students in their senior year who are enrolled in the Department of Bacteriology honors program.

H197. Research. (2–4) I and II. The Staff (Mr. Stanier in charge)
Open to students in their senior year who are enrolled in the Department of Bacteriology honors program.
Laboratory research.

198. Review of Selected Research Topics. (2–3) I and II. Mr. Stanier
Preparation of a term paper. Group instruction is given in bibliographical procedures and organization of a review article. Normally taken at the end of the senior year.

Graduate Courses
(Concerning conditions for admission to graduate courses, see page 165)

*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, Mr. DeOme
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) II.
An introduction to the analysis of scientific literature. Required of all first-year graduate students in bacteriology.

214. Seminar in Medical Microbiology. (1) I.

215. Seminar in Immunology. (1) I. Mr. Papernaster

* Not to be given, 1964–1965.
BACTERIOLOGY; BIOCHEMISTRY

280. Research. (1–9) I and II. The Staff (Mr. Fong in charge)

299. Special Study for Graduate Students. (2–4) I and II. The Staff (Mr. Fong 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, 401 Biochemistry Building)

Clinton E. Ballou, Ph.D., Professor of Biochemistry.
Horace A. Barker, Ph.D., Professor of Biochemistry (Chairman of the Department).
*Frederick H. Carpenter, Ph.D., Professor of Biochemistry.
Charles A. Dekker, Ph.D., Professor of Biochemistry.
David P. Hackett, Ph.D., Professor of Biochemistry.
William Z. Hassid, Ph.D., Professor of Biochemistry.
Choh H. Li, Ph.D., Professor of Biochemistry and Experimental Endocrinology.
John B. Neilands, Ph.D., Professor of Biochemistry.
Jesse C. Rabinowitz, Ph.D., Professor of Biochemistry.
Howard K. Schachman, Ph.D., Professor of Biochemistry and of Molecular Biology.
Esmond E. Snell, Ph.D., Professor of Biochemistry.
Wendell M. Stanley, Ph.D., Sc.D., LL.D., Docteur h.c., Professor of Biochemistry and of Molecular Biology and Director of the Virus Laboratory.
R. David Cole, Ph.D., Associate Professor of Biochemistry.
W. Terry Jenkins, Ph.D., Assistant Professor of Biochemistry.
Jack F. Kirsch, Ph.D., Assistant Professor of Biochemistry.
Raymond C. Valentine, Ph.D., Assistant Professor of Biochemistry.
Clyde D. Willson, Ph.D., Assistant Professor of Biochemistry.
Allan C. Wilson, Ph.D., Assistant Professor of Biochemistry.

C. Arthur Knight, Ph.D., Professor of Molecular Biology.

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 91.

Departmental Major Advisers: Mr. Dekker, Mr. Jenkins.

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, 4 or 1A–1B; Physics 4A–4B; Biology 11A–11B, or Botany 1 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 203). 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 may 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 and 9, or 8L; Mathematics 3A–3B or 16A–16B; Physics 2A–2B, 3A–3B; Biology 11A–11B, or Botany 1, 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 or 110A–110B. 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 206).
Upper Division Courses

100A-100B. General Biochemistry. (3-3) Yr. Mr. Dekker, Mr. Snell
100A. Mr. Dekker.
100B. Mr. Snell.
Prerequisite: Chemistry 8 and 9 or 12 with a grade of C or higher; Chemistry 109 or 110A, a course in biology (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.
101A. Mr. Cole, Mr. Kirsch.
101B. 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. Ballou, Mr. Cole, Mr. Hackett, Mr. Wilson
I. Mr. Cole, Mr. Hackett; II. Mr. Ballou, Mr. A. Wilson.
Prerequisite: Chemistry 8. Recommended: Chemistry 9, 109 and an introductory course in biology. 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. Barker, Mr. Hassid
I. Mr. Barker; II. Mr. Hassid.
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.
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.
Mr. Rabinowitz, Mr. A. Wilson
Prerequisite: courses 100A and 101A.
Biochemical literature and newer developments of the subject.

180. Research. (3-5) I and II.
The Staff (Mr. Cole 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. Dekker in charge)
Reading and conference for properly qualified students under the direction of a member of the staff. Open only to senior students in biochemistry with honor standing.

Graduate Courses

(Concerning conditions for admission to graduate courses, see page 165)
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. 
Mr. Ballou
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.

203. Biochemistry of the Hormones. (2) II. 
Mr. Li
Survey of the biochemistry of the hormones.

204. Biochemistry of Proteins. (2) II. 
Mr. Cole
Prerequisite: course 100A.
Chemistry and metabolism and peptides and proteins.

205. Biochemistry of Nucleic Acids. (2) I. 
Mr. Dekker
Prerequisite: course 100A–100B, or consent of the instructor.
The chemistry and biochemistry of the nucleic acids and their constituents.

206. Physical Biochemistry. (3) I. 
Mr. Schachman
Prerequisite: Chemistry 12 and 112 or 112C, 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.

209. Advanced Biochemical Laboratory Methods. (4) II. 
Mr. Rabinowitz, Mr. Valentine
One lecture and three three-hour laboratory periods per week. Prerequisite: courses 101A or 102L or consent of 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.

212. Enzyme Chemistry Laboratory. (4) I. 
Mr. Jenkins
Prerequisite: course 101A or 102L or consent of instructor.
Experimental methods of enzyme chemistry and biological oxidations.

213. Enzyme Synthesis and Control. (2) II. 
Mr. C. Willson
Prerequisite: course 102 or 100A–100B, or consent of instructor. Recommended: Bacteriology 107 or Genetics 104.
Modern concepts of protein synthesis at a molecular level; information transfer and gene expression; biological regulation, induction, repression, permeation and feedback systems.

214. Mechanisms of Enzyme Action. (2) II. 
Mr. Neilands, Mr. Kirsch
Prerequisite: course 102 or 100A–100B, physical chemistry and advanced organic chemistry, or consent of instructor.
An introduction to current concepts of the mode of action of enzymes. Topics covered include the kinetics and energetics of enzymatic reaction, the structure of active sites, and the catalytic action.

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. Hackett in charge)
Students must enroll for not less than 4 units, except by special permission of the chairman of the department.

* Not to be given, 1964–1965.
290. Seminar. (1) I and II.

Advanced study in various fields of biochemistry. These fields vary from year to year. The program for 1964-1965 will include four sections each semester, each emphasizing a somewhat different area: I. Mr. Hassid, Mr. Snell, Mr. Schachman, Mr. C. Willson; II. Mr. Dekker, Mr. Neilands, Mr. Kirsch, Mr. Valentine.

299. Special Study for Graduate Students. (1-3) I and II.

Reading and conference for properly qualified graduate students in biochemistry 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).
Botany 130 (4), 140 (4).
Chemistry. All upper division courses.
Entomology 110 (3).
Genetics 100 (3), 100C (1), 104 (3).
Molecular Biology 111 (3).
Nutritional Sciences 103 (3), 104 (3), 105 (2), 118A–118B (2–2).
Public Health 160A (3), 160B (3).
Soils and Plant Nutrition 111 (3), 114 (2), 115 (2), 117 (2).

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, Director of the University Herbarium, and Curator of Seed Plant Collections.
Ralph Emerson, Ph.D., Professor of Botany (Acting Chairman of the Department).
Adriance S. Foster, Sc.D., Professor of Botany.
William A. Jensen, Ph.D., Professor of Botany.
*Leonard Machlis, Ph.D., Professor of Botany (Chairman of the Department).
*George F. Papenfuss, Ph.D., Professor of Botany and Curator of Algal Collections.

† Johannes Proskauer, Ph.D., D.Sc., Professor of Botany.
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 and Director of the Botanical Garden, Emeritus.
Herbert L. Mason, Ph.D., Professor of Botany and Director of the University Herbarium, Emeritus.
Roderic B. Park, Ph.D., Associate Professor of Botany.
Daniel Branton, Ph.D., Assistant Professor of Botany.
Melvin S. Fuller, Ph.D., Assistant Professor of Botany.
Watson M. Laetsch, Ph.D., Assistant Professor of Botany.
Robert Ornduff, Ph.D., Assistant Professor of Botany.

Jerome M. Aronson, Ph.D., Lecturer in Botany.
Marion S. Cave, Ph.D., Lecturer in Botany.
Evan C. Evans, III, Ph.D., Lecturer in Botany.
William Z. Lidicker, Jr., Ph.D., Assistant Professor of Zoology and Assistant Curator of Mammals, Museum of Vertebrate Zoology.
James A. McAlear, Ph.D., Lecturer in Botany.
Calvin McMillan, Ph.D., Visiting Associate Professor of Botany.
Paul C. Silva, Ph.D., Lecturer in Botany.
Janet R. Stein, Ph.D., Visiting Assistant Professor of Botany for the spring semester.
Richard C. Strohman, Ph.D., Assistant Professor of Zoology.

Letters and Science List. All undergraduate courses in botany are included in the Letters and Science List of Courses. For regulations governing this list, see page 91.

Departmental Major Adviser: Mr. Foster.
The Major. General Requirements: (a) Botany 1; Chemistry 1A, and 8; Biochemistry 102; Physics 2A–2B; Zoology 1A. Recommended: Elementary courses in other biological sciences; German or French under the foreign language requirement. (b) Botany 100, 110, 120 and 140, and an upper division course in genetics. (c) Completion of field of emphasis I or II, listed below.

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. 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 Program.* 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. Students in the Honors program must pass an oral comprehensive examination.

**Credit Allowance for Lower Division Courses.**

(a) *Biology 11A–11B.* Three units of credit only if either Botany 1 or Botany 10 or Zoology 1A or Zoology 10 have already been completed and then assigned to which ever half is taken in sequence. No credit at all if any two of the preceding courses in any combination have been completed. Botany 1 and/or Zoology 1A may be taken for credit by students who have completed all or part of Biology 11A–11B.

(b) *Botany 1 and Zoology 1A.* Either or both of these courses may be taken for credit regardless of any other lower division courses in Botany or Zoology already completed.

(c) *Botany 10 and Zoology 10.* No credit for Botany 10 if Botany 1 has been completed. No credit for Zoology 10 if Zoology 1A has been completed. No credit for either course if all or part of Biology 11A–11B has been completed.

**GENERAL BIOLOGY**

*Biology 11A–11B. Introduction to the Science of Living Organisms.* (3–3) Yr.

Mr. Laetsch (in charge fall semester),

Mr. Strohman (in charge spring semester)

Lectures and laboratory. To receive credit toward the natural science requirement of the College of Letters and Science, students must take both semesters. See above for credit allowance in relation to other lower division courses.

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.

*Biology 150. General Ecology.* (3) I.

Mr. Lidicker, Mr. McMillan

Prerequisite: Biology 11A–11B; or introductory course in both botany and zoology.

An introduction to the principles of ecology, stressing the structure and dynamics of natural communities on both regional and local bases, and the historical and contemporary influences of man.

**BOTANY**

*Lower Division Courses*

1. *General Botany.* (5) I and II.

Mr. Branton, Mr. Aronson

I: Mr. Branton; II: Mr. Aronson.

Prerequisite: high school or introductory college chemistry. See above for credit allowance in relation to other lower division courses.

Lectures and laboratory. Designed as the basic course in botany for all students of plant or animal science.

An introduction to the principles of biology as illustrated by plants, with emphasis on the structure, activities, and reproduction of the green plants.
10. Plant Biology. (3) I and II. Mr. Aronson, Mr. Fuller
   I: Mr. Aronson; II: Mr. Fuller.
   Lectures and demonstrations. Open without prerequisite to all students and designed for those not specializing in the biological sciences. See above for credit allowance in relation to other lower division courses.
   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 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. Miss Stein

110. Comparative Morphology of Vascular Plants. (4) I.
   Lectures and laboratory. Mr. Foster

112. Plant Anatomy. (4) II.
   Lectures and laboratory. Prerequisite: course 110 and consent of the instructor.
   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.

115. Plants in Relation to Man. (3) I.
   Mr. Ornduff
   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.

*115L. Plants in Relation to Man. (1) II.
   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.

120. Taxonomy of Seed Plants. (4) II.
   Lectures, laboratory, and field work.
   A survey of the spermatophytes, with lectures on phylogeny and classification; laboratory and field work with collection and identification practice.

130. Plant Cytology. (4) I.
   Lectures and laboratory.
   A synthesis of morphological, biochemical, and genetical information on cell function, reproduction, and development.

140. Plant Physiology. (4) II.
   Lectures and laboratory. Prerequisite: Chemistry 1A and 8; Biochemistry 102 or consent of instructor.
   A study of the growth, development, water relations and mineral nutrition of higher plants and plant cells. Designed for students familiar with cellular metabolism at the level of Biochemistry 102.

142. General Plant Physiology. (3) I.
   Lectures and laboratory. Prerequisite: Chemistry 1A and 8.
   A study of the growth, development, water relations, mineral nutrition, and metabolism of plants. Designed for students who have not taken and do not plan to take Biochemistry 102 or an equivalent study of cellular metabolism.

1915. Special Study for Honors Candidates. (1–4) I and II.
   Restricted to junior and senior botany majors. The Staff (Mr. Laetsch in charge)
   * Not to be given, 1964–1965.
199. Special Study for Advanced Undergraduates. (1–4) I and II.

The Staff (Mr. Laetsch in charge)

Restricted to junior and senior honor botany majors.

Graduate Courses

(Open to graduate students and qualified undergraduate students.)

201. Biology of Lower Fungi. (4) II.

Mr. Emerson

Lectures and laboratory. Prerequisite: course 100.
Comparative studies of the development and significance of Myxomycetes, Phycymycetes, and Ascomycetes.


Mr. Fuller

Lectures and laboratory. Prerequisite: course 100. Course 201 recommended but not required. Offered every other year.
Comparative morphology, development, and activities of Basidiomycetes and Fungi Imperfecti.

204. Algology. (4) II.

Lectures and laboratory. Prerequisite: course 100. Offered every other year.
Advanced morphology and taxonomy of the algae.

206. Bryology. (4) I.

Lectures and laboratory. Prerequisite: course 100 and 110. Offered every other year.
A general treatment of the morphology and relationships of the bryophytes.

216. Comparative Subcellular Anatomy. (1) II.

Mr. McAlear

Prerequisite: course 130 or Zoology 107, 107C, or Bacteriology 100 or 104, or Physiology 100A–100B.
Lectures on the comparative fine structure of cells.

220. Advanced Taxonomy. (4) I.

Mr. Constance

Lectures and laboratory. Prerequisite: course 112 and 120. Offered every other year.
A survey of the morphological approaches, research tools, and literature basic to the classification of flowering plants.

224. Evolutionary Ecology. (4) II.

Mr. Baker

Lectures, laboratory, and field trips. Prerequisite: course 120; Genetics 100; an undergraduate course in ecology. Offered every other year.
A study of processes involved in the development and maintenance of ecological adaptation in individuals, populations, and communities.

226. Plant Ecology. (3) II.

Mr. McMillan

Lectures and laboratory. Prerequisite: graduate standing in the biological or geological sciences and consent of instructor.
Reading and discussion in various aspects of plant ecology and the application of ecological principles to world vegetation. Part of the laboratory time will be used for field trips of one to two days duration.

238. Molecular Cytology. (4) I.

Mr. Park

Lectures and laboratory. Prerequisite: consent of instructor. Course 130 or 140 or Biochemistry 102 is recommended as background for this course. Offered every other year.
Lectures and laboratories emphasizing the molecular basis of cytology with particular reference to plant material. Electron microscopic and biochemical techniques are combined to localize metabolic reactions in cells.

242. Physiology of Lower Plants. (2) II.

Prerequisite: course 140. Course 100 recommended. Offered every other year.
An intensive treatment of selected topics on algal, fungal, or lower archegoniate physiology.

* Not to be given, 1964–1965.
§ Approved for one offering only, 1964–1965.
242L. Physiology of Lower Plants. (2) II.
Prerequisite: course 140, 242 (must be taken concurrently), Chemistry 5. Offered every other year.
To accompany course 242.

244. Hormonal Control of Growth and Development. (2) I.
Prerequisite: course 140. Offered every other year.
The effect of plant growth hormones on the growth and development of higher plants.

244L. Hormonal Control of Growth and Development. (2) I.
Prerequisite: course 140, 244 (may be taken concurrently). Offered every other year.
Laboratory to accompany course 244. Techniques for the isolation, assay and use of plant growth hormones.

280. Seminar in Current Research. (No credit) I.
The Staff (Mr. Emerson in charge)
Lectures by members of the faculty on current research interests. Required of all graduate students during their first year of graduate study.

290. Seminar. (1) I and II.
The Staff
Advanced study in various fields of botany. Topics will be announced in advance of each semester. Pre-enrollment with graduate advisers is required. Enrollment for credit in more than one section is permitted.

299. Research. I and II.
The Staff
Credit up to a maximum of 12 units awarded according to work completed.

311. Techniques of Electron Microscopy for Biologists. (2) II. Mr. McAlear
Prerequisite: graduate standing; approval of major professor and consent of instructor.
The purpose of this course is to prepare graduate students in the biological sciences to use electron microscopy in their research.

Botany Colloquium. (No credit) I and II. The Staff (Mr. Laetsch in charge)
Meetings for the presentation of original work by the faculty, visiting lecturers, and graduate students. Graduate students are expected to attend. Botany majors are welcome.

BUSINESS ADMINISTRATION
(Department Office, 113 South Hall)
David A. Alhadeff, Ph.D., Professor of Business Administration.
Hector R. Anton, Ph.D., Professor of Accounting.
Frederick E. Balderston, Ph.D., Professor of Business Administration.
John P. Carter, Ph.D., Professor of Business Administration.
Earl F. Cheit, Ph.D., LL.B., Professor of Business Administration.
Cl. West Churchman, Ph.D., Professor of Business Administration.
John W. Cowee, Ph.D., LL.B., Professor of Business Administration (Chairman of the Department).
Leonard A. Doyle, C.P.A., Ph.D., Professor of Business Administration.
Howard S. Ellis, Ph.D., LL.D., Flood Professor of Economics.
Walter Galenson, C.P.A., Ph.D., Professor of Business Administration.
Joseph W. Garbarino, Ph.D., Professor of Business Administration.
Ewald T. Grether, Ph.D., LL.D., econ. dr. (hon.c.), Flood Professor of Economics.
Richard H. Holton, Ph.D., Professor of Business Administration.

* Not to be given, 1964–1965.
* In residence spring semester only, 1964–1965.
Sidney S. Hoos, Ph.D., Professor of Business Administration, of Agricultural Economics, and of 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.
* Choh-Ming Li, Ph.D., Professor of Business Administration.
Sherman J. Maisel, Ph.D., Professor of Business Administration.
Maurice Moonitz, C.P.A., Ph.D., Professor of Accounting.
Frederic P. Morissett, Ph.D., Professor of Business Administration.
David A. Revzan, Ph.D., Professor of Business Administration.
Arthur M. Ross, Ph.D., Professor of Industrial Relations.
George Strauss, Ph.D., Professor of Business Administration.
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.
Choh-Ming Li, Ph.D., Professor of Business Administration.
Sherman J. Maisel, Ph.D., Professor of Business Administration.
Maurice Moonitz, C.P.A., Ph.D., Professor of Accounting.
Frederic P. Morissett, Ph.D., Professor of Business Administration.
David A. Revzan, Ph.D., Professor of Business Administration.
John T. Wheeler, Ph.D., Professor of Business Administration.
Ira B. Cross, Ph.D., LL.D., Flood Professor of Economics, Emeritus.
Delbert J. Duncan, Ph.D., Professor of Marketing, Emeritus.
Charles C. Staehling, C.P.A., M.S., Professor of Accounting, Emeritus.
Catherine De Motte Quire, Ph.D., Assistant Professor of Accounting, Emeritus.
* K. Roland A. Artle, ekon.dr., Associate Professor of Business Administration.
Alan R. Cerf, C.P.A., Ph.D., Associate Professor of Business Administration.
Norman R. Collins, Ph.D., Associate Professor of Business Administration and of Agricultural Economics.
* Michael Conant, J.D., Ph.D., Associate Professor of Business Law.
Edward A. Feigenbaum, Ph.D., Associate Professor of Business Administration.
Julian Feldman, Ph.D., Associate Professor of Business Administration.
Austin C. Hoggatt, Ph.D., Associate Professor of Business Administration.
* Tillo E. Kuhn, Ph.D., Associate Professor of Business Administration.
C. Bartlett McGuire, M.A., Associate Professor of Business Administration.
† F. Theodore Malm, Ph.D., Associate Professor of Business Administration.
Thomas A. Marschak, Ph.D., Associate Professor of Business Administration.
Richard V. Mattessich, Dr.rer.pol., Associate Professor of Business Administration.
Lee E. Preston, Jr., Ph.D., Associate Professor of Business Administration.
Jack D. Rogers, Ph.D., Associate Professor of Business Administration.

† In residence fall semester only, 1964–1965.
‡ In residence spring semester only, 1964–1965.
Albert H. Schaaf, Ph.D., Associate Professor of Business Administration.
Milo W. Smith, J. D., Associate Professor of Business Law.
George J. Staibus, C.P.A., Ph.D., Associate Professor of Accounting.
D. Gordon Tyndall, Ph.D., Associate Professor of Business Administration.
Richard M. Bailey, D.B.A., Assistant Professor of Business Administration.
L. Vaughn Blankenship, Ph.D., Assistant Professor of Business Administration.
Wayne S. Boutell, C.P.A., Ph.D., Assistant Professor of Business Administration.

Louis P. Bucklin, Ph.D., Assistant Professor of Business Administration.
James M. Carman, Ph.D., Assistant Professor of Business Administration.
Robert Goshay, Ph.D., Assistant Professor of Business Administration.
Jacob P. Michaelson, Ph.D., Assistant Professor of Business Administration.
Raymond E. Miles, Ph.D., Assistant Professor of Business Administration.
Francesco M. Nicosia, Dottore in Economia e Commercio, Ph.D., Assistant Professor of Business Administration.

Gordon Pye, Ph.D., Assistant Professor of Business Administration.
Wallace F. Smith, Ph.D., Assistant Professor of Business Administration.
Herman O. Stekler, Ph.D., Assistant Professor of Business Administration.
John A. Tracy, Ph.D., Assistant Professor of Business Administration.
Roger C. Vergin, Ph.D., Assistant Professor of Business Administration.

Dawson E. Brewer, M.B.A., Acting Assistant Professor of Business Administration.
Eugene W. Burgess, Ph.D., Lecturer in Industrial Relations.
D. Douglas Davies, LL.B., Lecturer in Business Law.
Malcolm Davison, Ph.D., J.D., Professor of Economics.
Frank D. Deromedi, M.B.A., Lecturer in Business Administration.
John Henry Denton, LL.B., Lecturer in Business Administration.
Edwin M. Epstein, LL.B., Lecturer in Business Administration.
Lawrence Fouraker, Ph.D., Visiting Professor of Economics.
William Goldner, Ph.D., Lecturer in Business Administration.
John C. Harsanyi, Ph.D., Visiting Professor of Business Administration for the fall semester.

William M. Keenan, M.S., Acting Assistant Professor of Business Administration.
Endel J. Kolde, D.B.A., Visiting Professor of Business Administration.
Robert F. Love, M.A., Lecturer in Business Administration.
Richard K. Lynn, M.B.A., Lecturer in Business Administration.
Norman P. Monson, M.S., Acting Assistant Professor of Business Administration.

John G. Myers, M.B.A., Acting Assistant Professor of Business Administration.
J. Bruce Neighbor, Ph.D., Lecturer in Business Administration.

* In residence spring semester only, 1964-1965.
Joel Seidman, Ph.D., *Visiting Professor of Business Administration.*  
Leo Spier, D.B.A., *Acting Assistant Professor of Business Administration.*  
Stanley A. Zeff, Ph.D., *Visiting Associate Professor of Business Administration.*  

The requirements for the curriculum in the School of Business Administration are listed on page 95.

*Letters and Science List.* Courses 18, 100, 119 and 150 are included in the Letters and Science List of Courses. For regulations concerning this list, see page 91.

**Lower Division Courses**

**1A–1B. Principles of Accounting.** (3–3) Yr. Beginning each semester.  
The Staff (Mr. Vance in charge)

Two lectures and one two-hour laboratory section per week to be arranged. Prerequisite: at least sophomore standing.

**10. General Accounting.** (3) I and II.  
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.

Accounting principles and procedures.

**18. Business Law: Introduction.** (3) I and II.  
Mr. Stark

Prerequisite: at least sophomore standing. Not open to students planning to enter the School of Business Administration.

Introduction to law; contracts; sales; and agency.

**Upper Division Courses**

Prerequisite: Economics 1A–1B, 2 or equivalent, Mathematics 16A or equivalent and junior standing except where special provision has been made for students in certain curricula.

**100. Economics of Enterprise.** (3) I and II.  
The Staff (Mr. Maisel in charge)

Prerequisite: Not open to students who have taken Economics 100B.

Economic analysis applicable to the problems of business enterprises in the areas of price, output, and utilization of resources; effects of business practices and policy on industry structure, consumers, labor and government.

**101. Business Fluctuations and Forecasting.** (3) I and II.  
The Staff (Mr. Maisel in charge)

Prerequisite: course 100. Not open to students who have taken Economics 100A.

Factors responsible for economic instability; forecasting and other management problems thereby created for the business firm.

**102. Advanced Managerial Economics.** (3) II.  
Mr. McGuire

Prerequisite: course 100 and 101.

Advanced analysis of the theory and practice of decision-making in business firms, utilizing the concepts and techniques of managerial economics.

**103. Theory and Models of Economic Forecasting.** (3) I.  
Mr. Stekler

Prerequisite: course 101.

Theory and analysis of long-run and short-run forecasts of business activity for the economy.
106. Real Estate Law. (3) II.  
Prerequisite: course 180.  
Mr. Denton  
Historical development of the law of real property; estates in land; other legal matters affecting real estate.

109. Legal Aspects of Business Transactions. (3) I and II.  
Prerequisite: course 118.  
Mr. Davies  
A review of the legal implications of certain common business transactions and situations, including problems arising in sales, installment buying, inventory financing, obtaining and extending credit, negotiable instruments and insolvency.

118. Legal Environment of Business. (3) I and II.  
Mr. Smith, Mr. Epstein  
An analysis of the legal processes and techniques of legal reasoning, followed by applications to the law of contracts, sales, agencies, and business organizations.

119. Social and Political Environment of Business. (3) I and II.  
Prerequisite: senior standing. Mr. Cheit, Mr. Grether, Mr. Ross, Mr. Votaw  
Evolution of American business and the changing framework of its operation, responsibilities, and social control. Analysis of current problems in the light of different philosophies of business and changing political and social goals.

120. Industrial Accounting—Measurement, Analysis, and Planning. (2) I.  
Mr. Mattessich  
Prerequisite: senior standing and a satisfactory background in mathematics, statistics and production. Not open to students enrolled in Schools of Business Administration.  
Industrial Accounting as a system of measurement and its use in analyzing, planning and controlling the operations of industrial enterprises.

120L. Industrial Accounting—Measurement, Analysis, and Planning. (1) I.  
May be taken with course 120 or subsequently. Mr. Mattessich  
Laboratory. Systematic work in accounting data processing and analysis. Comparison of manual and machine accounting, including electronic data processing. Supervised problem work or field trip.

121A–121B. Advanced Accounting. (3–3) Yr. Beginning each semester.  
Mr. Moonitz, Mr. Mattessich, Mr. Tracy, Mr. Zeff, Mr. Staibus  
A two-hour laboratory period per week to be arranged. Prerequisite: course 1A–1B. Required for those specializing in accounting.  
Advanced theory of accounts and its application. Selected problems and reading.

122. Cost Accounting. (3) I and II.  
Mr. Tracy, Mr. Cerf, Mr. Staibus  
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 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, ethical, legal, and other aspects of the public accountant's work.

124. Budgetary Control and Accounting Systems. (3) I and II.  
Mr. Boutell  
Prerequisite: course 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.

126. Problems of Financial Reporting. (3) I.  
Mr. Moonitz  
Prerequisite: course 121A–121B.  
Consolidated statements, funds statements, index numbers in accounting, special problems.
131. Corporation Finance. (3) I and II.
Prerequisite: course 1A–1B. Mr. Brewer, Mr. Carter, M. Keenan, M. Monson
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.
Prerequisite: course 1A–1B, 131, and consent of instructor. Not open to students who
have taken course 126. Should not be elected by students specializing in accounting.

133. Investments. (3) I and II.
Mr. Lynn, ———
Prerequisite: course 131.
Sources of, and demand for, investment capital; operations of security markets; determination
of investment policy; and current procedures for analysis of securities.

135. Risk Management for Business Firms. (3) I
Mr. Goshay
Prerequisite: course 137.
Economic risk and business management's alternatives in dealing with it.

136. Life Insurance. (3) II.
Mr. Goshay
Prerequisite: course 137.
A nontechnical study of theory and practice.

137. Economics of Insurance. (3) I and II.
Mr. Goshay
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.

140. Production Organization and Management. (3) I and II.
Mr. Deromedi, Mr. Rogers, Mr. Van Gigch, Mr. Love, Mr. Vergin
Primarily for juniors.
Theory and practice of production management; internal organization; physical facili-
ties; product development; materials control; production control; production standards;
managerial controls.

141. Facilities Planning. (3) I.
Mr. Vergin
Prerequisite: course 140.
Economic and administrative aspects of the conception and establishment of industrial facilities.

142. Production Planning and Control. (3) II.
Mr. Vergin
Prerequisite: course 140. Recommended: course 145.
Production planning and budgeting; development of the production control system;
control of production quantity; quantity control; measurement of production efficiency.

145. Industrial Procurement. (3) II.
Mr. Preston
Prerequisite: course 160.
The problems met in purchasing by industrial organizations. Major buying policies,
sources of material, quantity and quality, and the relation to price and production cost.

150. Industrial Relations. (3) I and II. Mr. Garbarino, Mr. Malm, Mr. Miles,
Mr. Strauss, Mr. Ross, Mr. Seidman
Students will not receive credit for both Economics 150 and course 150.
Labor-management issues, 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. Miles, Mr. Neighbor, Mr. Strauss
Prerequisite: course 150 or Economics 150, or consent of instructor.
Personnel policies and procedures, with special attention to the structure of personal
relationships within the enterprise; development and administration of the wage structure
of a firm.

* Not to be given, 1964–1965.
152. Collective Bargaining Systems. (3) I.  
Mr. Seidman  
Prerequisite: course 150 or Economics 150.  

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.

160. Marketing. (3) I and II.  
Mr. Myers, Mr. Carman, Mr. Nicosia  
The evolution of markets and marketing; market structure, organization and behavior; marketing functions; pricing and price policy; marketing costs and efficiency; public and private regulations.

161. Principles and Problems of International Business. (3) I and II.  
Mr. Kolde  
Theories of geographical specialization of production; commercial policies and their impact on international business; regionalization of world markets; foreign market analysis for a firm; design strategy for entering and operating in foreign markets; organizational and managerial problems of international operations.

162. Retail Store Management. (3) I and II.  
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; the internal structure and problems of store management; trends; government regulation.

163. Advertising. (3) I and II.  
Mr. Nicosia, Mr. Myers  
Prerequisite: course 160.  
Basic concepts of advertising. Study of the English used. The evaluation of types of media used. Study of underlying psychology.

165. Sales Analysis and Sales Management. (3) I and II.  
Mr. Bucklin  
Prerequisite: course 160.  
Sales analysis and forecasting; organization of sales department; planning and policy determination; supervising sales force; territorial analysis; cost analysis, business and economic appraisal.

166. Wholesaling. (3) I.  
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; costs and profits, and efficiency.

169. Marketing Policies and Problems. (3) II.  
Mr. Collins  
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.

Mr. Zettel  
Prerequisite: 170A not prerequisite to 170B. National transportation policy evaluated in the light of the demand for and cost of the service, the structure of government agencies, the construction market pattern, and the problems induced by technological innovation.

175. Public Utilities. (3) I.  
The basis of control, administration and judicial machinery employed, problems of service, price, competition, and monopoly.

* Not to be given, 1964–1965.
179. Contemporary Problems in Transportation. (3) II. Mr. Carter
Selected topics of current interest in transportation: new developments in transportation legislation and policy; the shifting demand for transportation; innovation in analysis and technology; urban transport problems.

180. Introduction to Real Estate and Urban Land Economics. (3) I and II. Mr. W. Smith, Mr. Schaaf
The nature of real property; urban land utilization; classification of property rights; urban development; real property valuation; the real estate market; the real estate business; government regulation.

181. Valuation of Real Property. (3) I and II. Mr. Denton, Mr. W. Smith
Prerequisite: course 180.
Land valuation; factors influencing real estate values and income; trends in real property values and appraisal procedures in the urban real estate market.

183. The Management of Real Estate Resources. (3) II. Mr. Schaaf
Prerequisite: course 180.
Advanced analysis of real estate markets with emphasis on finance, investment, urban growth, and public policy. Allocation of financial resources; investment criteria; locational decisions; public policies in housing and urban development.

185. International Financial Markets and Mechanisms. (3) I and II. Mr. Ellis, Mr. Holton
Analysis of the mechanism for international flow of short-term funds and long-term capital: the spot exchange market, acceptance market, forward exchange market, inter-market clearing and the gold market. International liquidity: problems; exchange-rate policies; government intervention; developments of international monetary cooperation.

186. An Introduction to International Business Environment. (3) I and II. Mr. Spier
Prerequisite: course 161.
A framework for relating the complex social-behavioral structures to international operations; physical and economic environments; cultural environments; religious, political and ethnic environments; their interaction in international-business behavior.

190. Organization and Administration. (3) I and II. Mr. Blankenship, Mr. Harsanyi, Mr. Jastram, Mr. Feldman, Mr. Hoggatt, Mr. Marschak, Mr. Strauss, Mr. McGuire
Organizational environment and other influences: objectives. Formal organization structures; planning and control. Informal organizations; groups, leaders, and behavior standards; communication.

191. Management Problems and Policies. (3) II. Mr. Balderston
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.

193. Introduction to Operations Research. (3) I and II. Mr. McGuire,
Prerequisite: Mathematics 3A–3B, Statistics 130A–130B, or equivalent and junior standing.
Introduction to the history, practice, and nature of operations research; formulation of the problem; measuring costs; forecasting by probabilities. 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 GRADUATE SCHOOL OF BUSINESS ADMINISTRATION.

100G. Quantitative Methods and Their Use in Business Operation. (6) I and II.
Mr. Devine, Mr. Doyle, 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. Maisel, Mr. Fouraker, Mr. Artle

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.
Prerequisite: two years of high school algebra or the equivalent.
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. Devine, Mr. Mattessich, Mr. Doyle, Mr. Tracy, 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.

121G. Advanced Accounting. (3) I and II.
Prerequisite: 1A–1B or 120G or equivalent. Not open to students who have taken course 121A–121B.

Intensive study of the theory of accounts and its application; valuation of assets and liabilities, income determination, selected problems and readings in various phases of accounting procedure; financial accounting problems of corporations.

131G. Financial Policies of Business. (3) I and II.
Prerequisite: course 120G or equivalent.
Mr. Brewer, Mr. Keenan

Business finance, with emphasis upon financial problems and policies of corporations; 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. Devine, Mr. Doyle, Mr. Rogers, Mr. Vatter

Principles of organization and production management; emphasis 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.
Prerequisite: course 100G or equivalent. Mr. Garbarino, Mr. Miles, Mr. Malm
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.
Prerequisite: course 100G or equivalent. Mr. Preston, Mr. Carman
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 165)

203. Business Forecasting: Techniques and Applications. (3) II.
Prerequisite: course 101 or 100G or 101G. Mr. Maisel
Consideration of the techniques of long and short-run forecasts of business activity both for the economy and for firms and industries. Examination of typical models, data problems, and other projection requirements. Problems and examples in particular forecasts.

210. Seminar in Application of Digital Computers to Problems in the Social Sciences. (3) I and II. Mr. Feldman, ———
Prerequisite: consent of instructor.
Problems and projects in the computer simulation of economic and industrial processes, thinking and learning processes, and neural processes. Consideration of problems of artificial intelligence, mechanical linguistics and information retrieval.

222A. Seminar in Controllership. (3) I and II. Mr. Wheeler, ———
Prerequisite: course 121A–121B, 122.
Cost accounting practice from the viewpoint of the theory and objectives of cost analysis. The relations between cost accounting, statistics, economic theory and management philosophy.

222B. Seminar in Controllership. (3) II. Mr. Wheeler
Prerequisite: course 121A–121B, 122.
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: course 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. Mr. Vance
Prerequisite: course 123.
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) II.  
Mr. M. Smith  
Prerequisite: courses 121A–121B, 228A.  
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.  
Mr. Anton, Mr. Moonitz  
229A. 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. 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. Michaelson  
Prerequisite: Economics 135.  

*232. Money Markets and Capital Markets. (3) I and II.  
Mr. W. Martin  
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 private institutions. The influence of government financial operations and regulations.

233A. Securities Markets and Investment Policies. (3) I and II.  
Mr. W. Martin  
Prerequisite: course 133 or consent of the instructor.  

233B. Security Analysis and Selected Investment Problems. (3) I and II.  
Mr. W. Martin  
Prerequisite: 233A or consent of the instructor.  
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; special emphasis upon the financing of expansion.

239. Seminar in Insurance. (3) I and II.  
Mr. Cowee  
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.

241. Facilities Planning and Production Control. (3) I.  
Mr. Vergin  
Prerequisite: graduate standing.  
Nature of production planning and control; general and specific problems; application of modern analytical methods. Emphasis is placed on applications of modern analytical methods in the solution of practical production problems.

242. Analysis of Production Management Problems. (3) I.  
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. Rogers
Open to graduate students in business administration, economics, and engineering.

255. Seminar in Industrial Relations. (3) I. 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. Seidman
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. Strauss, Mr. Burgess
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. Ulman, Mr. Galenson

260. Advanced Marketing. (3) I and II. Mr. Bucklin
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.

261A-261B. Theories and Problems of International Business. (3–) Yr. Mr. Kolde
Prerequisite: course 161 and 185, or consent of instructor.
Tools of analysis applicable to problems of international business; case studies, designed to develop problem-solving skills, taking into account the different business environments, as well as to identify analytical problems such as location for multinational firms with or without multiproducts.

262. Retailing Policies and Problems. (3) I. Mr. Revzan
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. Mr. Nicosia
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) 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: graduate standing
Nature and significance of marketing research; development of marketing research methods; investigation and analysis of specific marketing research projects including case 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. 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

280. Real Estate and Urban Land Economics. (3) I and II.

Mr. Maisel, Mr. Schaal
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.

286. Seminar in International Business. (3) I and II. Mr. Spier, Mr. Ellis

Prerequisite: course 261A-261B, or consent of instructor.
International cartel arrangements and commodity agreements: stabilization and factor-movement effects, and market structures. Comparative studies of regionalized world markets: characteristics of organization, the state of development of their economies and political and social institutions, and the effects on international business.

289. Seminar in Real Estate and Urban Land Economics. (3) II. Mr. Maisel

Analysis of selected problems and special studies; cases in residential, commercial, and industrial real estate financing, investment, and development, 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. Wheeler, Mr. Blankenship, Mr. Feldman, Mr. McGuire, Mr. Marschak
The determination of business objectives, policy formulation, planning, executive staffing, organization, direction, and management controls. Special emphasis on the theory of organization, business leadership, and decision-making.

291. Seminar in Business Policy. (3) I and II. Mr. Jastram, Mr. Balderston
A study of business problems and the formulation of policies to meet these problems from the viewpoint of a top-management executive committee. The objective is to develop skill in the formulation of policy in particular functions and for enterprises as a whole.

292. Development of a Scientific Approach to Management. (3) II.

293. Seminar in Operations Research. (3) II.

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) I and II.
Prerequisite: course 193 or equivalent.
Analysis of inventory and scheduling problems, including formulation of management approaches to solutions, attention to the techniques of formal analysis, and comparison of applications in various industries.

297. Business Research Methods. (3) I and II.
Prerequisite: graduate standing. Mr. Blankenship, Mr. Jastram, Mr. Feldman
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.

298. Seminar in Business Administration. (3) I and II.
Prerequisite: graduate standing. Mr. Marschak, Mr. Harsanyi
Advanced study in various fields of business administration. Topics will vary from year to year and will be announced at the beginning of each semester.

299. Research in Business Problems. (1–6) I and II.
The Staff (Mr. Morrissey in charge)

CELL PHYSIOLOGY

(Department Office, 251 Hilgard Hall)
Daniel I. Arnon, Ph.D., Professor of Cell Physiology (Chairman of the Department).

Frederick R. Whatley, Ph.D., Lecturer in Cell Physiology.
This department provides facilities and accepts graduate students for research leading to the M.S. and Ph.D. degrees in three interdepartmental graduate curricula: biophysics, comparative biochemistry, and plant physiology.

Graduate Research

299. Research. (1–9) I and II. The Staff (Mr. Arnon in charge)
Prerequisite: consent of instructor.
See Plant Nutrition (page 573) for description of the following course offered by staff members of the Department of Cell Physiology: Plant Nutrition 222. Unifying Concepts of Photosynthesis. (2) I.

CHEMICAL ENGINEERING

(Department Office, 105 Gilman Hall)
Michel Boudart, Ph.D., Professor of Chemical Engineering.
LeRoy A. Bromley, Ph.D., Professor of Chemical Engineering.
Donald N. Hanson, Ph.D., Professor of Chemical Engineering (Chairman of the Department).
Eugene E. Petersen, Ph.D., Professor of Chemical Engineering.
John M. Prausnitz, 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.
Richard J. Ayen, Ph.D., Assistant Professor of Chemical Engineering.
Alan S. Foss, Ph.D., Assistant Professor of Chemical Engineering.
Simon L. Goren, Ph.D., Assistant Professor of Chemical Engineering.
Edward A. Grens, Ph.D., Assistant Professor of Chemical Engineering.
C. Judson King, Ph.D., Assistant Professor of Chemical Engineering.
John S. Newman, Ph.D., Assistant Professor of Chemical Engineering.
Richard A. Wallace, Ph.D., Assistant Professor of Chemical Engineering.

E. Morse Blue, M.S., Lecturer in Chemical Engineering.
David N. Lyon, Ph.D., Lecturer in Chemical Engineering.
Charles F. Oldershaw, M.S., Lecturer in Chemical Engineering.
Otto Redlich, Ph.D., Lecturer in Chemical Engineering.

Degree Requirement. For curriculum for the Bachelor of Science degree in chemical engineering, see under College of Chemistry, page 68.

Higher Degrees. See the ANNOUNCEMENT OF THE GRADUATE DIVISION, BERKELEY.

Upper Division Courses

143. Introduction to Chemical Engineering. (3) I and II.

Mr. Bromley, Mr. Greens, Mr. Tobias
Prerequisite: Chemistry 109 or 110A or Mechanical Engineering 105A (may be taken concurrently).
Material and energy balances, introduction to thermodynamic concepts. Application to industrial problems.

144. Chemical Engineering Thermodynamics. (3) I and II.

Mr. Tobias, Mr. Prausnitz, Mr. Lyon
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 multi-component systems; critical phenomena; reaction energetics and equilibria.

145A. Unit Operations Laboratory. (2) I and II.

Mr. Ayen, Mr. Greens, Mr. Wallace, Mr. Foss
Prerequisite: course 146A, Mechanical Engineering 107 (may be taken concurrently), English 1A or Speech 1A, or Speech 26 with a grade of C or higher.
Experiments on fluid mechanics and heat transfer problems in chemical process equipment. Emphasis on experimental investigations of basic relationships of fundamental importance to the engineer. Experimental design, analysis of results, and preparation of engineering reports are stressed.

145B. Unit Operations Laboratory. (2) I and II.

Mr. Ayen, Mr. Greens, Mr. Wallace, Mr. Foss
Prerequisite: course 145A, 146A, 146B, 146C.
Continuation of 145A. Experiments in mass transfer, simultaneous heat and mass transfer and special separation techniques.
145C. Unit Operations Laboratory. (2) I and II.

Mr. Ayen, Mr. Grens, Mr. Wallace

Prerequisite: course 145B (may be taken concurrently). An elective course for second semester seniors and graduate students in chemical engineering.

A semester project comprising an engineering study of a unit operation or related topic. Involves design and construction of apparatus, execution of experiments, analysis of data, oral and written reports.

146A. Chemical Engineering Unit Operations. (3) I and II.

Mr. Newman, Mr. Bromley

Prerequisite: Chemistry 110B (may be taken concurrently); course 143 (with a grade of C or higher), or consent of the instructor.

Elementary fluid mechanics and heat transfer and their application to chemical engineering problems.

146B. Chemical Engineering Unit Operations. (2) I and II. Mr. Hanson

Prerequisite: course 143, 146A (may be taken concurrently), or consent of the instructor.

Principles of equilibrium stage separation processes. Multistage calculation techniques for distillation, absorption, and extraction. Column design.

146C. Chemical Engineering Unit Operations. (2) I and II.

Mr. Wilke, Mr. Bromley

Prerequisite: course 146A, 146B (may be taken concurrently).

Mass transfer theory and its application to separation processes. Design principles for countercurrent differential contacting operations.

146D. Chemical Engineering Unit Operations. (2) II. Mr. Gore

Prerequisite: course 146A or consent of the instructor.

Production and separation of particulate systems in force and flow fields. Application of surface phenomena to chemical engineering problems.

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).

Analysis and prediction of rates of chemical conversion in flow and nonflow processes, including catalytic systems.

148. Industrial Kinetics Laboratory. (2) I and II.

Mr. Vermeulen

Prerequisite: course 147 (with a grade of C or better), 146A; or consent of the instructor.

Planning and conduct of bench-scale experiments relating chemical conversion to processing conditions.

149–149H. Design of Chemical Process Plants. (3–3) I and II.

Prerequisite: course 144, 146A, 146B, 146C.

Mr. Blue, Mr. Oldershaw

Sources of data and design principles. Individual and team study of selected plant design and process evaluation problems.

152. Principles of Inorganic and Electrochemical Processes. (3) I and II.

Prerequisite: courses 143 and 144 with a grade of C or better.

Mr. Redlich


180H. Research in Chemical Engineering. (2–6) I and II.

The Staff (Mr. Connick in charge)

Prerequisite: course 146C. 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.

† Chemical Engineering 146B completed prior to the fall semester 1962, will satisfy the requirements of Chemical Engineering 146B and 146C.
185. Special Laboratory Study. (2 or 3) I and II.

   The Staff (Mr. Hanson in charge)

   Prerequisite: course 145C and 148 or consent of instructor.
   Special laboratory work for advanced undergraduates.

199. Special Study for Advanced Undergraduates. (1-3) I and II.

   The Staff (Mr. Tobias in charge)

   Independent study on theoretical or computational problems.

Graduate Courses

Chemical Engineering 146A, 146B, 146C or equivalent is prerequisite to all courses in this group.

243. Theoretical Methods in Chemical Engineering. (3) I. Mr. Goren

   Prerequisite: open to senior honor students with 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. King

   General theory and application of multistage separation processes. Particular consideration to design methods for binary and multicomponent distillation.

245. Diffusional Operations. (2) I. Mr. King

   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 efficiency, diffusion and chemical reaction, equipment-design methods.

246. Phase Equilibria. (2) I. Mr. Prausnitz

   Prerequisite: course 144 and 146C or equivalent.
   Thermodynamics and intermolecular forces of multicomponent systems. Application to separation operations such as extraction, high-pressure absorption, and extractive distillation.

247. Chemical Reactor Design. (2) II. Mr. Petersen

   Prerequisite: courses 146A, 146C, 147, and 243 or former course, 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 heterogeneous reactions in fixed and fluidized beds.

248. Applied Chemical Kinetics. (2) I.

   Prerequisite: course 147 or equivalent, or consent of the instructor. Open to senior honor students with consent of the instructor. Open and catalytic reactions sequences. Steady-state approximation and rate-determining step. Branched chains and explosions. Kinetic analysis of complex processes.

249. Special Study for Graduate Students in Chemical Engineering. (1-6) I and II.

   The Staff (Mr. Prausnitz in charge)

   Independent study on theoretical or computational problems.

250. Research in Chemical Engineering. (1-9) I and II.

   The Staff (Mr. Hanson in charge)

251. Chemical Process Dynamics. (2) II. Mr. Foss

   Prerequisite: studies in the application of differential equations to physical problems or consent of instructor.
   Study of the unsteady-state behavior of the physical and chemical processes of the chemical industry. Analyses of process control techniques. Emphasis on formulating the interplay of physical and chemical phenomena in dynamic chemical systems.
**CHEMICAL ENGINEERING**

*252. Principles of Electrochemical Engineering. (2) II. Mr. Tobias
Prerequisite: courses 144, 146C, Chemistry 104 or course 152.
Electrode processes in electrolysis and in galvanic cells. Theory of potential, ionic mass transport, and electrode kinetics.

253. Transport Phenomena. (3) II. Mr. Newman
Prerequisite: course 146C, 243, or consent of the instructor. Open to senior honor students with consent of the instructor.
Formulation and rigorous analysis of the laws governing the transport of momentum, heat, and mass with special emphasis on the chemical engineering applications. Detailed investigation of laminar flows. Hydrodynamic stability.

*255. Nuclear Chemical Engineering. (2) I.
Prerequisite: open to undergraduates with consent of the instructor.
Chemical processing methods for nuclear materials, including solvent extraction and high temperature techniques; isotope separation by gaseous diffusion and other special processes.

256. Cryogenic Engineering. (2) I. Mr. Lyon
Prerequisite: course 144, 146A and 146C or equivalent.
Gas liquefaction and separation; magnetic cooling; transport properties of substances at low temperatures; cryogenic techniques in chemical processes.

*257. Seminar in Petroleum Processing. (2 or 3) I. Mr. Wilke
Prerequisite: course 146B or consent of the instructor.
Modern petroleum refinery practice. Technology of petroleum processing with emphasis on chemical conversion processes. Plant operation. Study of factors which determine plan of processing in a petroleum refinery.

260. Seminar in Chemical Engineering. (1–4) I and II.
Open to properly qualified graduate students. The Staff (Mr. Hanson in charge)
Lectures, reports, and discussions on current research in chemical engineering. Several sections are offered each semester.

290. Advanced Graduate Study in Chemical Engineering.
Open to properly qualified graduate students. The Staff (Mr. Hanson in charge)
Current and advanced study in chemical engineering, primarily for advanced graduate students.

290A. Kinetics in Combustion. (2) I. Mr. Petersen
290B. Statistical Mechanics and Phase Equilibria. (2) II. Mr. Prausnitz
290C. Equilibria and Rate Processes in Electrochemical Systems. (2) I.
Mr. Tobias, Mr. Newman
290D. Electrochemical Energy Conversion. (2) II.
Mr. Tobias, Mr. Newman
290E. Computational Methods in Chemical Engineering. (2) II.
Mr. Grens
290F. Fixed-Bed Operations. (2) I. Mr. Vermeulen
290G. Biochemical Engineering. (2) II. Mr. Wilke
290H. Kinetics Theory of Transport Processes. (2) I and II. Mr. Goren
290I. Design and Engineering of Integrated Chemical Process Systems. (3) II.
Mr. King
290J. Electrical Separation Techniques. (2) II. Mr. Hanson
290K. Optimization in Chemical Process Design. (2) I.
Mr. King
290L. High Polymer Processes. (2) I.
Mr. Wallace

* Not to be given, 1964–1965.
Colloquium and Graduate Seminar. (No Credit)

Members of the instructing staff and graduate students meet once a week to discuss investigations presented by invited speakers and Ph.D. candidates in the department.

Research Conference. (Jointly with the Department of Chemistry) (No Credit)

Members of the instructing staff and students engaged in graduate research meet once a week to discuss the various investigations in progress in the laboratory.

**CHEMISTRY**

(Department Office, 419 Latimer Hall)

Leo Brewer, Ph.D., Professor of Chemistry.

Melvin Calvin, Ph.D., Sc.D., Professor of Chemistry and Director of the Chemical Biodynamics Laboratory.

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 D. Gwinn, Ph.D., Professor of Chemistry.

Harold S. Johnston, Ph.D., Professor of Chemistry.

William L. Jolly, Ph.D., Professor of Chemistry.

George Jura, Ph.D., Professor of Chemistry.

Rollie J. Myers, Ph.D., Professor of Chemistry.

Donald S. Noyce, Ph.D., Professor of Chemistry.

Chester T. O’Konski, Ph.D., Professor of Chemistry.

Edwin F. 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.

Richard E. Powell, Ph.D., Professor of Chemistry (Chairman of the Department).

Henry Rapoport, Ph.D., Professor of Chemistry.

John O. Rasmussen, 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.

Andrew Streitwieser, Jr., Ph.D., Professor of Chemistry.

David H. Templeton, Ph.D., Professor of Chemistry.

William F. Giauque, Ph.D., Sc.D., LL.D., Professor of Chemistry, Emeritus.

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.

Bruce H. Mahan, Ph.D., Associate Professor of Chemistry.

*Samuel S. Markowitz, Ph.D., Associate Professor of Chemistry.

Norman E. Phillips, Ph.D., Associate Professor of Chemistry.

David A. Shirley, Ph.D., Associate Professor of Chemistry.


Margaret J. Jorgenson, Ph.D., Lecturer in Chemistry.
Charles W. Koch, Ph.D., Lecturer in Analytical 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 91.

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 the Dean’s office, 420 Latimer 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 or in the College of Letters and Science with a major in chemistry (see pages 67, 86). In order to decide between the two alternatives, the student may note that the College of Letters and Science has certain general requirements outside the major, while the curriculum of the College of Chemistry has somewhat different requirements 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 67.

Letters and Science Major Advisers: Mr. O’Konski and Mr. Tinoco.

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, 120; Mathematics 3A, 3B, 4A (or 1A–1B); 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 (or 2A), additional courses in chemistry, and a reading knowledge of German. Chemistry majors may count all units in chemistry in excess of 13 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 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, Berkeley.

Lower Division Courses

1A. General Chemistry. (5) I and II.
Mr. Burlingame, Mr. Cerny, Mr. Connick, Mr. Gwinn, Mr. Harris, Mr. Hearst, Mr. Johnston, Mr. Jolly, Mr. Jura, Mr. Kirtman, Mr. Moore, Mr. Myers, Mr. O’Konski, Mr. Powell, Mr. Rasmussen, Mr. Sauer, Mr. Sederholm, Mr. Shirley, Mr. Strauss, Mr. Street, Mr. Tinoco, Mr. Williamson
Lectures and laboratory (I: Mr. Powell, Mr. Sederholm; II: Mr. Williamson).
Prerequisite: high school chemistry or high grades in high school physics and Mathematics.

1B. General Chemistry, Qualitative Analysis. (5) I and II.
Mr. Burlingame, Mr. Cerny, Mr. Connick, Mr. Gwinn, Mr. Harris, Mr. Hearst, Mr. Johnston, Mr. Jolly, Mr. Jura, Mr. Kirtman, Mr. Moore, Mr. Myers, Mr. O’Konski, Mr. Perlman, Mr. Powell, Mr. Rasmussen, Mr. Sauer, Mr. Sederholm, Mr. Shirley, Mr. Strauss, Mr. Street, Mr. Tinoco, Mr. Williamson
Lectures and laboratory (I: Mr. Williamson; II: Mr. Powell, Mr. Sederholm).
Prerequisite: course 1A.

4A–4B. General Chemistry. (5–5) Yr.
Mr. Mahan
Prerequisite: high school chemistry, Mathematics 3A or 1A, 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

Lectures and laboratory. Prerequisite: course 1B with a grade of C or higher.
In the fall semester a special section (lecture section 1, laboratory sections 1 and 4) will be organized for chemistry majors.

8. A Short Survey of Organic Chemistry. (4) I and II.

Mr. Calvin, Mrs. Jorgenson

Three lectures and one three-hour laboratory period per week.
Prerequisite: course 1A or 4A.
For students not majoring in chemistry, and not planning to take additional courses in organic chemistry. A survey of the important classes of organic compounds, with emphasis upon materials of interest to students of the biological sciences. Recommended for students in curricula requiring 4 units of organic chemistry.

8L. Survey of Organic Chemistry, with Greater Emphasis on Laboratory Work. (5) I and II.

Mr. Calvin, Mr. Scherer

Lectures and laboratory.
Prerequisite: course 1B or 4B with a grade of C or higher.
Equivalent to Chemistry 8 plus one additional laboratory period per week. This course will place greater emphasis on the identification of organic compounds, and substitutes for the former courses 8 and 9. Recommended for students in curricula requiring 5 units of organic chemistry.

9. Organic Chemistry—Supplementary Laboratory. (3) I.

Mr. Sherer

Prerequisite: course 1B or 4B with grade of C or higher, and 8.
Laboratory work (6 hours a week) and one lecture, designed to follow a one-semester course in organic chemistry which included a minimum of laboratory work or none. Students who have completed course 8L cannot receive credit for course 9: Students who completed course 8 after September, 1962, will receive only 1 unit of credit for course 9.


12. Organic Chemistry. (5) I and II.

Mr. Rapoport, Mr. Jensen, Mr. Griffin,——

Lectures (I: Mr. Rapoport; II: Mr. Jensen).
Lectures and laboratory work for students whose major is chemistry or a closely related field such as biochemistry or chemical engineering. This course will normally be followed by course 112 or 112C. Introduction to the general theory of organic chemistry and the chemistry of aliphatic compounds.
Prerequisite: course 1B or 4B with a grade of C or higher. Students with 3 units of credit in organic chemistry (course 8 taken prior to September 1962) may receive 2 units of credit for course 12. Students with 4 units of credit in organic chemistry (course 8 taken after September 1962) may receive only 1 unit of credit for course 12.

Upper Division Courses

104. Inorganic Chemistry. (3) II.

Mr. Jolly

Prerequisite: course 5 or 4B, and 110A.
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 or 4B, and 110A.

106. Synthetic Inorganic Chemistry. (3) I and II.

Mr. Brewer, Mr. Jolly

Lecture and laboratory. Prerequisite: course 5 or 4B, and 110A.

109. Physical Chemistry—Brief Course. (3) I.

Mr. Sauer

Prerequisite: course 5 or 4B and one year of college physics. Primarily for nonchemistry majors.
110A–110B. Physical Chemistry. (3–3) Yr. Beginning each semester.
Mr. Hearst, Mr. Johnston, Mr. Jura, Mr. O'Konski, Mr. Shirley,
Mr. Street, Mr. Templeton, Mr. Rasmussen
Lectures 110A: I: Mr. Hearst, Mr. Street, Mr. Templeton; II: Mr. Jura, Mr. Johnston,
Mr. Rasmussen.
Lectures 110B: I: Mr. Shirley, Mr. O'Konski; II: Mr. Hearst, Mr. Street, Mr. Templeton.
Prerequisite: Mathematics 4A or 1B, Physics 4B, and course 5 or 4B, or junior standing in
a curriculum in physical science or engineering.

111. Physical Chemistry—Laboratory. (3) I and II.
Mr. Jura, Mr. O'Konski, Mr. Sauer, Mr. Tinoco
Prerequisite: courses 5 or 4B 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. Griffin
Lectures and laboratory.
Prerequisite: course 12; or, with consent of the instructor, course 8L or courses 8 and 9.
Introduction to the chemistry of aromatic and heterocyclic compounds. Simple enolate
condensations.

112C. Organic Chemistry. (3) I and II.
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. Thermodynamics. (3) I and II.
Mr. Shirley, Mr. Phillips, Mr. Brewer
Prerequisite: course 5 or 4B, 110A–110B; Physics 4C or the equivalent; familiarity
with differential and integral calculus; and honors standing.
The principles of thermodynamics; applications to phase transformations, chemical
equilibrium, solutions, and problems involving electromagnetic and gravitational fields.
Introduction to statistical thermodynamics of independent particles; the Boltzmann dis-
tribution, calculation of thermodynamic properties from molecular data.

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 bioorganic or inorganic chemistry.

117H. Quantum Theory I. (3) I and II.
Mr. Gwinn, Mr. Strauss
Prerequisite: course 110A–110B; also recommended: differential equations or advanced
calculus, atomic physics.
Introduction to quantum theory. Elementary application to atoms and molecules.

120. Advanced Inorganic Chemistry. (3) II.
Mr. Connick
Lecture and laboratory. Prerequisite: courses 5 or 4B, 104 or 105, and 109 or 110A.

121. Molecular Structure and Chemical Bonds. (3) I.
Mr. Myers
Prerequisite: course 110B.
The study of chemical bonding and structure by physical methods: rotational, vibra-
tional and electronic spectra; nuclear magnetic resonance; quadruple coupling; and X-ray
diffraction.

123. Nuclear Chemistry. (2) I.
Mr. Perlman
Prerequisite: senior standing.

*125. Chemical Instrumentation. (1) II.
Lectures.
Prerequisite: course 111.

* Not to be given, 1964–1965.
125L. Chemical Instrumentation Laboratory. (1-3) II.
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. Physical Organic Chemistry. (3) I.
Prerequisite: course 112, 109 or 110A; and a reading knowledge of German. Chemistry 110B is recommended.
Applications of modern theoretical concepts to the chemical and physical properties of organic compounds, kinetics and mechanism of organic reactions.

128. Organic Chemistry—Analytical Methods. (3) I and II.
Lecture and laboratory. Prerequisite: courses 5 or 4B and 112.

129. Organic Chemistry—Synthetic Methods. (3) I and II.
Lecture and laboratory. Prerequisite: a reading knowledge of German; course 128 and consent of the instructor.

180H. Research. (2-15) I and II.
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.
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.

190. Special Topics. (2) I and II.
Prerequisite: consent of the instructor.
Special topics will be offered from time to time. Examples are: heterogeneous equilibria, chemistry of surfaces and colloids, X-ray crystallography.

199. Special Study for Advanced Undergraduates. (1-3) I and II.
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 165)

206. Organic Chemistry. (3) II.
Prerequisite: course 206.
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.
Prerequisite: course 206.
The chemistry of heterocyclic compounds, with emphasis on those of natural origin.

* Not to be given, 1964–1965.
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.
Kinetics and mechanism of organic reactions; mechanism of rearrangements.

216. Statistical Mechanics. (3) II. Mr. Harris
Prerequisite: course 114H or the equivalent, and an introduction to quantum mechanics (which may be taken concurrently). Open to senior honor students with consent of instructor.
Principles and applications of statistical mechanics: ensemble theory, fluctuations, ideal and imperfect gases, solids, liquids and chemical equilibrium.

217. Quantum Theory II. (3) I and II. Mr. Strauss, Mr. Gwinn
Prerequisite: course 117H or Physics 115.
Matrix mechanics, symmetry effects, vibration-rotation spectra of polyatomic molecules, electronic spectra and crystal field theory, electron and nuclear spin resonance, quadrupole coupling, collision theory.

219. Chemical Kinetics. (3) I. Mr. Johnston
Prerequisite: course 114H. Also recommended: course 117H or equivalent. Open to senior honor students, without these prerequisites, by consent of instructor.
Theory of elementary reactions: activated complex theory and collision theory. Treatment of data and deduction of mechanisms of complex reactions.

223. Advanced Nuclear Chemistry. (2) II. Mr. Rasmussen
Prerequisite: course 123 and 117H or equivalent. Primarily for chemistry students.
Advanced survey of nuclear theory and experimentation.

280. Research. (1-9) I and II. The Staff (Mr. Powell in charge)
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.

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 (jointly with the Department of Chemical Engineering). (No credit)
Members of the instructing staff and students engaged in graduate research meet once a week to discuss the various investigations in progress in the laboratory.
Facilities

Administrative offices of the College of Chemistry and the Department of Chemistry are located in Latimer Hall. Also in Latimer Hall are laboratories for freshman chemistry and organic chemistry, and the Chemistry Library of periodicals and reference texts relating to chemistry and chemical engineering. Laboratories for analytical chemistry, advanced inorganic chemistry, and microchemistry, are housed in Lewis Hall. In Gilman Hall are the administrative offices of the Department of Chemical Engineering and laboratories for chemical engineering.

The research laboratories are well equipped for research in a variety of areas. In addition to laboratories for graduate research in chemical engineering, physical and inorganic chemistry, and organic chemistry, located in Gilman Hall, Lewis Hall, and Latimer Hall, there are available facilities elsewhere for research in specialized fields; among these are the Low-Temperature Laboratory for investigations at liquid hydrogen and liquid helium temperatures, the Lawrence Radiation Laboratory for studies in nuclear chemistry and inorganic materials, and the Laboratory of Chemical Biodynamics.

CITY AND REGIONAL PLANNING

(Department Office, 100 City and Regional Planning Building)

John W. Dyckman, Ph.D., Professor of City and Regional Planning.
Donald L. Foley, Ph.D., Professor of City Planning and of Architecture (Chairman of the Department of City and Regional Planning).
T. J. Kent, Jr., M.C.P., Professor of City Planning.
Corwin R. Mocine, A.B., Professor of City Planning and of Architecture.
Jesse Reichek, Professor of Design.
Francis Violich, B.S., Professor of City Planning and of Landscape Architecture.
William L. C. Wheaton, Ph.D., Professor of City Planning.
Catherine Bauer Wurster, A.B., Professor of City and Regional Planning.
Melvin M. Webber, M.A., M.C.P., Associate Professor of City Planning.

John E. Burchard, S.M., Visiting Professor of Environmental Design for the fall semester.
J. Thomas Cooke, M.C.P., Acting Assistant Professor of City Planning.
Mellier G. Scott, Jr., A.B., Lecturer in City Planning.
Michael B. Teitz, M.S., Acting Assistant Professor of City and Regional Planning.

Letters and Science List. All undergraduate courses in city and regional

2 In residence spring semester only, 1964–1965.
planning are included in the Letters and Science List of Courses. For regulation governing this list, see page 91.

The Department of City and Regional Planning offers a two-year graduate program of professional education in the field of city and metropolitan regional planning leading to the degree, 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. (3) I and II.

Prerequisite: Architecture 102 or advanced standing in landscape architecture, or consent of the instructor. (Not open to students who have taken course 110.)

Introduction to the theory and techniques of city planning.

100L. City Planning Laboratory for Architects and Landscape Architects.

(3) I and II. Mr. Kent, Mr. Schmid.

Prerequisite: Architecture 102 or advanced standing in landscape architecture. (Not open to students who have taken course 110.) May be taken only concurrently with course 100.

Laboratory: individual and group practice in solving typical city planning problems.

110. Introduction to City Planning. (3) I.

Prerequisite: open to majors in all fields except architecture. Not open to students who have taken course 100.

Survey of the city planning as it has evolved in the United States since 1800 in response to physical, social, and economic problems; major concepts and procedures used by city planners and local governments to improve the urban environment.

111. Introduction to Housing. (3) II.

Lectures and five field trips. Open to majors in all fields.

Historical development of housing problems in Western Europe and the United States; local, state, and federal housing programs in the United States; national and international demand for housing.

121. Urban Aesthetics. (2) I.

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.

Prerequisite: consent of the instructor. The Staff (Mr. Wheaton in charge)

**Graduate Courses**

(Concerning conditions for admission to graduate courses, see page 165)

222. Housing and Urban Redevelopment Policy. (2) I and II.

Prerequisite: consent of the instructor. Mrs. Wurster, Mr. Wheaton

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.

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) I.

The social organization and spatial patterning of the large metropolitan area. Physical development problems and policies.

231. Seminar in City and Metropolitan Planning. (2) I. Mr. Scott

Prerequisite: 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 theory and practice; functions of the planning agency and its principal policy instruments; analytic and design methods; relationships to engineering.

250. Theories of the Planning Process. (2) I. Mr. Webber

Planning as a special type of decision-making process; applications in guiding urban spatial development.

251. Introduction to City Planning Theory and Practice. (3) I.

Mr. Cooke

Historical background of contemporary city planning; its theory and practice; principles, standards, and procedures of physical urban planning. Laboratory problems.

252. Seminar in City Planning Function and Organization. (2) II.

Mr. Kent, Mr. Wheaton

The general physical planning function in city and county governments; general problems of agency organization; metropolitan regional planning.

253. City Planning Analysis. First Course. (2) I. Mr. Dyckman, Mr. Foley

The urban community context within which city planning operates. Community structure, values, and decision-making.

254. City Planning Analysis. Second Course. (2) 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.

The legislative and technical functions of the urban general plan; general-plan characteristics; organization of general-plan documents.

256. The Urban General Plan—Laboratory. (4) I. Mr. Kent, Mr. Webber

Field problems in major phases 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. Mr. Mocine

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. Mr. Cooke, Mr. Schmid

Three-dimensional design of urban areas within general-plan policy. The process of collaboration among the several professions involved in large-scale site planning and urban design. Laboratory problems.
259. Analytic Models in City Planning. (2) II. Mr. Teitz
Mathematical and other analytic models in urban planning; rationales for the design of models; review of existing models.

297. Field Study. (No credit) Summer course. Mr. Mocine
Required for city planning students who have not had practical city planning office experience.

298. Group Studies. (1-5) I and II. The Staff (Mr. Webber in charge)
Prerequisite: consent of instructor.

299. Individual Study or Research. (1-5) I and II.
The Staff (Mr. Wheaton in charge)
Prerequisite: consent of the instructor.

CLASSICS
(Department Office, 5224 Dwinelle Hall)

Murray B. Emeneau, Ph.D., Professor of Sanskrit and of General Linguistics.
Joseph Fontenrose, Ph.D., Professor of Classics (Chairman of the Department).

Arthur E. Gordon, Ph.D., Professor of Latin.
Louis Alexander MacKay, M.A., Professor of Latin.

William Kendrick Pritchett, Ph.D., Professor of Greek and Curator of Classical Epigraphy, Museum of Anthropology.

William M. Green, Ph.D., Professor of Latin, Emeritus.

William C. Helmbold, Ph.D., Professor of Classics, 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 and Associate Curator of Classical Archaeology, Museum of Anthropology.

William S. Anderson, Ph.D., Associate Professor of Latin.
Elroy L. Bundy, Ph.D., Associate Professor of Classics and of Comparative Literature.

W. Gerson Rabinowitz, Ph.D., Associate Professor of Greek.

Anne R. Amory, Ph.D., Assistant Professor of Classics.

Charles Witke, Ph.D., Assistant Professor of Classics and of Comparative Literature.

George L. Koniaris, Ph.D., Instructor 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 91.
Departmental Major Adviser (Classics, Greek, Latin): Mr. Gordon.

The Major in Classics. Greek 1 or 1A–1B, 100, 101, 102, 103; Latin 1 or 1A–1B, 2, 3, 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 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 11A. Recommended: Latin 1 or 1A–1B, 2, 3.

The Major in Latin. Latin 1 or 1A–1B, 2, 3, 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 11B. 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 either Greek H195 or Latin 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 have a grade-point average of at least 3.0 in all courses undertaken in the Classics department, and of at least 3.5 in all courses undertaken in the department during the junior year.

CLASSICS

Courses That Do Not Require a Knowledge of Greek, Latin, or Sanskrit

(Courses in this group are designed Classics 10A, Classics 10B, etc.)

Lower Division Courses

10A–10B. Ancient Greek and Roman Civilization. (3–3) Yr.

10A. Greek. 10B. Roman.

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.

17A. 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.

17B. Monuments of Western civilization from the Hellenistic Age to the Age of the Antonines, with particular reference to urban development and provincial organization. Course 17A is not prerequisite to 17B.
28. The Classic Myths. (3) I.  
34. Epic Poetry: Homer and Vergil. (2) I.  
35. Greek Tragedy. (2) II.  
36. Plato: Selected Dialogues. (2) I.

Upper Division Courses

100A-100B. Greek and Latin Literature in Translation. (3–3) Yr.
Lectures, essays, and group discussions. Enrollment limited to fifteen students. Course 100A is not prerequisite to 100B.

§134. Augustan Poets. (2) I.  
Lectures and Readings in Vergil, Horace, and elegiac poets.

138. The Greek and Roman Historians. (2) II.  
The five historians Herodotus, Thucydides, Polybius, Livy, and Tacitus, in English translation: their intellectual background, documentary sources, and philosophy of history.

170. Classical Archaeology. (2) II.  
170A. Vase-painting in Greece and Italy to 600 B.C.  
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) I.  
Mr. J. K. Anderson
An ancient description of the topography of Athens as illustrated by modern archaeological discoveries.

*176. Ancient Greek Religion. (3) II.  
The worship of the gods in ancient Greece; cults and religious ideas.

178. Mythology. (3) II.  
Prerequisite: Classics 28 or 176 or Anthropology 121 or 130 or Near Eastern Languages 170 or advanced standing in Greek, Latin, or Sanskrit.  
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. (3) II.  
Greek ideas about society and the State, from Homer to Aristotle.

199. Special Study for Advanced Undergraduates. (1–5) I and II.  
Restricted to senior honor students.

Mr. J. K. Anderson in charge

GREEK

(Courses in this group are designated Greek 1, Greek 1A, Greek 1B, etc.)

Duplication of credit. A student will not be allowed unit credit for that part of Greek 1, 1A–1B, 100, 101, or 102 which duplicates courses previously completed in high school or at another institution of collegiate grade. The first two years of work in a foreign language in high school is considered to be equivalent to one semester in college (4 units); each successive year in a foreign language in high school is equal to one additional semester in college (4 units).

* Not to be given, 1964–1965.
§ To be given, 1964–1965 only.
Language and Literature

Lower Division Courses

1. Greek for Beginners. Double Course. (5) II.

1A–1B. Greek for Beginners. (3–3) Yr. Mr. Pritchett, Mr. Koniaris

40A–40B. Greek Prose Composition, first course. (2–2) Yr.
Prerequisite: Greek 1 or 1A–1B. This course may not be offered in satisfaction of the foreign language requirement in the College of Letters and Science.

Upper Division Courses

Greek 100, 101, 102, 103 should be completed before the other courses are undertaken.

100. Xenophon, Anabasis. (3) I. Mr. Koniaris

101. Homer. (3) II. Mrs. Amory

102. Plato: Apology and Crito. (3) I. Mr. Rabinowitz

103. Drama. (3) II. Mr. Bundy

115. Senior Course in Greek Drama. (3) I.
115A. Aristophanes. Mr. Pritchett
115B. Sophocles.
115C. Aeschylus.

120. Senior Course in Greek Prose Authors. (3) II. Mr. Koniaris
120A. Demosthenes.
120B. Herodotus.
120C. Thucydides.

150A–150B. Advanced Greek Prose Composition. (2–2) Yr. Mr. Bundy
Prerequisite: Greek 40A–40B.

H195. Honors Course. (3) I and II. Mr. Bundy, Mr. Rabinowitz
I: Mr. Bundy; II: Mr. Rabinowitz.
Advanced and independent study for honor students in Greek. Special study (over two semesters) of a philosophical, an historical, and a literary text. Conferences and thesis.

199. Special Study for Advanced Undergraduates. (1–5) I and II.
Restricted to senior honor students. Mr. Rabinowitz in charge

LATIN

(Courses in this group are designated Latin 1, Latin 2, etc.)

Duplication of credit. A student will not be allowed unit credit for that part of Latin 1, 1A–1B, 2 or 3 which duplicates courses previously completed in high school or at another institution of collegiate grade. The first two years of work in a foreign language in high school is considered to be equivalent to one semester in college (4 units); each successive year in a foreign language in high school is equal to one additional semester in college (4 units).

* Not to be given, 1964–1965.
Language and Literature

Lower Division Courses

1. Elementary Latin. Double Course. (5) I and II. Mr. Koniaris in charge

1A-1B. Elementary Latin. Beginners’ Course. (3–3) Yr. Mr. Gordon in charge

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 instructor.

3. Catullus and Cicero. (3) I and II. Mr. Witke, Mr. Koniaris, Mrs. Amory, ———

Prerequisite: Latin 2 or the equivalent.

9A-9B. Latin Composition. (2–2) Yr. Mr. Gordon

Prerequisite: at least completion of Latin 2. Recommended to accompany Latin 3.
This course may not be offered towards satisfaction of the foreign-language require­
ment in the College of Letters and Science.

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. (3) I and II. Mr. Gordon, Mr. Fontenrose

105. Livy. (3) I. Mr. Gordon

106. Horace: *Odes and Epodes.* (3) II. Mr. Witke

107. Cicero. (3) II. Mr. MacKay

109A–109B. Composition and Sight Reading. (2–2) Yr. Mr. MacKay

Prerequisite: Latin 9A–9B.

§134. Readings in Augustan Poetry. (1) I. Mr. Pöschl

145. Senior Course in Latin Poetry. (2)

145A. Roman Comedy. I. Mr. W. S. Anderson

145B. *Lucretius.* II. Mr. Witke

145C. *Elegiac Poets.* I.

145D. *Juvenal.* II.

150. Senior Course in Latin Prose Authors. (2)

150A. Sallust. I. Mr. W. S. Anderson

150B. *Seneca.* II. Mr. MacKay

150C. *Cicero’s Letters.* I.

150D. *Tacitus.* II.

166. Latin Verse Composition. (1) I. Mr. MacKay

H195. Honors Course. (3) I and II. Mr. Gordon in charge

Advanced and independent study for honor students in Latin. Special study (over two
semesters) 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

Restricted to senior honor students.

* Not to be given, 1964–1965.

§ To be given, 1964–1965 only.
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.
   Restricted to senior honor students.  Mr. Emeneau

CLASSICS

Graduate Courses

All graduate courses in this department are designated Classics (Classics 200, etc.).

(Congering conditions for admission to graduate courses, see page 165)

*200. Proseminar. (3) I.  Mr. Fontenrose
   As introduction to the general literature of classical philology, to methods of research,
   and to textual criticism.

211. PosthomerlC Epic Poetry. (3) I.  Mr. Bundy
   *211A. Homeric Hymns.
   211B. Hesiod.

212. Greek Lyric Poetry. (3) I.  Mr. Pritchett
   *212A. Early Lyric Poets.
   212B. Pindar and Bacchylides.
   *212C. Elegaic and Iambic Poets.

215. Seminar in Greek History. (3) II.
   Prerequisite: consent of instructor.
   *215A. Herodotus.
   215B. Thucydides.
   *215C. Aristotle’s Constitution of Athens.
   *215D. Greek Epigraphy.

216. Greek Philosophy. (3) II.  Mr. Rabinowitz
   *216A. Presocratics.
   *216B. Plato.
   216C. Aristotle.

*233. Roman Amatory Poets. (3) II.  Mr. W. S. Anderson
   *233A. Catullus.
   *233B. Propertius.
   *233C. Tibullus.

234. Augustan Poets. (3) II.
   *234A. Virgil.
   *234B. Horace: Odes and Epodes.
   234C. Ovid.

235. Republican and Augustan Historians. (3) II  Mr. Gordon
   *235A. Caesar.
   *235B. Sallust.
   235C. Livy.

* Not to be given, 1964–1965.
236. Roman Satire. (3) I.
- 236A. Horace: *Satires and Epistles.*
- 236B. Juvenal and Persius.
- 236C. Martial.

237. Imperial Historians. (3) II.
- 237A. Tacitus.
- 237B. Suetonius.
- 237C. Ammianus Marcellinus.

238. Silver Latin Prose. (3) I.
- 238A. Seneca.
- 238B. Petronius.
- 238C. Apuleius.

239. Silver Latin Poetry. (3) I.
- 239A. Lucan.
- 239B. Statius.

240. Latin Epigraphy. (3) I.

245. Latin Literature of the Early Middle Ages, 500–900 A.D. (3) I.

270A–270B. Seminar in Classical Archaeology. (3–3) Yr.

290. Advanced Sanskrit. (1–5) I and II.

298. Special Study. (1–5) I and II.

299. Special Study. (1–5) I and II.

1G. Latin for Graduate Students, first course (No credit) I and II.

2G. Latin for Graduate Students, second course. (No credit) I and II.

Readings in Medieval Latin. (English 210). (3) I.

The Medieval Mind. (English 220). (3) II.

Linguistic History of the Roman Empire. (Romance Philology 200).

Late Latin Language and Literature. (Romance Philology 201). (2) I.

Humanistic Literature in Latin. (Romance Philology 204). (2) II.

Medieval Latin and Romance Learning. (Romance Philology 206). (2) II.

* Not to be given, 1964–1965.
COMPARATIVE LITERATURE

(Office, 102 Dwinelle Hall Annex)

William S. Anderson, Ph.D., Associate Professor of Latin.
John H. Atherton, Ph.D., Assistant Professor of French.
Elroy L. Bundy, Ph.D., Associate Professor of Classics.
Shih-Hsiang Chen, B.Litt., Professor of Chinese.
† John Coolidge, Ph.D., Assistant Professor of English.
Eric O. Johannesson, Ph.D., Associate Professor of Scandinavian.
John H. R. Pott, Ph.D., Assistant Professor of Spanish.
Warren Ramsey, Ph.D., Professor of French and of Comparative Literature.
David W. Reed, Ph.D., Professor of English.
Alain Renoir, Ph.D., Associate Professor of English (Chairman of the Group).
L. Janette Richardson, Ph.D., Assistant Professor of Speech.
Aldo Scaglione, Dottore in Lettere, Professor of Italian.
Blake L. Spahr, Ph.D., Associate Professor of German.
Gleb Struve, A.B., Professor of Slavic Languages and Literatures.
Arturo Torres-Rioseco, Ph.D., Professor of Latin American Literature.
Charles Witke, Ph.D., Assistant Professor of Classics.

Helene R. DiBona, M.A., Supervisor of Subject A.
Kathryn B. Feuer, M.A., Lecturer in Slavic Languages and Literatures.

Letters and Science List. All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 91.

Group Major Advisers: Mr. Atherton, Mr. Renoir, Miss Richardson, Mr. Witke.

The Group Major. First and Second Years—Recommended: (1) courses in modern foreign languages and in Greek or Latin (a modern foreign language and either Greek or Latin are required for the Secondary Credential and for honors in Comparative Literature), and (2) an introductory or survey course in one literature (e.g., Classics 10A-10B, English 46A-46B, French 39A-39B-39C).

Third and Fourth Years—Required: a minimum of thirty approved upper division units in literature, including (1) at least twelve units in one literature (e.g., Russian, English, Latin) studied in the original language, with emphasis on the classic works of that literature, (2) not fewer than six units in another literature, studied in the original language, and (3) Comparative Literature 100 and 190A or 190B. Degree candidates who have not elected Classics 10A-10B and do not plan to complete Greek 102 or Latin 104 must elect six units of Greek and Latin literature in translation. In addition, each candidate must, either through course work or through independent reading, acquire a sense of the historical development of one of his chosen literatures.

Honors Program. The honors program in comparative literature is open to seniors with a grade-point average of 3.00 or higher who have completed at least 12 upper division units in literature, including Comparative Literature 100 or an equivalent course. In addition to satisfying the requirements for the regular major, a student in the honors program must (a) do upper division work in both a modern foreign language and either classical Greek or Latin, and (b) earn a grade of B or higher in Comparative Literature H198. Although the honors program is limited to seniors, interested students should consult their adviser at their earliest opportunity.

Teacher Training: consult Mr. Renoir.

Graduate Program: consult Mr. Bundy; see also ANNOUNCEMENT OF THE GRADUATE DIVISION, BERKELEY, for programs leading to the M.A. and Ph.D. degrees in comparative literature.

Lower Division Course

1A–1B. English Composition in Connection with the Reading of World Literature. (3–3) Yr. Mr. Reed (in charge)

Prerequisite: Subject A examination or course.
Expository writing based on analysis of selected masterpieces of ancient and modern literature.

Upper Division Courses

100. Introduction to Comparative Literature. (3) I and II. Miss Richardson, Mrs. Feuer

Prerequisite: at least 12 units in one foreign language, and at least two semesters of lower division or upper division literature.

Selected critical and literary texts from classical antiquity to the present, read in English and one foreign language. Emphasis on principles of literary comparison and analysis.

*141. Cultural Background of the Renaissance in Western Europe. (2) II. Mr. Scaglione

Not open to students who have received credit for course 151A–151B. Discussion of phases of the movement and the contribution of great writers with special reference to Italy.

151A–151B. The Literature of the Renaissance in Western Europe. (2–2) Yr. Mr. Scaglione

Ramifications of the Renaissance movement in the West 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. Not open to students who have received credit for course 141.

160. Western Literary Crosscurrents in Twentieth-Century China. (2) II.

The impact of western literature on modern China and China’s responses in literary theory, movements, and creation.

190A. Comparison of Authors: English, French, German. (3) I. Mr. Atherton

Prerequisite: course 100 or English 100, and at least 12 units in upper division literature courses including at least 3 in French or German.

Comparison of 3 important authors, English, French, German; one foreign author must be read in original language; examination and substantial comparative paper required.

* Not to be given, 1964–1965.
190B. Comparison of Authors: English, French, Latin. (3) II.
Mr. Anderson
Prerequisite: course 100 or English 100, and at least 12 units in upper division literature courses including at least 3 units of French or Latin.
Comparison of 3 important authors, English, French, Latin; one foreign author must be read in original language; examination and substantial comparative paper required.

*190C. Comparison of Authors: English, French, Spanish. (3) II.
Prerequisite: course 100 or English 100, and at least 12 units in upper division literature courses including at least 3 units of French or Spanish.
Comparison of 3 important authors, English, French, Spanish; one foreign author must be read in original language; examination and substantial comparative paper required.

H198. Honors Course. (1–3) I and II.
The Staff (Miss Richardson in charge)
Prerequisite: honors standing, 12 units in upper division literature courses including course 100 or the equivalent, and a knowledge of a modern foreign language and either Greek or Latin.
Preparation and writing of an honors thesis under the supervision of a member of the faculty.

199. Special Study for Advanced Undergraduates. (1–4) I and II.
Restricted to senior honor students.
The Staff (Miss Richardson in charge)

Graduate Courses

200. Methods of Study in Comparative Literature. (2) I.
Mr. Ramsey

201A*-201B. The Symbolist Movement in European Literature. (2–2) Yr.
Especially in French, German, English, and Spanish literatures.
Mr. Ramsey

Mr. Torres-Rioseco
Studies in the Parnassian, Symbolist, and Modernist movements.

204A*-204B. Studies in Relations between Classical and Modern Literatures.
(3–3) II.
Mr. Bundy
Prerequisite: preparation in two foreign languages, at least one of which must be either Greek or Latin. 204A is not prerequisite to 204B.

*205. Arthurian Literature. Theme: The Grail. (2) I.
Mr. Spahr
Prerequisite: knowledge of Old French, Middle English or Middle High German.
Comparative study of a theme from Arthurian literature of the Middle Ages.

*210A-210B. Studies in Medieval Literature. (3–3)
Miss Richardson
Prerequisite: preparation in two medieval languages. 210A is not prerequisite to 210B.

215A-215B. Studies in Renaissance Literature. (3–3)
Mr. Scaglione
Prerequisite: preparation in two foreign languages. 215A is not prerequisite to 215B.
Comparative investigation of a topic in Western literature in the Renaissance period. Topic for 1964–1965: Italian and Northern Renaissance.

* Not to be given, 1964–1965.
*220A–220B. Studies in Neoclassical Literature. (3–3) I and II.
Mr. Coolidge

Prerequisite: preparation in two foreign languages. 220A is not prerequisite to 220B.

221. Romanticism in Western Europe. (3) I.
Miss Bonwit

Prerequisite: knowledge of French or German (preferably both) required.
The movement in France and Germany, with references to English romanticism.

*230A–230B. Studies in East-West Literary Relations. (3–3) I and II.
Mr. Chen

Prerequisite: preparation in two foreign languages one of which must be oriental. 230A is not prerequisite to 230B.
Comparative investigation of a literary topic requiring the study of both Oriental and Western documents. Topic for 1964–1965: China and the West.

*235A–235B. Studies in Linguistics and Comparative Literature. (3–3) I and II.
Mr. Reed

Prerequisite: preparation in two foreign languages and English 205A, or equivalent knowledge of linguistics. 235A is not prerequisite to 235B.

240. Problems in Comparative Literature. (3) II.
Mr. Witke

Prerequisite: preparation in two foreign languages.

298. Special Study. (1–4) I and II.
The Staff (Mr. Bundy in charge)

Primarily for students engaged in preliminary exploration of a restricted field, involving the writing of a report. May not be substituted for available seminars.

299. Directed Research. (1–4) I and II.
The Staff (Mr. Bundy in charge)

Normally reserved for students directly engaged on the doctoral dissertation.

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CRIMINOLOGY

(Department Office, 101 Haviland Hall)

Bernard L. Diamond, M.D., Professor of Criminology and of Law.
Paul L. Kirk, Ph.D., Professor of Criminalistics.
Joseph D. Lohman, M.A., Professor of Criminology (Chairman of the Department).
Arthur H. Sherry, A.B., LL.B., Professor of Criminology and of Law.
Paul W. Tappan, Ph.D., Jur. Sc.D., Professor of Criminology and of 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 Blumer, Ph.D., Professor of Sociology.
Herbert S. Breyfogle, M.D., Lecturer in Criminology.
James T. Carey, Ph.D., Lecturer in Criminology.

* Not to be given, 1964–1965.
Edward V. Comber, M.A., Lecturer in Criminology.
Joel Fort, M.D., Lecturer in Criminology.
Joel Goldfarb, Ph.D., LL.B., Lecturer in Criminology.
George W. Harman, B.S.E., Lecturer in Criminology.
John D. Holstrom, A.B., Lecturer in Criminology.
John A. Lindquist, A.B., M.C., Lecturer in Criminology.
Terence P. Morris, Ph.D., Visiting Professor of Criminology.
A. Lamont Smith, D.P.A., Lecturer in Criminology.

The requirements for the curricula in the School of Criminology are listed on page 98.

Letters and Science List. Courses 100A, 100B, 102, 106, 112, and 119 are included in the Letters and Science List of Courses. For regulations concerning this list see page 91.

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.

100A–100B. Introduction to Criminology. (3–3) Yr. Mr. Smith

100A not prerequisite to 100B.
A survey of criminological theory and practice, causes of delinquency and criminal behavior, institutions and processes of law enforcement, the administration of criminal justice, theories and current practices in correctional treatment and crime prevention.

101A–101B. Principles of Criminal Investigation. (2–2) Yr. Mr. O'Neill
Basic considerations in the investigation of crimes, the identification of persons, collection and preservation of evidence, examination of questioned documents, elements of legal proof in the submission of evidence, utilization of criminalistic skills and services.

102. The Etiology of Crime: Sociological. (3) I. Mr. Tappan
Social factors and processes in criminal and delinquent behavior, regional, cultural, institutional and group variables, personal and group alienation, social-psychological conditions of criminal careers and organized crime.

103A–103B. The Etiology of Crime: Psychological and Psychiatric. (3–3) Yr. Mr. Diamond
Psychological factors and processes in criminal and delinquent behavior, components of normal and abnormal personality, methods of personality measurement and clinical diagnosis, psychopathology and mental disorder in relation to crime and delinquency.

104A–104B. The Correctional and Penal System. (2–2) Yr. Mr. Smith
Organization and function of institutions and noninstitutional services in the punishment, correction and/or incapacitation of criminal and juvenile offenders, contemporary philosophies and methods in the treatment of adult criminals and juvenile delinquents.

105A–105B. Fundamentals of Police Administration. (3–3) Yr. Mr. Lindquist
Prerequisite: students who have not taken 105A must receive consent of instructor before enrolling in 105B.
The police as a functional aspect of the system of criminal justice, principles of organization and personnel management, line, staff and auxiliary functions, modus operandi of arrest and detention, political controls and limitations on authority and jurisdiction, professionalization of the police.
106. The Criminal Self and Criminal Careers. (3) II. Mr. Carey
Prerequisite: course 102 or consent of the instructor.
The development of criminal self-conceptions, social-psychological processes of group alienation and individual estrangement, maturation and professionalization in the development of criminal careers, selected case studies.

108. History of Crime and Its Treatment. (3) II. Mr. Goldfarb
Perspectives and methods in the study and control of crime, the evaluation of correctional philosophies and programs, 18th and 19th Century Schools of Criminology, contemporary correctional practices and their philosophical antecedents.

109. Theories of Criminal Causation. (3) I. Mr. Morris
The major criminological theories, comparison and analysis of their assumptions and methodologies, particularistic, eclectic and integrated approaches, current theoretical contributions.

*110. European Systems of Criminal Justice. (3)
A comparative survey of the police, the courts and corrections in selected European countries.

*112. Organized Crime and the Professional Criminal. (2) Mr. Lohman
Prerequisite: senior standing or consent of the instructor.
A systematic analysis of criminal associations in their various manifestations, informal types of cliques and mobs and formal organizations of industry and area-wide rackets, the professional criminal as a social type, varieties and modus operandi of professional criminals.

113. Forensic Medicine in Criminology. (3) I. Mr. Breyfogle
Prerequisite: Physiology 1, or equivalent; course 101A-101B or consent of instructor.
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.

114. Prevention and Control of Crime in Metropolitan Areas. (2) I. Mr. Holstrom
Crime in relation to the development of metropolitan areas, incongruent patterns of criminal activity and police organization, demographic and ecological factors in the incidence and distribution of crime and delinquency, considerations of policy and planning.

115A-115B. The Criminal Law in Action. (2-2) Yr. Mr. Sherry
Basic concepts of the criminal law, their origin and development in Anglo-American jurisdictions; constitutional limitations on the police power, the administrative processes of law enforcement, modern criminal procedure.

116. Constitutional and Procedural Problems in Law Enforcement. (2) II. Mr. Tappan
Prerequisite: senior standing.
Constitutional and procedural restraints on law enforcement, their purpose and implementation; Federal and state relationships in the administration of criminal justice.

*117. The Prison Community. (2)
Prerequisite: senior standing.
Effects of informal inmate social interaction, types of formal prison organization, latent effects of inmate culture and prisonization, antithetical processes of socialization, types of group controls, authoritarian and permissive.

118. The Alcoholic, the Narcotic and the Sexual Offender. (3) I. Mr. Fort
Selected studies of types of social deviants and criminal offenders.

* Not to be given, 1964-1965.
119. Ethnic Tension and Conflict in Relation to Law Enforcement. (3) I.
Prerequisite: senior standing or consent of the instructor. **Mr. Carey**
Race and cultural differences as a factor in differential law enforcement; variations in punitive sanctions, double standards as modus operandi, symbolic reactions of tension and conflict, positive and negative factors in the control of ethnic hostilities.

**151A–151B. Microscopy and Microchemistry of Physical Evidence. (4–4) Yr.** **Mr. Kirk**
Lectures and laboratory. Prerequisite: Chemistry 5, 12, 112C, with a grade of C or higher (112C may be taken concurrently).
Identification principles and practice. Chemical microscopy, physical constants, microchemical tests, physiological fluids, poisons, inorganic and organic materials.

**153A–153B. Quantitative and Instrumental Techniques. (3–3) Yr. Mr. Kirk**
Lecture and laboratory. Prerequisite: course 151A–151B; Chemistry 5, 12, 112C.
Advanced identification by instrumental and quantitative procedures.

**155. Comparative Microscopy. (3) II.** **Mr. O'Neill**
Lecture, demonstration, and laboratory. Prerequisite: course 101A–101B. Recommended: Botany 1 and Zoology 109.
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.

**163. Problems and Procedures in Criminal Interrogation. (3) I.** **Mr. Harman**
Prerequisite: senior standing.
Survey of historical and contemporary methods of interrogation including techniques for detection of deception, psychological and physiological variables in subject response, evaluation of responses and of instrumental techniques.

**180. Juvenile Delinquency: Prevention and Control. (3) II.** **Mr. Tappan**
Social dimensions of juvenile delinquency, its nature, amount and distribution, comparison and analysis of agencies of control and correction, the role of the police and the courts, individual group and community oriented programs of treatment and prevention.

*182. Comparative Criminal Behavior. (2) II.*
Cross-cultural and cross-national uniformities and diversities as they give rise to and sustain crime in selected Western and non-Western nations.

**190. Field Studies in Criminology. (1–4) I and II.**
The Staff (Mr. Smith in charge)
Supervised research and field studies in specific aspects of criminal justice such as law enforcement, criminalistics, and corrections.

**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 165)

**280. Crime and the Political Process. (2) I.** **Mr. Lohman**
The nature and sources of criminal political power, ecological aspects of criminal-political organization, reciprocal relations of organized crime and political parties, political functions of criminal groups, political crimes.

*281. Latent Functions in Law Enforcement and Correction. (2)*
Ambivalence in the social processes of the law, the courts and corrections is evaluated; empirical analysis of latent and manifest functions; identification of criminogenic and otherwise abortive characteristics of the institutions of criminal justice.

*Not to be given, 1964–1965.*
**282. Prediction Methods in Parole and Probation.** (2) II.
Survey of research in methods and techniques of selection for probation and parole, validity of prediction factors and experience tables, application of predictive methods to other aspects of delinquency and criminality, practical implications and limitations for crime control.

**283. Seminar in Experimental Criminology.** (2) I. Mr. Morris
Advanced study in the field of crime causation and the development of delinquency prediction techniques.

**284. Seminar in Community Approaches to Delinquency and Crime.** (2) II. Mr. Lohman
Advanced study of the organization and operation of delinquency and crime prevention groups in the urban community.

**285. Seminar in Problems of Criminal Responsibility.** (2) I. Mr. Diamond
Current problems of criminal responsibility; an historic review of legal concepts and contemporary theological, philosophical, and behavioral science aspects; contemporary ideas of individual responsibility.

**290A–290B. Seminar in Crime Investigation.** (2–2) Yr. Mr. O'Neill
**291A–291B. Seminar in Police Administration.** (2–2) Yr. Mr. Comber
**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. Diamond

**295A–295B. Seminar in Criminalistics.** (2–2) Yr. Mr. Kirk
**296A–296B. Seminar in the Correctional Treatment of Offenders.** (2–2) Yr. Mr. Smith

**297. Principles of Counseling and Psychotherapy.** (2) I. Mr. Diamond
Techniques of rehabilitation of criminal offenders, psychological evaluation of offenders under supervision and control.

**298. Directed Group Study.** (1–4) I and II. The Staff
**299. Research and Special Study.** (1–4) I and II. The Staff

**Related Courses in Another Department**
The Metropolitan Region. (City and Regional Planning 226.) I. Mr. Foley
Selected Problems in Criminal Law and Administration. (Law 278.) (2) I. Mr. Sherry
Municipal Government and Administration. (Political Science 272A–272B.) Mr. Lee, Mr. Gardner
Social Interaction and Personal Organization. (Sociology 178.) (3) I. Mr. Blumer
Analysis of Social Action. (Sociology 207.) (2) II. Mr. Blumer

*Not to be given, 1964–1965.*
DEDECORATIVE ART

(Department Office, 104 Decorative Art Building)

†Mary A. Dumas, M.A., Professor of Design.
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.
†Charles E. Rossbach, M.F.A., Professor of Design.
Herwin Schaefer, Ph.D., Professor of Decorative Art.
Hope M. Gladding, Professor of Decorative Art and Design, Emeritus.
*Willard V. Rosenquist, M.A., Associate Professor of Design.
†Peter H. Voulkos, M.F.A., Associate Professor of Design.
Ruth McDonald Boyer, Ph.D., Assistant Professor of Decorative Art.
Robert Kabak, M.F.A., Assistant Professor of Design.
Ragnhild L. Langlet, Assistant Professor of Design.
Alan R. Meisel, M.F.A., Assistant Professor of Design.
Torben Strandgaard, M.A.A., Assistant Professor of Design.
Arne Wolf, Assistant Professor of Design.
Margaret P. Dhaemers, M.F.A., Instructor in Decorative Art.
Matthew S. Glavin, M.F.A., Instructor in Decorative Art.

Charles W. Lindstrom, B.A., Lecturer in Decorative Art.

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 91.

Departmental Major Advisers: Miss Langlet, Miss Nelson, 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 1A or 1B or 1C or 1D; History 4A–4B. Recommended: Anthropology 2A–2B; Art 3, 14A–14B; Classics 28; History 8A–8B; Philosophy 6A–6B.

A total of 27 to 29 units of upper division work must also be completed, and must include the following: (1) courses 150A, 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–

*In residence spring semester only, 1964–1965.
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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, 170. (4) 5 units chosen 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. 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 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 certain 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. Mr. Schaefer
1A not prerequisite to 1B. From the ancient Near East to the present. Development of style and evaluation of form.

Mrs. Dhaemers, Mr. Glavin, Mr. Kabak, Miss Langlet, Mr. Meisel, Mr. Rosenquist, Mr. Rossbach, Mr. Strandgaard, Mr. Wolf
Laboratory survey of the elements and principles of two- and three-dimensional design. 6B. Emphasis on color.

Prerequisite: course 6A–6B. Mrs. Miller, Mr. Wolf, Mr. Strandgaard
7A. Laboratory problems emphasizing line and space, based upon calligraphy and the alphabet from pre-Roman times.
7B. Laboratory problems in three-dimensional design; the nature and use of materials.

Upper Division Courses

Group A: Lecture Courses

General prerequisite: upper division standing and consent of the instructor.

125. American Decorative Art from the First Colonial Periods to 1850. (3) II.
The styles and their significant artists, housewrights, and craftsmen. Mr. Lindstrom

127A not prerequisite to 127B or 127C.
Analysis of salient art styles in their cultural contexts.
127A. Paleolithic West Europe, South and West Africa. I.
127B. Oceania and South America. II.
127C. Middle and North America. II.
† Prerequisites for this course should be noted, as they must be included in the maximum of 30 upper division units offered for the degree.
* Not to be given, 1964–1965.
130A–130B. Interior Design. (2–2) Yr. Mr. Wellington
130A not prerequisite to 130B.
Design, selection, and arrangement of furniture, with consideration for its relation to
the architectural background.

140A–140B–140C. Survey of Ceramic and Glass Forms. (3–3–3)
140A not prerequisite to 140B or 140C.
Their design 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. I.

167. History of Design since the Industrial Revolution. (3) I. Mr. Schaefer
The theory and practice of design 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
175A not prerequisite to 175B.
175A. The New World: Native America; Oceania.
175B. The Old World: Europe, India, Asia.

180A–180B. Survey of Expression in Materials. (3–3) Yr. Mr. Wellington
180A not prerequisite to 180B.
Form as exemplified by significant objects made from metals, wood, glass, clay, etc.

193A–193B. Historic Costume. (3–3) Yr. Mrs. Boyer
193A not prerequisite to 193B.
Design, material, cultural factors, and contemporary arts as expressed in costume.
193A. Native America; Indonesia; Asia.
193B. Classic Mediterranean; Medieval to Modern Europe.

195A–195B. The History of Interior Design. (3–3) Yr. Mr. Schaefer
195A. II.
195A not prerequisite to 195B.
The interior as an aesthetic composition and as an expression of domestic culture from
the Middle Ages to the present.

Group B: Laboratory Courses
General prerequisite: 6A–6B, 7A–7B or the equivalent and consent of the
instructor. Courses in Group B may be repeated indefinitely without duplica­tion of credit.

141A–141B. Advanced Design: Ceramics. (2–2) Yr. Beginning each semester.
Prerequisite: 140A or 140B which may be taken concurrently. Enrollment limited.
Preference given to decorative art majors.
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.
Prerequisite: 175A or 175B which may be taken concurrently.
The development of pattern through the processes of stencil, screen, block, and batik.

* Not to be given, 1964–1965.
166A–166B. Advanced Design: Principles of Three-Dimensional Design. (2–2) Yr. Beginning each semester. Mr. Rosenquist.

166A not prerequisite to 166B.

166A. Interrelation of space and material as problems of abstract design, emphasizing color, light, and motion.

166B. Studies of volume and spatial relationships in metal.

*168. Introduction to Industrial Design. (2) II.

Lectures, demonstrations and studio exercises offering insight into methods of analysis and solution employed in the design of industrial products.

170. Advanced Design: Calligraphy. (2) I. Mr. Wolf

Studio problems based on historical antecedents, using various graphic media.


Mrs. Miller, Mr. Rossbach

Prerequisite: 175A or 175B which may be taken concurrently.

Design, emphasizing structure in relation to color, texture, and pattern.

196A–196B. Interior Design. (2–2) Yr. Beginning each semester.

Mr. Strandgaard, Mr. Wellington

Prerequisite: 130A–130B, 195A, which may be taken concurrently, and some mechanical drawing.

Individual criticism and discussion of theory.

Group C: Special Study Courses

101. Critical Literature of the Decorative Arts. (2) I. Mr. Lindstrom

Prerequisite: senior standing in decorative art or consent of instructor. Enrollment limited.

Guided readings and discussions.

179. Textile Analysis. (2) I. Miss Gayton

Prerequisite: 175A, 176A–176B, or consent of the instructor. Enrollment limited; preference given to decorative art majors.

Basic problems in the construction and design of ethnic and historic textiles.

190. Proseminar in Decorative Art. (2) I and II. The Staff (Miss Nelson in charge)

Prerequisite: senior standing in decorative art or the equivalent.

Contemporary developments in the decorative arts, emphasizing the relation to historical antecedents and other areas of the visual arts.

198. 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.

198A. Enamel design. (2) I and II.

198B. Metal design. (2) II.

198C. Design of woven textiles. (2) II.

198D. Design of printed textiles. (2) I.

198E. Ceramic design. (2) II.

199. Special Study for Advanced Students. (1–4) I and II. The Staff (Mr. Schaefer in charge)

Restricted to senior honor students and graduate students. Prerequisite: consent of the department and at least a B average in all decorative art courses undertaken.

* Not to be given, 1964–1965.
Graduate Courses

Concerning conditions for admission, see the ANNOUNCEMENT OF THE GRADUATE DIVISION, BERKELEY. Candidates for the master's degree will be expected to consult with the graduate adviser concerning specific requirements.

291. Seminar. (2) I. Mr. Kabak
   Required of all graduate students.
   Advanced study specially related to graduate work and research.

Seminars in Decorative Art.
   *294A. American Decorative Art. (2) I. Miss Gayton
   Studies based upon textiles in the collections of the department of Decorative Art and in the Museum of Anthropology.
   294B. Textiles. (2) II. Mr. Wellington
   Analysis of the tangible and intangible determinants of style in ethnic and historic costume.
   294C. Decorative Motifs in Oriental Art. (2) I. The Staff
   294D. Components of Costume. (2) I. Mrs. Boyer
   294E. Studies of Form in Primitive Art. (2) I. Miss Nelson
   294F. Industrial Design. (2) II. Mr. Schaefer
   294G. Ceramic Design. (2) II.

296A–296B. Problems in the History of Folk Art. (2–2) Yr. Mrs. Boyer
   296A. Concept and Expression.
   Lectures, guided research, and discussions of folk art as a concept, its areas of expression, and analyses of selected regional styles, with emphasis on the folk arts of Europe.
   296B. Traditionalism and Individualism in Regional Art Styles.
   Intensive research, reports, and critiques of sophisticated art influences in the folk arts; stylistic lag; psychological and social factors of stability and change in regional styles.

298. Special Study in the Practice of Design. (2) I and II. The Staff (Mr. Voulkos in charge)
   Prerequisite: graduate 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.

299. Directed Research. (2–4) I and II. The Staff (Mrs. Boyer 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, 131, 176A–176B; Philosophy 136B; Psychology 131.

For detailed descriptions see the announcement section of the respective departments.

\[ \text{DRAMATIC ART} \]

(Department Office, 120 Dwinelle Hall Annex)

Travis Bogard, Ph.D., Professor of English and of Dramatic Art (Chairman of the Department of Dramatic Art).

†Robert W. Goldsby, M.F.A., Professor of Dramatic Art.

* Not to be given, 1964–1965.
Fred Orin Harris, M.F.A., Professor of Dramatic Art.
Henry May, B.A., Professor of Dramatic Art.
Marvin Rosenberg, Ph.D., Professor of Dramatic Art.
Garff B. Wilson, Ph.D., Professor of Speech and of Dramatic Art.
William I. Oliver, Ph.D., Associate Professor of Dramatic Art.
Henrietta C. Harris, M.A., Assistant Professor of Dramatic Art.
Dunbar H. Ogden, III, Ph.D., Assistant Professor of Dramatic Art.

James E. Jewell, M.F.A., Lecturer in Dramatic Art.
James E. Kerans, M.A., Lecturer in Dramatic Art.
Juris M. Svendsen, M.A., Acting Assistant Professor of Dramatic Art.

The Staff

Letters and Science List. All undergraduate courses are included in the
Letters and Science List. A total of not more than 8 units from courses 49
and 190 will be accepted for Letters and Science credit. For regulations gov­
erning this list see page 91.

Departmental Major Advisers: Mr. Kerans, Mr. Ogden.

The Major. Required: 37 units, including the following lower division
courses: 10A (3), Resources for Acting; 20A–20B (3–3), Introduction to Dra­
matic Literature; 45 (3), Introduction to Theater; 49 (1), University Theater;
and 24 units of upper division courses including 120 (3), Dramatic Theory;
181 (3), Senior Proseminar; and at least 6 units of 125A–125B–125C–125D–
than 3 units of course 190 (Advanced University Theater) may be offered as
part of the 24-unit major requirement.

Honors Program. Majors in dramatic art with an overall grade-point aver­
age in the University of 3.0 may apply for admission to the honors program.
Application should be made through a departmental major adviser not later
than the end of the student’s junior year. A student accepted in the honors
program will include in his program course H195A, intensive critical study
of problems of dramatic literature, acting, playwriting, directing, or design­
ing (may be substituted in the major program for Dramatic Art 181); and
H195B, development of studies begun in H195A, either under circumstances
of actual theatrical production or as senior thesis.

Higher degrees. Consult Mr. Bogard; see also the ANNOUNCEMENT OF THE
GRADUATE DIVISION, BERKELEY.

The University Theater

Under the direction of the Department of Dramatic Art, the University
Theater presents a major and studio series of play productions, extending into
the laboratory of stage practice the theories of dramatic literature, criticism
and production studied in the departmental curriculum. These productions
are selected so as to present to the University community a program of dis-
Dramatic Art

Lower Division Courses

1A–1B. English Composition in Connection with Reading of Dramatic Literature. (3–3) Yr.
Prerequisite: Subject A, examination or course.
Expository writing based on analysis of masterpieces of dramatic literature and related expository works.

10A–10B. Theory of Acting. (3–3) Yr. Mr. Harris, Miss Harris
10A. Resources for Acting. I. A study of physical, psychological, and spiritual resources for acting. Mr. Harris, Miss Harris.
10B. Methods of Acting. II. Approaches and practices in characterization. The fundamentals of stage speech and movement. Mr. Harris.

10C. Theory of Acting; Vocal Resources for Acting. (3) I and II. Miss Harris

20A–20B. Introduction to Dramatic Literature. (3–3) Yr. Mr. Ogden
A study of masterworks of theater from the Greek classic period to the present.
20A. Aeschylus to the Renaissance.
20B. The Renaissance to the Present.

39. Introduction to Playwriting. (3) II. Mr. Oliver

40A–40B. Twentieth-Century World Theater. (3–3) Yr. Mr. May
Course 40A is not prerequisite to 40B.
A survey of the characteristic forms of the major contemporary theatrical modes.

45. Introduction to Theater. (3) I.

49. University Theater. (1) I and II. The Staff (Mr. Bogard in charge)
Prerequisite: consent of instructor. May be repeated for credit.

Upper Division Courses

110. Advanced Theory of Acting. (2) I and II. Mr. Harris
Prerequisite: course 10A, 10B, 10C, 20A, 20B and junior standing.

111. Theory of Acting Styles. Mr. Kerans, Mr. Oliver
Prerequisite: course 110.
111A. (formerly numbered 110A) Acting in Classical Styles. (2) I. Mr. Kerans
111B. (formerly numbered 110B) Acting in Renaissance Styles. (2) I. Mr. Kerans
111C. (formerly numbered 110C) Acting in Major Modes, 1700–1900. (2) II. Mr. Oliver

120. Dramatic Theory. (3) I and II. Mr. Rosenberg, Mr. Svendsen
Prerequisite: junior standing.
Major documents of dramatic criticism and theory, studied in historical sequence and related to analysis of important plays.

125. Dramatic Literature of Western Civilization.
Mr. Oliver, Mr. Ogden, Mr. Svendsen
125A. Greek and Roman Dramatic Literature. (3) II. Mr. Svendsen
125B. Dramatic Literature of Western Europe from the Middle Ages to 1600. (3) I. Mr. Ogden
125C. Dramatic Literature of Western Europe from 1600 to 1700. (3) I. Mr. Oliver

Not to be given, 1964–1965.
125D. Dramatic Literature of Western Europe and the United States from 1700 to 1900. (3) I.
125E. Dramatic Literature of Western Europe and the United States from 1900 to the Present. (3) II.

139A–139B. Playwriting. (3–3) Yr. Mr. Rosenberg
Prerequisite: course 39, junior standing and consent of instructor. Practice in the fundamentals of dramatic composition. Group readings and discussion of written work.

145. History of the American Theater. (3) I. Mr. Wilson
The development of the American theater from colonial times to the twentieth century.

150A–150B. History of Theater. (3–3) Yr. Mr. Jewell, Mr. May
Course 150A is not prerequisite to 150B.
150A. The beginnings to 1700.
150B. 1700 to the present.

155A. Theory of Theater Design. (3) I. Mr. May
Course 155A is not prerequisite to 155B.
Theory of stage design.

155B. Theory of Lighting Design. (3) II. Mr. Jewell
Course 155A is not prerequisite to 155B.
Theory of lighting design.

160. Theory of Directing. (3) I. Mr. Svendsen
Prerequisite: junior standing.

161. Advanced Directing. (3) II. Mr. Svendsen
Prerequisite: course 161 and consent of instructor.

181. Senior Proseminar. (3) II. Mr. Svendsen
Prerequisite: course 120 and senior standing. Designed primarily for senior students in the dramatic art major. Sections limited to 20 students. Studies in a single playwright or mode of the art; not for practice of acting or playwriting.

190. Advanced University Theater. (1) I and II. The Staff (Mr. Bogard in charge)
Prerequisite: junior standing and consent of instructor. May be repeated for credit.

H195A. Honors Course. (3) I and II. The Staff (Mr. Bogard in charge)
Prerequisite: candidacy for honors in dramatic art. Seminar leading to the preparation of a research paper on a single aspect of theater. No final examination.

H195B. Honors Course. (3) I and II. The Staff (Mr. Bogard in charge)
Prerequisite: completion of H195A with an honors grade. Development of subject studied in H195A either as a bachelor’s thesis or as a laboratory project in acting, directing, playwriting, or design. No final examination.

199. Special Study for Advanced Undergraduates. (1–3) I and II. The Staff (Mr. Bogard in charge)
Prerequisite: 9 or more units in dramatic art, with an average grade of not less than B. Reading and conference. Restricted to senior honor students.

* Not to be given, 1964–1965.
Graduate Courses

(Concerning conditions for admission to graduate courses, see page 165)

Requirements for the M.A. degree: 24 units in upper division and graduate courses, of which at least 12 units must be in graduate courses in the Department of Dramatic Art. All students are required to take course 220, at least one seminar in dramatic literature, and either course 290 or 299. Before certification for the degree will be given, candidates must pass an examination testing their reading knowledge of either French or German and a comprehensive final examination.

Beginning with the fall semester, 1964, the department will offer a program leading to the Ph.D. degree in dramatic art. For information, consult the departmental graduate adviser.

210A–210B. Advanced Acting. (3–3) Yr. Mr. Oliver

220. Theater Research. (2) I and II. Mr. Rosenberg

An introduction to bibliographical methods and materials for theater research projects.

221A–221B. Studies in the Modern Theater. (3–3) I and II. Mr. Kerans

Prerequisite: course 220; may be taken concurrently. Course 221A is not prerequisite to 221B.

221A. Realism in Twentieth Century Drama. I.
221B. Anti-Realistic Trends in Twentieth-Century Drama. II.

222. Studies in Classical Theater. (3) I. Mr. Ogden

Prerequisite: course 220; may be taken concurrently.

223. Studies in the Theater of Shakespeare. (3) II. Mr. Rosenberg

Prerequisite: course 220; may be taken concurrently

224. Studies in the French Theater. (3) I. Mr. Goldsby

Prerequisite: course 220; may be taken concurrently.

225. Studies in the Russian Theater. (3) II. Mr. Rosenberg

Prerequisite: course 220; may be taken concurrently.

226. Studies in Dramatic Genre. (3) I. Mr. Wilson

Prerequisite: course 220; may be taken concurrently Seminar in one of the major dramatic genres: tragedy, comedy, melodrama, farce.

239. Advanced Playwriting. (3) I. Mr. Oliver

Prerequisite: consent of instructor, not open to undergraduates.

245. Studies in the American Theater. (3) II. Mr. Wilson

Prerequisite: course 220; may be taken concurrently

255A. Theater Design. (3) II. Mr. May

(Formerly numbered 250.) Open to qualified seniors, with consent of instructor. Principles and problems of stage design for the contemporary theater.

255B. Lighting Design. (3) II. Mr. Jewell

Open to qualified seniors, with consent of instructor. Principles and problems of lighting design for the contemporary theater.

256. Theory of Contemporary Stage Techniques. (3) I. Mr. Jewell

Open to qualified seniors with consent of instructor.

* Not to be given, 1964–1965.
260. Advanced Directing. (3) II. 
Open to qualified seniors with the consent of the instructor.

Mr. Oliver

290. Theater Laboratory. (1-4) I and II. 
The Staff (Mr. Bogard in charge)
Prerequisite: course 210A-210B, or 239, or 250, or 260.
Advanced practice in theater design, directing, playwriting and acting. May be repeated for credit.

298. Special Studies. (3-6) I and II. 
The Staff (Mr. Bogard in charge)
Reserved for students engaged in work on their doctoral dissertations and productions.

299. Special Studies. (1-4) I and II. 
The Staff (Mr. Bogard in charge)
Prerequisite: consent of instructor. Not open for practice of acting, design, directing or playwriting. May be repeated for credit.

Related Courses in Other Departments

Form in Drawing (Art 2A).
The Classic Myths (Classics 28).
Greek Tragedy (Classics 35).
Mythology (Classics 178).
Historic Costume (Decorative Art 193A-193B).
Shakespeare (English 17).
The English Drama to 1642 (English 114A).
The English Drama, 1660 to 1850 (English 114B).
British and American Drama, 1850 to the Present (English 114C).
Shakespeare (English 117A-117B).
Modern French Drama (French 115A-115B).
The Seventeenth Century (French 120A-120B).
Drama (Greek 103).
Nineteenth-Century German Drama (German 105).
Italian Literature of the Eighteenth Century (Italian 114).
Italian Literature of the Twentieth Century (Italian 116).
Roman Comedy (Latin 145A).
Introduction to Opera (Music 127A).
Survey of Chinese Vernacular Literature (Oriental Languages 172).
Theatrical Fencing (Physical Education 12).
Rhythmic Basis of Dance and Allied Arts (Physical Education 35).
History of Scandinavian Drama up to 1900 (Scandinavian 106).
The Plays of Ibsen (Scandinavian 107).
Strindberg and His Writings (Scandinavian 108).
Scandinavian Drama of the Twentieth Century (Scandinavian 109).
Chekhov (Slavic 133F).
The Russian Drama from the Seventeenth Century to the Twentieth (Slavic 135).
Modern Peninsular Drama: From the Romantic Movement to the Present (Spanish 105).
The Spanish Drama of the Sixteenth and Seventeenth Centuries (Spanish 109A-109B).
ECONOMICS

(Department Office, 250 Barrows Hall)

Joe S. Bain, Jr., Ph.D., Professor of Economics.
*George F. Break, Ph.D., Professor of Economics.
Carlo M. Cipolla, Laurea, Professor of Economics for the fall semester.
Malcolm M. Davison, J.D., Ph.D., Professor of Economics.
Gerard Debreu, D.Sc., 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 of Business Administration.
Robert A. Gordon, Ph.D., Professor of Economics.
Ewald T. Grether, Ph.D., LL.D., ekon.dr. (hon.c.), Flood Professor of Economics.
*Gregory Grossman, Ph.D., Professor of Economics.
Sidney S. Hoos, Ph.D., Professor of Economics, Agricultural Economics and of Business Administration.
Dale W. Jorgenson, 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 of Statistics.
Harvey Leibenstein, Ph.D., Professor of Economics.
John M. Lettche, Ph.D., Professor of Economics.
Andreas G. Papandreou, Ph.D., Professor of Economics.
Roy Radner, Ph.D., Professor of Economics and of Statistics (Vice-Chairman of the Department).
Earl R. Rolph, Ph.D., Professor of Economics.
Henry Rosovsky, Ph.D., Professor of Economics and of History.
Tibor Scitovsky, M.Sc., J.D., Professor of Economics (Chairman of the Department).
Lloyd Ulman, Ph.D., Professor of Economics and of Industrial Relations.
Ira B. Cross, Ph.D., LL.D., Flood Professor of Economics, Emeritus.
Charles A. Gulick, Ph.D., Professor of Economics, Emeritus.
Emily H. Huntington, Ph.D., Professor of Economics, Emeritus.
Melvin M. Knight, Ph.D., Professor of Economics, Emeritus.
Carl Landauer, Ph.D., LL.D., Professor of Economics, Emeritus.
Paul S. Taylor, Ph.D., Professor of Economics, Emeritus.
Albert Fishlow, Ph.D., Associate Professor of Economics.
Hyman P. Minsky, Ph.D., Associate Professor of Economics.
Benjamin N. Ward, Jr., Ph.D., Associate Professor of Economics.

Letters and Science List. All undergraduate courses in economics are included in the Letters and Science List. For regulations governing this list, see page 91.

Departmental Major Advisers: Mr. Minsky (chairman), Mr. Cipolla, Mr. Fishlow, Mr. Letiche, Mr. Rosovsky, Mr. Ward.

The Major. Required: either (A) Economics 1A–1B, 2, and 24 units of upper division economics; or (B) Economics 103A–103B, 2, and 18 units of upper division economics. For students electing alternative (A) above, Economics 100A–100B and either 112A or 112B, or 113 are required and should be taken prior to the senior year. For students electing alternative (B) above, Economics 100B and either 112A or 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 a departmental major adviser. The selection shall include one year-course or two one-semester courses in the same field. Statistics 131, 131L and Economics 142 will be a year sequence in statistical analysis for purposes of satisfying the major requirement. Economics 112A–112B may be used to satisfy the sequence requirement provided 113 is also taken. A course (3 units) in another department may be included in a sequence if 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 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 Great Distinction, 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. Klappholz, Mr. Gordon, Mr. Rolph, Mr. Haley, Mr. Sherman
1A. I: Mr. Gordon, Mr. Rolph; II: Mr. Klappholz; 1B. I: Mr. Sherman; II: Mr. Haley, Mr. Gordon.
Two lectures and two recitation sessions per week to be arranged. Credit will not be given for both 1A–1B and 103A–103B.

2. Economic Statistics. (4) I and II.
Mr. Laidler, Mr. Pyatt
I: Mr. Laidler, Mr. Pyatt.
II: Mr. Laidler, Mr. Pyatt.
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 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, course 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. Chen, Mr. Laidler, Mr. Sen, Mr. Ivory, Mr. Pyatt, Mr. Bain, Mr. Klappholz, Mr. Corden.
100A. I: Mr. Laidler, Mr. Sen, Mr. Ivory; II: Mr. Ivory, 100B. I: Mr. Chen; II: Mr. Chen, Mr. Pyatt, Mr. Bain, Mr. Klappholz, Mr. Corden.
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 competition, monopoly and economic power, economic opportunity, motivation, efficiency, and freedom.


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. Mr. McFadden

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.

103A–103B. Introduction to Economic Principles, Institutions, and Policies. (3–3) Yr. Mr. Winter

Income, employment, price theory, and applications. Credit will not be given for both 101A–1B and 103A–103B.

106. Economics of Marxism. (3) I. Mr. Landauer

A survey of the economic thought of Marx and his followers down to the present.

110. Economic Development. (3) I and II. Mr. McFadden, Mr. Ivory

Theories of economic development and of underdevelopment; historical aspects; policies for achieving development in poor countries; favorable conditions for development in rich countries.

114. Economic Development and Problems of Latin America. (3) II. Mr. Fishlow

Evolution of Latin-American economy in terms of basic institutions and international influences; standards of living; problems of mono-economies; land tenure systems; policies of improving agricultural methods; foreign investment; industrialization and related problems.

115. Economic Development and Problems of the Far East. (3) I. Mr. Ivory

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. Ward

Comparative Economic Systems. (3–3) Yr. Mr. Ward

116A. Economic organization and institutions, and their impact on economic variables.

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. Sherman

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. Williamson

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 to prevent monopoly and maintain competition.

*125. Economics of Regulation and Control. (3) II. Not to be given, 1964–1965.
130. Government Finance. (3) I and II.  
Mr. Davison  
Budget-making, expenditures, public debt, taxation, and fiscal policy at federal, state, and local levels. 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.  
Mr. Diamond  
Prerequisite, 131B: course 131A, or 130 and consent of instructor. Credit will not be given for both course 130 and 131A.  
Fiscal theory and policy and of the incidence and effects of taxation, governmental expenditure programs, and public debt operations.

133. Dynamic Economics and Business Fluctuations. (3) I.  
Mr. Sen  
Prerequisite: course 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. Diamond, Mr. Laidler  
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. A one semester survey course of entire field.

136A-136B. Money, Banking, and the Monetary Policy. (3-3) Yr.  
(136B formerly numbered 137.)  
Mr. Ellis, Mr. Minsky  
Prerequisite, 136B: course 136A, or 135 with consent of instructor.  
136A: The monetary economy; survey of monetary interest, and income theory; commercial and central banks, the Treasury, and the supply of money. Credit will not be given for both course 136A and 135.  
Monetary standards and international finance; competing objectives of monetary policy; recent monetary experience; current issues.

*138. Economic Accounting. (3) I.  
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) I.  
Mr. Pyatt  
Prerequisite: Statistics 131.  
Application of statistical methods to economic research.

150. Labor Economics. (3) I and II.  
Mr. Galenson  
Comparative survey of American and foreign labor movements. Course 150 not prerequisite to course 152.

153. Wage Theory and Policy. (3) II.  
Mr. Ulman  
Prerequisite: course 150 or consent of instructor.  
Theoretical analysis and empirical description of wage issues, both at the micro- and macro-economics level; national wage and employment policy.

*185. Social Insurance. (3) II.  
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.

* Not to be given, 1964-1965.
190A–190B. International Economic Relations. (3–3) Yr.

190A. Theory. Mr. Letiche, Mr. Corden


H195. Junior Honors Course. (1–3) I and II. Mr. Leibenstein

H196. Senior Honors Course. (3) I and II. Mr. Minsky

*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.

Prerequisite: consent of 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. Minsky in charge)

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. Laidler, Mr. Winter, Mr. Diamond, ———

Two lectures and one discussion section per week.

200A. Micro-economics: The behavior of firms and households, and the determination of prices and resource allocation patterns in a decentralized economy. Mr. Laidler, Mr. Winter.

200B. Macro-economics: Determination of national income, employment, price level, growth, distribution. Mr. Diamond, ———.

201A–201B. History of Economic Thought. (3–3) Yr. Mr. Letiche

Analysis of the relationships between historical conditions, economic theory, and economic policy from the Greeks to modern times.


202A: I.

202B, 202C: II.

Mr. Winter, Mr. McFadden, Mr. Scitovsky, Mr. Sen

Prerequisite: 202A. Admission to Department’s Ph.D. program, or consent of instructor; 202B and 202C, 202A, or consent of instructor.

202A. The theory of the firm; partial equilibrium analysis of prices and output determination under competition and other market structures; capital theory. Mr. Winter, Mr. McFadden.

202B. The theory of consumer behavior; general equilibrium under perfect competition; welfare economics and the efficiency of competitive equilibrium. Mr. Winter, Mr. McFadden.

202C. Aggregate analysis of levels and rates and growth of income, output, prices and wages. Mr. Scitovsky, Mr. Sen.

* Not to be given, 1964–1965.
203. Advanced Topics in Economic Theory. (3) I and II.  
Mr. Bain, Mr. Klappholz, Mr. Radner, Mr. Rolph  
Prerequisite: course 200A–200B or equivalent.  
For students desiring further training in theoretical analysis. Topics to be covered in  
the different sections will be announced annually.  
I. Sec. 1: Topics in pure and applied price and investment theory, Mr. Bain; Sec. 2:  
Theory of economic policy, Mr. Klappholz.  
II. Sec. 1: Mathematical theories of economic planning, Mr. Radner; Sec. 2: Topics in  
public finance, money, and impure economic theory, Mr. Rolph.  

(3–3) Yr.  
Mr. Leibenstein, Mr. Sen  
Theory of economic change; applications to the development of underdeveloped eco-  
nomics; relation of such theories to general economic theory. Institutional patterns of  
development; population problems, changes in resource and product composition.  

206. Linear Models in Economic Theory. (3) I.  
Mr. Vind  
Prerequisite: course 200A–200B or equivalent, Mathematics 190A–190B.  
An introduction to linear programming and input-output analysis.  

207A–207B. Mathematical Economics. (3–3) Yr.  
Mr. Vind, Mr. Debreu  
Prerequisite: two years of calculus, one semester of linear algebra, one semester of  
upper division probability.  
Mathematical analysis of economic theory. The problems treated involve as wide a  
range of mathematical techniques and of economic topics as possible, including theories  
of utility, personal probability, value, games, growth, stability and dynamic program-  
ming.  

208. Mathematical Economics Seminar. (3) I and II.  
Mr. McFadden, Mr. Vind  
Prerequisite: 207A–207B and consent of instructor.  
Primarily for students at the dissertation stage. May be repeated for credit.  

216. Seminar in Comparative Economic Systems and Planning. (3) II.  
Mr. Sherman  
Advanced topics in comparative economic systems, planning, the Soviet economy, the  
economy of Communist China, social reform movements, and related subjects. The topics  
will be announced annually.  
I. Sec. 1: comparative economic systems.  
II. Sec. 1: comparative economic systems; Sec. 2: advanced topics in the Communist  
Chinese economy.  

217. Applications of National Economic Programming. (3) II.  
Mr. Ward  
Prerequisite: course 206 and 240.  
Investigation of selected national economic programs for growth and development in  
the light of modern theoretical and statistical tools. Each student will prepare a report  
on one such program.  

217L. Laboratory in National Economic Programming. (2) II.  
Prerequisite: course 217.  
Guided team research on selected applied aspects of national economic programming  
for growth and development.  

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. Public policies affecting competition  
and monopoly.  

*Not to be given, 1964–1965.
222. Economic Analysis of Public Services. (3) II.
Economic behavior of government agencies and criteria for selection and operation of public services. Special attention to transportation, water and other natural resources, and metropolitan government.

230A–230B. Public Finance. (3–3) Yr. Mr. Rolph
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. Minsky, Mr. Ellis
Analysis of banking institutions and money, monetary theory, and monetary policy.

236. Seminar in Economic Policy. (3) II. Mr. Minsky, Mr. Ulman, Mr. Gordon
Prerequisite: graduate work in economic theory and one or more applied fields. Analysis of important questions of contemporary economic policy in the United States and other countries. The precise topics will vary from year to year.

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.

240. Introduction to Econometrics. (3) II. Mr. Jorgenson
Prerequisite: Mathematics 190A or equivalent. Problems in the application of statistical methods in economics, illustrated by a representative selection of empirical studies.

241A–241B. Econometrics. (3–3) Yr. Mr. Jorgenson
Prerequisite: Mathematics 190A–190B or equivalent, Statistics 131. Recommended: Statistics 132.

242. Econometrics Seminar. (3) I and II. Mr. Jorgenson, Mr. Winter
Prerequisite: course 241A–241B or equivalent, and consent of instructor. Primarily for students at the dissertation stage. May be repeated for credit.

*250A–250B. Advanced Labor Economics. (3–3) Yr.
Prerequisite: two courses in labor and consent of 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. Kerr, Mr. Ross, Mr. Ulman

*254A–254B. Seminar in Agricultural Labor in Advanced and in Underdeveloped Countries. (3–3) Yr.
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.

* Not to be given, 1964–1965.
290A–290B. International Economics. (3–3) Yr. Mr. Scitovsky, Mr. Letiche

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. Seminar in Economic Development Problems. (3) II.

Mr. Leibenstein

Prerequisite: course 205A or permission of instructor. Open to qualified undergraduate as well as graduate students.

Studies in the theory of economic development and research on current problems of underdeveloped countries.

298. Research. (1–6) I and II.

The Staff

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.

Berkeley–Stanford Mathematical Economics Seminar. (No credit).

Research papers are read by resident and visiting staff. Mr. Radner in charge

Economic History

All of the courses in this section are acceptable for major credit in economics.

Upper Division Courses

112A–112B. Economic History of Europe. (3–3) Yr. Mr. Cipolla

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.

Mr. Fishlow, Mr. Landauer

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.

Graduate Courses

210A–210B. Advanced Study in Economic History. (3–3) Yr. Mr. Rosovsky, Mr. Fishlow

Prerequisite: consent of instructor.

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: selected problems in the comparative study of industrialization, Mr. Rosovsky. Economics graduate students who intend to write their thesis in the field of economic history must take Economics 210A, Section 1, in the fall semester.

210B. Sec. 1: quantitative techniques and economic theory. Mr. Fishlow, Mr. Rosovsky.

212. Topics in Economic History. (3) I and II.

Mr. Cipolla, Mr. Fishlow, Mr. Rosovsky

The History requirement may be satisfied by taking any one of the following courses:

212A. The Rise of Capitalism. I. Mr. Cipolla

212B. The Industrial Revolution in Europe. I. Mr. Rosovsky

212C. Economic Growth of the United States. I. Mr. Fishlow

212D. Economic Growth in Follower Countries: Cases of Japan and Russia. II. Mr. Rosovsky

1 In residence.
Economics of Agricultural Production and Consumption. (Agricultural Economics 200A–200B.) (3–3) Yr. Mr. Hoch,

Rural Sociology. (Agricultural Economics 112A–112B.) (2–2) Yr. Mr. McEntire

Survey of Algebra and Analysis. (Mathematics 190A–190B.) (3–3) Yr.

Introduction to Social Science. (Social Science 1A–1B.) (3–3) Yr. Mr. Hoch in charge

Game Theory. (Statistics 168.) (3) II. Mr. Blackwell

Dynamic Programming. (Statistics 169.) (3) I. Mr. Radner

Statistical Inference for Social Scientists. (Statistics 131.) (3) I and II. Mr. Kuznets

Laboratory Course in Statistical Inference for Social Scientists. (Statistics 131L.) (1) I and II. Mr. Kuznets in charge

EDUCATION

(Department Office, 1501 Tolman Hall)

Harold D. Carter, Ph.D., Professor of Education.
Thomas Bentley Edwards, Ph.D., Professor of Education.
Jack A. Holmes, Ph.D., Professor of Education.
James L. Jarrett, 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.
J. Cecil Parker, Ed.D., Professor of Education.
Theodore L. Reller, Ph.D., Professor of Education (Chairman of the Department).

David H. Russell, Ph.D., Professor of Education.
James C. Stone, Ed.D., Professor of Education and Head of Teacher Education.

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.
William A. Brownell, Ph.D., LL.D., Professor of Education, Emeritus.
Guy T. Buswell, Ph.D., LL.D., Professor of Education, 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.

1 In residence fall semester only, 1964–1965.
George C. Kyte, Ed.D., Professor of Education, Emeritus.
Edgar L. Morphet, Ph.D., Professor of Education, Emeritus.
Lars H. Peterson, Ph.D., Associate Professor of Education, Emeritus.
Charles S. Benson, Ph.D., Associate Professor of Education.
Burton R. Clark, Ph.D., Associate Professor of Education.
Abraham S. Fischler, Ed.D., Associate Professor of Education.
Arthur R. Jensen, Ph.D., Associate Professor of Education.
Walter D. Loban, Ph.D., Associate Professor of Education.
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.
Arden K. Ruddell, Ed.D., Associate Professor of Education.
Lloyd F. Scott, Ph.D., Associate Professor of Education and Coordinator of Laboratory Schools.
Lawrence H. Stewart, Ed.D., Associate Professor of Education.
Martin A. Trow, Ph.D., Associate Professor of Education and of Sociology.
Joe L. Byers, Ph.D., Assistant Professor of Education.
John G. Hurst, Ph.D., Assistant Professor of Education.
Geraldine Jonchich, Ed.D., Assistant Professor of Education.
Leonard A. Marascuilo, Ph.D., Assistant Professor of Education.
Robert W. Moulton, Ph.D., Assistant Professor of Education.
John L. Rimm, Ed.D., Assistant Professor of Education.
Robert B. Ruddell, Ed.D., Assistant Professor of Education.
Malcolm J. Slakter, Ph.D., Assistant Professor of Education.
William A. Watts, Ph.D., Assistant Professor of Education.
Alan B. Wilson, Ph.D., Assistant Professor of Education.

David W. Brokensha, Ph.D., Lecturer in Education.
Enoch Dumas, Ed.D., Lecturer in Education, Associate Head of Teacher Education, and Supervisor of Elementary Education.
Mae J. Durham, B.L.S., Lecturer in Librarianship.
Harold J. Dyck, B.A., Acting Assistant Professor of Education.
Joseph L. Fischer, M.A., Lecturer in Education.
Barbara Kirk, M.A., Lecturer in Education.
George H. Kyme, Ph.D., Lecturer in Music and Supervisor of the Teaching of Music.
William D. Rohwer, Jr., A.B., Acting Assistant Professor of Education.
John G. Ross, Ed.D., Lecturer in Education.
Karl E. Schevill, Ph.D., Lecturer in Education, Associate Head of Teacher Education, and Supervisor of the Teaching of Foreign Languages.
Harry Dale Tillery, M.A., Lecturer in Education and Supervisor of the Junior College Leadership Program.

1 In residence fall semester only, 1964–1965.
Letters and Science List. Course 100A, and not more than 3 units from 105A-105B are included in the Letters and Science List of Courses. For regulations governing this list, see page 91.

Departmental Advisers: Mr. Jarrett, Mr. Lund, Mr. Reller.

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 junior 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**

100A. Learning and the Learner. (2) I and II.

Mr. Byers, Mr. Hurst, Mr. Watts, Mr. Rohwer

Sections will be devoted to areas such as: Educational Psychology; Survey; Child Development; Adolescent Development; Intellectual Processes; Current Topics in Educational Psychology.

100B. The School in American Society. (2) I and II.

Mr. Edwards, Miss Joncich, Mr. Loban, Mr. Lund, Mr. Schevill, Mr. Stone

Development and operation of the school as a social institution; current purposes and programs; roles of school personnel; relation to other social agencies; professional and legal aspects of teaching.

101. History of Education—General Course. (3) I.

Mr. Mosier

The development of educational thought and practice viewed as a phase of social progress.

102. History of American Education. (2) I and II. Miss Joncich, Mr. Mosier

The leading ideas and ideals of American education and the institutions in which they have been embodied.

§105A–105B. Introduction to Comparative Education. (2–2) Yr. Mr. Fischer

106. Contemporary Educational Thought. (2) II.

Mr. Mosier

109. Problems in the Sociology of Education. (3) I.

Mr. Wilson

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 Psychology of Reading. (2) I.

Prerequisite: Psychology 1A or equivalent.

Mr. Holmes

114. Statistical Methods in Education. (3) I and II.

Prerequisite: Psychology 1A or equivalent and consent of instructor. Mathematics D recommended.

Mr. Marascuilo, Mr. Slakter

115. Informal Evaluation Techniques. (2) I and II.

Prerequisite: Psychology 1A or equivalent.

Mr. Holmes

116. The Exceptional Child. (2) I.

Prerequisite: Psychology 1A or equivalent.

117. Psychology of High School Subjects. (2)

Prerequisite: Psychology 1A or equivalent.

119. Standard Tests in Education. (3) I and II.

Prerequisite: Psychology 1A or equivalent.

Mr. Carter

127. Principles of Teaching the Slow Learner. (2) II.

Prerequisite: Psychology 1A or equivalent and teaching experience. Teaching experience may be satisfied through student teaching and may be taken concurrently.

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* Not to be given, 1964–1965.

§ Approved for one offering only 1964–1965.
130. The Elementary School Curriculum.
Purposes, content, organization, instructional materials, and evaluation of subjects in the curriculum.
130A. Arithmetic. (2) I and II.  
Prerequisite: Decorative Art 6A, Music 10.  
Mr. Dumas, Mr. Scott
130B. Art and Music. (2) I.  
Mrs. Aubin, Mr. Kyme, Mr. Luca
130C. Reading and the Other Language Arts. (3) I and II.  
Mr. R. Ruddell
130D. Social Studies. (2) I and II.
130E. Foreign Languages. (2) I and II.  
Prerequisite: consent of instructor.
130F. Science. (2) I and II.  
Mr. Fischler

153. Mental Hygiene—Elementary. (2) I and II.  
Prerequisite: Psychology 1A or equivalent.
Basic course concerned with problems of childhood.

*154. Mental Hygiene—Advanced. (2) I.  
Prerequisite: course 153 or 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. Rinn
Nature, scope, organization, and administration of personnel services in educational institutions. Basic guidance techniques. For nonmajors in student personnel and counseling psychology.

167. Personality Theory in Counseling. (2) II.  
Mr. Moulton
Prerequisite: consent of instructor.
Critical analysis of personality theories and their relationships to counseling theories.

172. Junior High School Education. (2) I.  
Mr. Loban

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.

177. Investigations of the Curriculum in Science Education. (2) I.  
Mr. Fischler
Prerequisite: secondary science credential; or elementary school credential and Physics 11A-11B, or Biology 11A-11B, or consent of instructor.

181. Introduction to Adult Education. (3) I and II.  
Mr. London
The role of adult education in an industrial society.

*182. Problems of Adulthood. (3) II.  
Mr. London
Problems of work, leisure, and aging.

*186. Laws Relating to Schools and to Children. (2) II.  
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. Reller 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

* Not to be given, 1964–1965.
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.
Mr. Clark, Mr. Fischer, Miss Joncich
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 and II.
Prerequisite: Psychology 1A or equivalent.
A systematic course designed to organize and to integrate the field of educational psychology at an advanced level.

200C. Foundations of Curriculum Development. (3) I.
Mr. Parker
General concepts, principles, and practices of public school curriculum planning.

200D. Public School Organization and Administration. (3) I and II.
Mr. Dyck
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
Admission on consultation with the instructor.
The theory and practice of historical inquiry as applied to research in the history of education.

203. Problems in the History of Education. (2) I.
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.

205. Problems in Comparative Education.
The different subdivisions deal with the recent history and present status of education in the countries and areas mentioned, with educational problems and programs common to newly developing countries, and with community development as an educational and organizational process.

205A. Soviet Russia. (2) I.
205B. Western Europe. (2) II.
205C. Asian Countries. (2) I and II.
205D. Latin American Countries. (2) I and II.
205E. Newly Developing Countries. (2) I and II.
205F. International Community Development. (2) II.

206A–206B. Philosophy of Education. Readings and Research. (2–2) Yr.
Mr. Lilge

209. Selected Problems in the Philosophy of Education. (2) I.
Mr. Jarrett

210. The Learning Process. (2) I and II.
Prerequisite: Psychology 1A or equivalent.

* Not to be given, 1964–1965.
### Course Descriptions

#### 211B. Children’s Thinking. (2) I.
- **Instructor:** Mr. Russell
- *Description:* Children’s thinking with special reference to influences of home and school, and development of concepts, problem-solving abilities, critical thinking, and creative thinking.

#### 212. Analysis of Difficulties in Reading and Language Arts. (2) II.
- **Instructor:** Mr. Holmes
- *Description:* 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) II.
- **Instructor:** Mr. Hurst
- *Description:* Prerequisite: course 114 or equivalent and consent of instructor. The history and techniques of individual intelligence testing. The theory of individual intelligence testing is emphasized, some supervised practice in administering, scoring and interpreting both the Stanford-Binet and the Wechsler-Bellevue scales is a regular requirement.

#### 214. Topics in Educational Statistics. (2) I and II.
- **Instructor:** Mr. Marascuilo, Mr. Slakter
- *Description:* Prerequisite: course 114 or equivalent and consent of instructor. Topics in statistics. Contents will vary from year to year. I. Nonparametric techniques; analysis of variance. II. Scaling; regression and correlation.

#### 215. Advanced Educational Psychology.
- **Instructor:** Mr. Carter
- *Description:* Prerequisite: course 114 or equivalent and consent of instructor. A systematic and critical appraisal of the scientific literature of the field. Primarily for doctoral candidates in educational psychology.

#### 215A. Principles and Theories of Psychological Measurement. (4) II.
- **Instructor:** Mr. Carter
- *Description:* The development and application of methods of measuring human behavior, including intelligence, interests, attitudes, adjustments, etc.

#### 215B. Learning Theory. (4) I.
- **Instructor:** Mr. Hurst
- **Instructor:** Mr. Watts

#### 215C. Human Development: Individual Differences. (4) I.
- **Instructor:** Mr. Hurst

#### 215D. Human Development: Personal and Social. (4) II.
- **Instructor:** Mr. Watts

#### 217A. Experimental Education. (2) I.
- **Instructor:** Mr. Holmes
- *Description:* Prerequisite: course 114 or equivalent and consent of instructor. Laboratory experiments applied to the various school subjects. Voice recording, photographing eye movements in reading and spelling, analysis of rhythm in reading, arithmetic, and writing, and studies of the motor responses accompanying appreciation.

#### 217B. Experimental Education. (2) II.
- **Instructor:** Mr. Holmes
- *Description:* Prerequisite: course 217A. Course 215B and a course in the analysis of variance are recommended. Students expected to complete an advanced laboratory project.

### 218. Investigations in the Elementary School Curriculum.
- *Research in the curriculum; students will have an opportunity to specialize in a selected area.*

#### 218A. Psychological Bases. (2) I.
- **Instructor:** Mr. Russell

#### 218B. Reading. (2) II.
- **Instructor:** Mr. R. Ruddell

#### 218C. Speaking, Listening, Writing. (2) II.
- **Instructor:** Mr. A. Ruddell
- **Instructor:** Mr. Michaelis
- **Instructor:** Mr. Fischler

#### 218D. Arithmetic. (2)

#### 218E. Social Studies. (2) I and II.

#### 218F. Science. (2) II.
- *Prerequisite: courses 177 and 114 or equivalents.*

#### 226. Curriculum Development. (2) II.
- **Instructor:** Mr. Parker
- *Description:* Principles and operational techniques of public school curriculum construction.

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*Not to be given, 1964–1965.*
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 instructor. Designed 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) II. 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.

233A-233B. Supervision of Elementary Education Practicum. (2-2) Yr.
Prerequisite: consent of instructor. Mr. Fischler

235. The Elementary School Curriculum. (2) I and II.
Prerequisite: consent of instructor.

236A-236B. Evaluation of Elementary Education. (2-2) Yr.
Mr. Fischler

237. Trends in Elementary Education. (2) I and II. Mr. Michaelis
Current practices, issues, and problems descriptive of the emerging elementary school.

241A-241B. Introduction to Educational Administration. (4-4) Yr.
Mr. Ross, Mr. Swanson
Prerequisite: consent of 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.

Prerequisite: course 241A-241B and consent of 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. Dyck, 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) II.
Mr. Swanson

242D. Finance and Business Administration. (2-4) I and II.
Mr. Benson, Mr. Ross

242E. School-Community Relations and Schoolhousing. (2-4) I and II.
Mr. Swanson, Mr. Watts

242F. Analysis of Administrative Theories. (2-4) I and II.
Mr. Clark, Mr. Dyck
Prerequisite: course 241A-241B or 285.

243. Administration of the Individual School. (2) II. Mr. Edwards
Principles and practices in the organization and administration of the elementary and secondary school.

261. Student Personnel and Counseling Psychology.
Prerequisite: consent of instructor. Primarily for students working for graduate degrees in this field or for the pupil personnel services credential. The sections are designed to organize and integrate the field at an advanced level.

* Not to be given, 1964–1965.
§ Approved for one offering only, 1964–1965.
261A. Principles and Theories of Guidance. (2) I and II.  
Mr. Stewart  
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 and II.  
Mr. Rinn  
Theories of environmental interaction in personal adjustment and the counseling process. Labor market dynamics, occupational surveys and studies, investigation of training opportunities. Sources and interpretation of data.

261C. Group Guidance. (2) I and II.  
Mr. Rinn  
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) I.  
Mr. Stewart  
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.  
Mr. Moulton  
Prerequisite: course 261 and consent of 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: teaching credential, and consent of instructor.  
For advanced students. A 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 instructor.

273. Supervision in Secondary Schools. (2) I.  
Mr. Edwards  
Prerequisite: teaching credential, and consent of instructor.  
The organization, function, and techniques of secondary school supervision.

275. Secondary Education: Survey. (2) I.  
Mr. Lund  
Survey and critical review of secondary education and related literature. Admission on consultation with the instructor.

279. The Junior College. (2–3)  
Sec. 1. (2–3) I and II.  
Mr. Medsker  
Sec. 2 (2–3) I. Limited to students in the Junior College Leadership Program.  
Mr. Tillery  
The nature and role of the junior college in American society including a consideration of purposes, curriculum, characteristics of students, and the implications for instruction and student personnel services.

281A–281B. Adult Education Seminar. (2–2) Yr.  
Mr. McConnell  
Prerequisite: course 181 or experience in adult education.  
Social forces which create and mold various designs of adult education.

285. Higher Education in the United States. (3) I and II.  
Mr. Jarrett, Mr. McConnell  
Trends and problems, with emphasis on functions and educational programs; admission and counseling of students; instructional problems; and administration, control, and financing.

§288. Advanced Study in Higher Education.  
Prerequisite: course 285 or consent of instructor.  
Intensive study of the following problems in higher education:  

288A. The Student in Higher Education. (2) I.  
Mr. McConnell  

* Not to be given, 1964–1965.

§ Approved for one offering only, 1964–1965.
288B. The Curriculum of Higher Education. (2) II.
Prerequisite: course 288A.

288C. The Administration of Higher Education. (2) II.

288D. Teacher Education. (2) II.
Prerequisite: course 288A.

288E. Problems in Junior College Administration. (2) II.
Prerequisite: course 279.

292. Research Techniques. Seminar. (2) I.
Mr. McCollum
Mr. McConnell
Mr. Stone
Mr. Medsker

293. Surveys and Field Studies. (2) I and II.
Mr. Ross

294. Seminar. (2–4) I and II.
Prerequisite: consent of instructor.
Required of all master's and doctor's candidates in connection with seminar papers and dissertations.

A. Adult Education. I.
Mr. London
B. Educational Administration. I and II.
Mr. Dyck, Mr. Reller, Mr. Swanson
C. Educational Curriculum. I and II.
Mr. Parker
D. Educational Psychology. I and II.
Mr. Carter, Mr. Tyler
Prerequisite: course 114 or equivalent and consent of instructor.
E. Educational Sociology.
Mr. Trow
F. Elementary Education. I and II.
Mr. Fischler, Mr. Michaelis, Mr. R. Ruddell, Mr. Russell
G. Higher Education. I and II.
Mr. McConnell, Mr. Medsker, Mr. Stone
H. History of Education.
Mr. Mosier
I. Philosophy of Education. I and II.
Mr. Lilge
J. Secondary Education. I and II.
Mr. Loban
K. Student Personnel and Counseling Psychology. I and II.
Mr. Moulton, Mr. Rinn, Mr. Stewart

298. Directed Research Seminar. (2–4) I and II.
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.

Sec. 1. (2–4) I and II.
The Staff (Mr. Reller in charge)
Sec. 2. (4) I. Topic: Teaching Machines and Programmed Instruction.
Mr. Tyler
Sec. 3. (4) II. Topic: Psychology of Classroom Learning.
Mr. Tyler
Sec. 4. (2–4) I. Topic: Social Studies Curriculum.
Mr. Michaelis

313. School Psychologist Internship. (4) II.
Prerequisite: course 213 and consent of 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, Mr. Moulton, Mr. Stewart
Prerequisite: consent of 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.
Prerequisite: course 241A–241B and 293, and consent of instructor.

* Not to be given, 1964–1965.
Supervised Teaching

The University will accept only those candidates who meet the requirements set up by the State Board of Education.
Education 320A, 320B, 320C, 320E, 323 and 324 are scheduled as extra-session courses, to begin with the opening of the University and to end with the closing of the semester in the public schools.

320A. Secondary Supervised Teaching. (3) I and II.
Lectures, conferences, and supervised teaching. Mr. Schevill, and Supervisory Staff

320B. Introduction to Teaching in Secondary Schools. (2) I and II.
Mr. Schevill, and Supervisory Staff
Conferences, observations, and supervised teaching.

320C. Supervised Teaching. (3) I and II.
Mr. Schevill, and Supervisory Staff
Conferences, observations, and supervised teaching.

320E. Procedures, Materials, and Curriculum. (2) I and II.
Supervisory Staff
A course concerned with the curriculum, instructional procedures, and related learning materials of specific subject-matter areas commonly taught in secondary schools.

School Library Administration (Liberarianship 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 and Supervisory Staff
Prerequisite: a course in supervised teaching 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 with the opening of the University and ending with the semester in the public schools.

324. Junior College Supervised Teaching. (3) I and II.
Mr. Schevill
Conferences, observation, and supervised teaching.
Note that this is an extra-session course, beginning with the opening of the University and ending with the semester in the public schools. Enrollment is limited to available facilities.

The University will accept only those candidates who meet the requirements set up by the State Board of Education.
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 330C.
Education 330C is scheduled as an extra-session course, to begin and end with the semester in the public schools.

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. Enrollment is limited to available facilities.

330C. Elementary Supervised Teaching. (8) I and II.
Mr. Dumas, and Supervisory Staff
Prerequisites: Two or more units in course 100A or equivalents; two or more units in 100B or equivalents; six or more units from 130A, 130C, 130D, 130E, 130F; 330A; Decorative Art 6A; Music 110; Mathematics 5 (section for elementary teacher candidates); Physical Education 12 (sections on elementary school activities); two semesters of laboratory science. Note that two units of the above may be taken concurrent with courses 330C and 330E. Enrollment limited to available facilities.
Conferences, observation, and supervised teaching.

330E. Methods of Teaching in Elementary School. (2) I and II.
Mr. Dumas, and Supervisory Staff
Restricted to candidates for the 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.

*370. Speech Defects and Disorders with Corrective Techniques. (2) II.
Prerequisite: course 100A or former course 110.
Designated 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 speech correction classes in the public schools 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) I and II.
Music 328A–328B. Vocal Technique and Methods of Teaching Voice. (2–2) Yr.
   329. Instrumental Methods.
      329A. Stringed Instruments. (1) I and II.
      329B. Brass Instruments. (1) I.
      329C. Woodwind Instruments. (1) I.
      329E. Orchestra and Band Repertory: Survey and Performance. (1) II.
   330. Choral Repertory. (1) II.

Physical Education Upper Division Courses for Women.
   160A. Theory of Dance. (3) II.
   165A. Theory of Group Athletics. (3) I.
   165B. Theory of Gymnastics. (2) I.
   166. Theory of Individual Athletics. (2) II.

Physical Education Methods Courses for Men.
   340. The Theory and Teaching of Aquatics. (1) I and II.
   341. The Theory and Teaching of Gymnastics and Individual Adapted Activities. (1) I.
   342. The Theory and Teaching of Combative Activities. (1) II.
   344. The Theory and Teaching of Field Sports. (2) II.
   345. The Theory and Teaching of Court Sports. (2) I.

* Not to be given, 1964–1965.
Education Field Service Center

The Field Service Center is an administrative unit of the Department of Education. The Center’s principal purpose is to make available to schools and other educational organizations of California resources to assist them in solving problems by working with laymen and professional people in cooperative efforts to find practical solutions. The administrative heads of the Center are also members of the faculty of the School of Education. Policies and plans are formulated by a departmental Field Service Committee which is assisted by an advisory group representing the State Department of Public Instruction, large and small school districts, county schools, and other departments of the University.

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)

Hydraulic and Sanitary Engineering

(Division Office, 113 Engineering Building)

Hans Albert Einstein, D.S.T., Professor of Hydraulic Engineering.

Joe W. Johnson, M.S., Professor of Hydraulic Engineering and Director, Hydraulic Engineering Laboratory (Chairman of the Division of Hydraulic and Sanitary Engineering).

Warren J. Kaufman, Sc.D., Professor of Sanitary and Radiological Engineering.

Percy H. McGauhey, M.S., Professor of Sanitary Engineering, Professor of Public Health Engineering and Director, Sanitary Engineering Research Laboratory (Chairman of the Department of Civil Engineering).

Gerald T. Orlob, Ph.D., Professor of Civil Engineering.

Erman A. Pearson, Sc.D., Professor of Sanitary Engineering.

Bernard D. Tebbens, Sc.D., Professor of Industrial Hygiene Engineering.

*David K. Todd, Ph.D., Professor of Civil Engineering.

Robert L. Wiegel, M.S., Professor of Civil 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.

James A. Harder, Ph.D., Associate Professor of Civil Engineering.

William J. Oswald, Ph.D., Associate Professor of Sanitary Engineering, and Associate Professor of Public Health.
Jerome F. Thomas, Ph.D., Associate Professor of Sanitary Engineering.
David I. Jenkins, Ph.D., Assistant Professor of Sanitary Engineering.
Robert I. Selleck, Ph.D., Assistant Professor of Sanitary 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.
Howard D. Eberhart, M.S., Professor of Civil Engineering.
*Tung-Yen Lin, M.S., Professor of Civil Engineering.
Joseph Penzien, Sc.D., Professor of Civil Engineering.
Karl S. Pister, Ph.D., Professor of Civil Engineering (Vice-Chairman of the Division).
Milos Polivka, M.S., Professor of Civil Engineering.
Egor P. Popov, Ph.D., Professor of Civil Engineering.
Jerome M. Raphael, S.M., Professor of Civil Engineering.
Alexander C. Scordelis, M.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.
Joe W. Kelly, B.S., Professor of Civil Engineering, Emeritus.
George E. Troxell, B.S., Professor of Civil Engineering, Emeritus.
*Vitelmo Bertero, Sc.D., Associate Professor of Civil Engineering.
Jack G. Bouwkamp, C.I., Associate Professor of Civil Engineering.
Hugh D. McNiven, Ph.D., Associate Professor of Civil Engineering.
David Pirtz, M.S., Associate Professor of Civil Engineering.
Jerome L. Sackman, Eng.Sc.D., Associate Professor of Civil Engineering.
Charles F. Scheffey, M.S., Associate Professor of Civil Engineering.
Colin B. Brown, Ph.D., Assistant Professor of Civil Engineering.
Jacob Lubliner, Ph.D., Assistant Professor of Civil Engineering.
Robert L. Taylor, M.S., Assistant Professor of Civil Engineering.
Marc R. P. Traubert, Ph.D., Assistant Professor of Civil Engineering.

Henry J. Degenkolb, B.S., Lecturer in Civil Engineering.
Alexander Klein, M.S., Lecturer in Civil Engineering.


**Transportation Engineering**

*(Division Office, 107 Engineering)*

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* (Chairman of the Division).

Paul F. Keim, M.Sc., *Professor of Civil Engineering*.

W. Norman Kennedy, B.S., *Professor of Transportation Engineering*, and *Assistant Director of the Institute of Transportation and Traffic Engineering*.

Francis H. Moffitt, M.C.E., *Professor of Civil Engineering*.

Harry Bolton Seed, Ph.D., *Professor of Civil Engineering*.


Ralph A. Moyer, M.S., C.E., Sc.D. (hon.), *Professor of Transportation Engineering*, Emeritus.

James K. Mitchell, Sc.D., *Associate Professor of Civil Engineering*.

Carl L. Monismith, M.S., *Associate Professor of Civil Engineering*.

Walter E. Gillfillan, M.Eng., *Lecturer in Transportation Engineering*.

Wolfgang S. Homburger, M.S., *Lecturer in Transportation Engineering*.

James H. Kell, M.S.C.E., *Lecturer in Transportation Engineering*.


**ELECTRICAL ENGINEERING**

*(Department Office, 231 Cory Hall)*

Diogenes J. Angelakos, Ph.D., *Professor of Electrical Engineering* and Acting Director, *Electronics Research Laboratory*.

Charles K. Birdsall, Ph.D., *Professor of Electrical Engineering*.

Leonard J. Black, Ph.D., *Professor of Electrical Engineering*.

Charles F. Dalziel, E.E., *Professor of Electrical Engineering*.

Charles A. Desoer, Sc.D., *Professor of Electrical Engineering* (Vice-Chairman of the Department).

David C. Evans, Ph.D., *Professor of Electrical Engineering* and Associate Director, *Computer Center*.

Arthur M. Hopkin, Ph.D., *Professor of Electrical Engineering* (Vice-Chairman of the Department).

Harry D. Huskey, Ph.D., *Professor of Electrical Engineering* and of Mathematics.


Ernest S. Kuh, Ph.D., *Professor of Electrical Engineering*.

* In residence spring semester only, 1964–1965.
Paul L. Morton, Ph.D., Professor of Electrical Engineering.

Donald O. Pederson, 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.

Samuel Silver, Ph.D., Professor of Engineering Science and Director, Space Sciences Laboratory.

Otto J. M. Smith, Ph.D., Professor of Electrical Engineering.

Charles Susskind, Ph.D., Professor of Electrical Engineering.

Shyh Wang, Ph.D., Professor of Electrical Engineering.

John R. Whinnery, Ph.D., Professor of Electrical Engineering.

Lotfi A. Zadeh, Ph.D., Professor of Electrical Engineering (Chairman of the Department).

Lester E. Reukema, Ph.D., Professor of Electrical Engineering, Emeritus.

Herbert J. Scott, E.E., Professor of Electrical Engineering, Emeritus.


Albert C. English, Ph.D., Associate Professor of Electrical Engineering.

Thomas E. Everhart, Ph.D., Associate Professor of Electrical Engineering.

Arthur Gill, Ph.D., Associate Professor of Electrical Engineering.

Jerome R. Singer, Ph.D., Associate Professor of Electrical Engineering.

David H. Sloan, Ph.D., Associate Professor of Electrical Engineering.

Aram J. Thomasian, Ph.D., Associate Professor of Electrical Engineering and of Statistics.

Alvin W. Trivelpiece, Ph.D., Associate Professor of Electrical Engineering.

George L. Turin, Sc.D., Associate Professor of Electrical Engineering.

Theodore Van Duzer, Ph.D., Associate Professor of Electrical Engineering.

John R. Woodyard, Ph.D., Associate Professor of Electrical Engineering.

James H. Eaton, Ph.D., Assistant Professor of Electrical Engineering.

Edmund Eisenberg, Ph.D., Assistant Professor of Electrical Engineering and of Industrial Engineering.

Ivan T. Frisch, Ph.D., Assistant Professor of Electrical Engineering.

Michael A. Harrison, Ph.D., Assistant Professor of Electrical Engineering.

Allan J. Lichtenberg, M.S., Assistant Professor of Electrical Engineering.

Kenneth K. Mei, Ph.D., Assistant Professor of Electrical Engineering.

Richard S. Muller, Ph.D., Assistant Professor of Electrical Engineering.

William G. Oldham, Ph.D., Assistant Professor of Electrical Engineering.

Robert S. Pepper, Ph.D., Assistant Professor of Electrical Engineering.

Elijah Polak, Ph.D., Assistant Professor of Electrical Engineering.

David J. Sakrison, Sc.D., Assistant Professor of Electrical Engineering.

Willard H. Wattenburg, Ph.D., Assistant Professor of Electrical Engineering.

William J. Welch, Ph.D., Assistant Professor of Electrical Engineering.


2 In residence spring semester only, 1964–1965.
Richard M. White, Ph.D., Assistant Professor of Electrical Engineering.
Eugene Wong, Ph.D., Assistant Professor of Electrical Engineering.

Stirling A. Colgate, Ph.D., Lecturer in Electrical Engineering.
Jose Bejai Cruz, Jr., Ph.D., Visiting Associate Professor of Electrical Engineering.
Roman Kulikowski, D.Tech.Sc., Visiting Professor of Electrical Engineering.
Roger F. W. Pease, B.A., Acting Assistant Professor of Electrical Engineering.
Paul O. Vogelhut, Ph.D., Acting Assistant Professor of Electrical Engineering.

INDUSTRIAL ENGINEERING
(Department Office, 201 Building T-4)
George B. Dantzig, Ph.D., Professor of Engineering Science.
Louis E. Davis, M.S., Professor of Industrial Engineering.
E. Paul DeCarmo, M.S., Professor of Industrial Engineering.
Raymond C. Crassi, M.S., Professor of Industrial Engineering.
*Ronald W. Shepard, Ph.D., Professor of Engineering Science.
E. R. F. W. Grossman, Ph.D., Associate Professor of Industrial Engineering.
*William S. Jewell, Sc.D., 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.
Robert M. Oliver, Ph.D., Associate Professor of Industrial Engineering (Chairman of the Department).
Richard E. Barlow, Ph.D., Assistant Professor of Industrial Engineering.
Edmund Eisenberg, Ph.D., Assistant Professor of Industrial Engineering and Electrical Engineering.
Ronald W. Wolff, Ph.D., Assistant Professor of Industrial Engineering.

Frank Proschlan, Ph.D., Lecturer in Industrial Engineering.

MECHANICAL ENGINEERING
(Department Office, 320 Engineering Building)
Aeronautical Sciences
(Division Office, 203 Mechanics Building)
Edmund V. Laitone, Ph.D., Professor of Aeronautical Sciences (Chairman of the Division).
George J. Maslach, B.S., Professor of Aeronautical Engineering.
Antoni K. Oppenheim, Ph.D., Professor of Aeronautical Sciences.
Samuel A. Schaaf, Ph.D., Professor of Engineering Science (Chairman of the Department of Mechanical Engineering).

Lawrence Talbot, Ph.D., Professor of Aeronautical Sciences.
Gilles M. Corcos, Ph.D., Associate Professor of Aeronautical Sciences.
Frederick S. Sherman, Ph.D., Associate Professor of Aeronautical Sciences.
Stanley A. Berger, Ph.D., Assistant Professor of Aeronautical Sciences.
D. Roger Willis, Ph.D., Assistant Professor of Aeronautical Sciences.

Maurice Holt, Ph.D., Professor of Aeronautical Sciences in Residence for the fall semester.
Franklin C. Hurlbut, Ph.D., Associate Professor of Aeronautical Sciences in Residence.

Applied Mechanics
(Division Office, 120 Building T-7)
Werner Goldsmith, Ph.D., Professor of Applied Mechanics.
*Chieh S. Hsu, Ph.D., Professor of Applied Mechanics.
George Leitmann, Ph.D., Professor of Engineering Science.
Paul Lieber, Ph.D., Professor of Engineering Science.
Paul M. Naghdi, Ph.D., Professor of Engineering Science (Chairman of the Division).
Reinhardt M. Rosenberg, M.S., Professor of Applied Mechanics.
Walter W. Soroka, Sc.D., Professor of Acoustical Sciences.
Cyril P. Atkinson, M.S., M.E., Associate Professor of Applied Mechanics.

Stephen H. Crandall, Ph.D., Visiting Professor of Applied Mechanics.
John A. DeRuntz, Ph.D., Acting Assistant Professor of Applied Mechanics.
Ian N. Sneddon, M.A., Visiting Professor of Applied Mechanics for the spring semester.
Charles R. Steele, Ph.D., Lecturer in Applied Mechanics.

Heat-Power Systems
(Division Office, 215 Engineering Building)
Israel I. Cornet, Ph.D., Professor of Mechanical Engineering.
Warren H. Giedt, Ph.D., 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. Iversen, M.S., Professor of Mechanical Engineering.
Harold A. Johnson, M.S., Professor of Mechanical Engineering.
* Alan D. K. Laird, Ph.D., Professor of Mechanical Engineering.
Ralph A. Seban, Ph.D., Professor of Mechanical Engineering.

Ernest S. Starkman, M.S., Professor of Mechanical Engineering (Chairman of the Division).
Carl J. Vogt, M.S., Professor of Mechanical Engineering, Emeritus.
Leonard Farber, M.S., Associate Professor of Mechanical Engineering.
Paul B. Stewart, Ph.D., Associate Professor of Mechanical Engineering.
Chang-Lin Tien, Ph.D., Associate Professor of Mechanical Engineering.
Ralph Greif, Ph.D., Assistant Professor of Mechanical Engineering.

Mechanical Design
(Division Office, 124 Building T-7)
G. Wayne Brown, M.S., Professor of Mechanical Engineering.
Don N. Cunningham, M.S., Professor of Mechanical Engineering.
Iain Finnie, Sc.D., Professor of Mechanical Engineering.
Joseph Frisch, M.S., Professor of Mechanical Engineering.
Thomas H. Hazlett, M.S., Professor of Mechanical Engineering.
Alexander S. Levens, M.S., C.E., Professor of Mechanical Engineering.
Charles W. Badcliffe, M.S., M.E., Professor of Mechanical Engineering (Chairman of the Division).
Robert F. Steidel, Jr., D.Eng., Professor of Mechanical Engineering (Vice-Chairman of the Division).
Yasundo Takahashi, Ph.D., Professor of Mechanical Engineering.
Herman Thal-Larsen, M.S., Professor of Mechanical Engineering.
Erich G. Thomsen, Ph.D., Professor of Mechanical Engineering.
James S. Campbell, Jr., M.M.E., Associate Professor of Mechanical Engineering.
Frank E. Hauser, Ph.D., Associate Professor of Mechanical Engineering.
James L. Costanza, Ph.D., Assistant Professor of Mechanical Engineering.
Shiro Kobayashi, Ph.D., Assistant Professor of Mechanical Engineering.

Michael S. De Malherbe, Ph.D., D.I.C., Visiting Professor of Mechanical Engineering for the fall semester.

MINERAL TECHNOLOGY
(Department Office, 210 Hearst Memorial Mining Building)
John E. Dorn, Ph.D., Professor of Materials Science.
Irving Fatt, Ph.D., Professor of Petroleum Engineering.
Douglas W. Fuerstenau, Sc.D., Professor of Metallurgy.

1 In residence fall semester only, 1964–1965.
2 In residence spring semester only, 1964–1965.
Herbert E. Hawkes, Ph.D., Professor of Mineral Exploration.
Ralph R. Hultgren, Ph.D., Professor of Metallurgy (Chairman of the Department).
Earl R. Parker, Met.E., Professor of Metallurgy.
Joseph A. Pask, Ph.D., Professor of Ceramic Engineering.
John A. Putnam, Ph.D., Professor of Petroleum Engineering.
S. Frederick Ravitz, Ph.D., Professor of Metallurgy.
Alan W. Searcy, Ph.D., Professor of Materials Science.
Lysle E. Shaffer, E.M., Professor of Mining.
†Stanley H. Ward, Ph.D., Professor of Mineral Exploration.
Jack Washburn, Ph.D., Professor of Metallurgy.
Paul A. Witherspoon, Ph.D., Professor of Petroleum Engineering (Vice-Chairman of the Department).
Anders J. Carlson, Ph.D., Professor of Petroleum Engineering, Emeritus.
Edward H. Wisser, B.S., Professor of Mineral Exploration, Emeritus.
Richard M. Fulrath, D.Eng., Associate Professor of Ceramic Engineering.
Wilbur H. Somerton, Pet.E., Associate Professor of Petroleum Engineering.
†Gareth Thomas, Ph.D., Associate Professor of Metallurgy.
Richard E. Goodman, M.S., Assistant Professor of Geological Engineering.

Phil R. Bradley, B.S., Lecturer in Mining.
Ian Campbell, Ph.D., Lecturer in Mineral Exploration.
Elmer L. Dougherty, Ph.D., Lecturer in Petroleum Engineering.
George M. Gordon, Jr., M.S., Lecturer in Materials Science.
Kenneth K. Kelley, Ph.D., Lecturer in Metallurgy.
Thomas A. Lang, M.S., Lecturer in Geological Engineering.
Robert B. Langston, M.S., Lecturer in Materials Science.
James E. Lindsay, B.S., Lecturer in Petroleum Engineering.
Thomas D. Mueller, Ph.D., Lecturer in Petroleum Engineering.
Roger F. Rhoades, A.B., Lecturer in Geological Engineering.
Thomas F. Thompson, A.B., Lecturer in Geological Engineering.
Victor Zackay, Ph.D., Lecturer in Metallurgy.

NAVAL ARCHITECTURE

(Department Office, 224 T-3)

Henry A. Schade, Dr.Ing., Professor of Naval Architecture.
John V. Wehausen, Ph.D., Professor of Engineering Science (Chairman of the Department).


J. Randolph

Osvald J. Stu..

NUC

(Part.

Paul L. Char..

Lawrence M.

Hans Mark,

Donald R. G.

Lawrence R.

Virgil E.

Rudolph Gold.

Richard M.

Sp.

Albert J.

Robert R.

Frederick J.

Robert W.

Inspection

Lower Division

Addition

Lower Division

M. Engineering

Prerequisite: Substantial knowledge of random events and vertical curves, and of least squares.

17. Introduction

Prerequisite: Introduction to computer science and knowledge of typical amplifiers.
J. Randolph Paulling, Jr., D.Eng., Associate Professor of Naval Architecture.

Osvald J. Sibul, M.S., Lecturer in Naval Architecture.

NUCLEAR ENGINEERING
(Department Office, 219 T-4)

Paul L. Chambré, Ph.D., Professor of Engineering Science and of Mathematics.

Lawrence M. Grossman, Ph.D., Professor of Nuclear Engineering.

Thomas H. Pigford, Sc.D., Professor of Nuclear Engineering.

Harvey J. Amster, Ph.D., Associate Professor of Nuclear Engineering.

Hans Mark, Ph.D., Associate Professor of Nuclear Engineering.

Donald R. Olander, Sc.D., Associate Professor of Nuclear Engineering.

Lawrence Ruby, Ph.D., Associate Professor of Nuclear Engineering.

Virgil E. Schrock, M.S., M.E., Associate Professor of Nuclear Engineering.

Rubin Goldstein, Ph.D., Assistant Professor of Nuclear Engineering.

Harold P. Smith, Jr., Ph.D., Assistant Professor of Nuclear Engineering.

Richard M. Fulrath, Ph.D., Associate Professor of Ceramic Engineering.

Selig N. Kaplan, Ph.D., Lecturer in Nuclear Engineering.

Albert J. Kirschbaum, Ph.D., Lecturer in Nuclear Engineering.

Robert V. Pyle, Ph.D., Lecturer in Nuclear Engineering.

Frederick J. Shon, B.S., Lecturer in Nuclear Engineering.

Roger W. Wallace, 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 Survey Measurements. (3) I and II. Mr. Moffitt

Prerequisite: Mathematics 1A or 3A.

Standards, units, calibration; measurement of distance, elevation, angles; systematic and random error analysis in measurements; directions; traverse computations; horizontal and vertical curves; topographic mapping; adjustment of measurements; weighting; principles of least squares.

17. Introduction to Electronic Systems, Circuits, and Devices. (3) I and II. Mr. Pederson

Prerequisite: Physics 4B.

Introduction to typical systems and circuits; physical electronics of semiconductor and vacuum devices; characteristics and circuit models of useful electronic devices; analysis of typical amplifying and switching circuits.
18A–18B. Introduction to Structural Analysis. (3–3) Yr. Mr. McNiven, Mr. Polivka

Beginning each semester.

Prerequisite 18A: Physics 2A and 3A, or 4A; Mathematics 3A. For students in architecture. Not open to students in engineering. 18B: course 18A, 21 and Mathematics 3B. For students in architecture. Not open to students in engineering.

18A. Qualitative study of loads on architectural structures and their resulting behavior. A study of Newton’s Equations and their use in obtaining reactions and stress resultants in beams, columns, and trusses subjected to loads.

18B. Deformation of structural members and frames. Introduction to analysis of indeterminate structures using moment distribution. Study of sidesway using moment distribution and approximate methods.

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.

27. Basic Engineering Graphics. (2) I and II.

The Staff (Mr. Levens in charge)

Prerequisite: Mechanical drawing; and Mathematics 1A (or 3A) which is taken concurrently.

Fundamental principles of orthogonal projection and their application to the analysis and solution of space problems arising in the various fields of engineering; graphical presentation of data; graphical, numerical and mechanical solutions and computations.


The Staff (Mr. Levens in charge)

Prerequisite: Mechanical drawing; and Mathematics 1A (or 3A) which is taken concurrently.

Fundamental principles of orthogonal projection and their application to the analysis and solution of space problems arising in the various fields of engineering; graphical presentation of data; graphical, numerical, and mechanical solutions and computations; freehand pictorials and orthographics; true-position dimensioning; and an introduction to conceptual design.

36. Engineering Mechanics. (3) I and II. The Staff (Mr. Steidel in charge)

(Formerly numbered 35.)

Prerequisite: Physics 4A, Mathematics 2A, and Engineering 27 or 28. (Engineering 27 or 28 not required for students enrolled in curricula in chemical engineering.)

Principles of plane statics and dynamics and their application to engineering problems. Concentrated and distributed force systems and equilibrium conditions covering structures, machines, and friction. Kinematics and kinetics in plane motion. Methods of work and energy, impulse and momentum.

45. Properties of Materials. (3) I and II. The Staff (Mr. Ravitz in charge)

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. Applications of basic principles to the selection and use of engineering materials.

48. Computers in Engineering. (3) I and II. The Staff (Mr. Morton in charge)

Prerequisite: Mathematics 1A (may be taken concurrently).

Upper Division Courses†

100. Materials and Methods Used in Manufacturing. (3) I and II.  
Mr. Campbell  
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.

103. Elementary Fluid Mechanics. (3) I and II.  
The Staff (Mr. J. W. Johnson in charge)  
Prerequisite: Mechanical Engineering 102, which may be taken concurrently.  
Principles of mechanics applied to the statics and dynamics 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 understanding of professional responsibilities of the engineer; practice in the elements of effective speaking and in preparation of technical and nontechnical papers; study and discussion of selected topics of value to the engineer beginning his career.

120. Principles of Engineering Economy. (3) I and II.  
Mr. DeGarmo, Mr. Lapsley, Mr. Keachie  
Prerequisites: Mechanical Engineering 105A, or Physics 112, or Chemistry 110B; Electrical Engineering 100A, 101A or 101B, or 109A, or Physics 110A; Civil Engineering 130 or 132.  
Study and application of the methods used in making economic analyses for decision making for maximizing the effectiveness of utilization of capital in engineering and business projects.

140. Elementary Illumination. (2) I and II.  
Mr. Finch  
Prerequisite: consent of the instructor; Physics 4C; Electrical Engineering 100A, or 109A (may be taken concurrently), and either 101A or 101B.  
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).  

† The basic prerequisite for all upper division courses is satisfaction of the lower division requirements in an engineering program of study, completion of the Upper Division Engineering Examination, and advancement to the upper division in the College of Engineering. Additional prerequisites are indicated.
Graduate 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.

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. Photocconductivity 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†

100. Control Surveys. (3) I and II.
Mr. Moffitt
Prerequisite: Engineering 1A or 10; Engineering 21 by approval of instructor.
Lectures and laboratory instruction on vertical control, precise leveling; horizontal control, triangulation, trilateration, traverse; electronic distance measurement; least squares adjustment of control survey observations; state coordinate systems; astronomical observations for azimuth and latitude. The student is also introduced to photogrammetry and supplemental control surveys.

101. Elementary Photogrammetry. (3) I.
Mr. Moffitt
Prerequisite: Engineering 11, or consent of the instructor.
Nature of photogrammetry; precision cameras; geometry of photograph; ground control, flight planning; stereoscopy and parallax; radial line plot; mosaics; oblique photographs; stereoscopic plotting instruments. Laboratory exercises amplify these items.

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; state coordinate system; geodetic levelling.

† 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.
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 photo reading, analysis, and interpretation applied to soils, slopes, geological forms and structures, selection of materials for engineering construction.

110. Engineering Materials Laboratory. (2) I and II.
The Staff (Mr. Pirtz in charge)
Prerequisite: course 130 (may be taken concurrently); Engineering 45.
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) II. The Staff (Mr. Pirtz in charge)
Prerequisite: course 130 (may be taken concurrently); Engineering 45. For students in agricultural, mechanical, mining, geological, and petroleum engineering. Not open for credit to students who take Civil Engineering 112.
Principles and methods of testing engineering materials. Physical tests of concrete, steel and wood.

113. Concrete and Concrete Materials. (2) I.
Mr. Polivka
Prerequisite: course 110.
Composition and properties of concrete. Concrete materials. Proportioning of concrete mixtures. Selected experiments on physical and mechanical properties of cement pastes, mortars and concretes.

114. Soil Properties and Their Engineering Applications. (1) I and II.
Mr. Mitchell
Prerequisite: course 121 (may be taken concurrently).
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.

120. Soil Mechanics. (3) I. Mr. Mitchell
Prerequisite: consent of the instructor. Not open to undergraduate students in civil engineering.
Selected topics in soil mechanics and experiments on physical and mechanical properties of soils including their application in design problems.

121. Soil and Foundation Engineering. (3) I and II. Mr. Davis
Prerequisite: course 130; 133 (may be taken concurrently).
Lectures, discussions and problems in 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.

124. Strength of Structural Materials and Systems. (3) I and II. Mr. Scordelis
Prerequisite: Engineering 18B. For students in architecture.
Elastic and ultimate resistance of structural materials. Stress and deformation analysis for members subjected to axial force, shear, moment, or torque. Buckling of compression members. Behavior under load of cables, arches, shells, and folded plates.
126. Design of Structural Elements. (3) I and II. Mr. Bertero
Prerequisite: course 124 or equivalent. Open only to students in architecture.
General principles of structural design. Loads-mechanical behavior of structural materials. Analysis and design methods based on working and ultimate loads. Analysis and design of members made of metals, wood, and reinforced concrete and subjected to tensile, compressive flexural, and combined loading conditions.

127. Structural Systems. (3) I and II. Mr. Bouwkamp
Prerequisite: course 126 or equivalent. Open only to students in architecture.
Concept and behavior of structural systems in various materials. Approximate design and dimensioning of continuous beams, rigid frames, flat slabs, arch, suspension and prestressed systems. Multistory buildings, space frames, economics and selection of types.

130. Mechanics of Materials. (3) I and II. The Staff (Mr. Popov in charge)
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. Mr. Eberhart
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 Solids. (2) I and II. Mr. Pister
Prerequisite: Engineering 35. Open only to students in electrical engineering and to nonengineering majors.
Concepts of stress and strain, transformation laws; stress-strain laws for elastic and inelastic materials; stress and deformation analysis for rods and beams; stability of columns; elastic vibration; energy methods.

133. Structural Elements. (4) I and II. Mr. Bresler
Prerequisite: course 130.
Introduction to design of structural members and connections in steel, reinforced concrete, and timber.

135. Reinforced Concrete Design. (3) I and II. Mr. Scordelis, Mr. Raphael
Prerequisite: course 130.
The analysis and design of reinforced concrete structures.

136. Analysis and Design of Bridges. (3) I.
Prerequisite: course 131, 133, 135.
Analysis and design of girder, truss, rigid frame, and continuous bridges, with special emphasis on highway bridges. Economics and layout of bridges, optimum proportions, influence lines and moment envelopes for indeterminate structural systems.

137. Analysis and Design of Buildings. (3) II. Mr. Baron
Prerequisite: course 131, 133, 135.
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. Flight Structures. (3) II. Mr. Penzien
Prerequisite: course 130.
Stress, deformation, and stability analyses of flight structures; torsion and bending of typical sections; buckling and post-buckling strengths of thin sheet elements; stress and stability considerations of sandwich components; thermal stresses and thermal buckling; high temperature creep effects.

139. Introduction to Mechanics of Solids. (3) I. Mr. Popov
Prerequisite: Mathematics 2B or 14B; course 130 or Physics 105A or consent of the instructor.
Stress-strain relations for elastic and inelastic materials; plastic flow, creep, relaxation, thermal effects; solution of problems in elasticity and inelasticity.
140. Water and Waste Water Engineering. (4) I and II.

Prerequisite: Engineering 103. Mr. Pearson, Mr. Kaufman, Mr. Selleck
Planning of water and waste systems. Estimates of population and municipal, industrial, and agricultural water requirements. Hydrology of surface and ground water sources. Design of impoundment, transmission, and collection systems. Laboratory experiments in metering, pipe friction, pumping, and power generation.

141. Water and Waste Water Treatment. (2) I and II.

Mr. Kaufman, Mr. Selleck, Mr. Oswald, Mr. Pearson
Prerequisite: course 140, Engineering 103.
Chemical, physical, and biological aspects of water and waste water. Theory and design of water and waste water treatment plants. Special conditioning problems in water treatment. Waste water discharge and receiving water pollution. Special problems of suburban and rural waste disposal, waste water reclamation, and solid waste disposal operations.

142. Sanitary Engineering Design. (2) II.

Mr. Orlob
Prerequisite: course 140 and 141.
Functional engineering design of systems for water purification, waste disposal, and water reclamation.

144. Principles of Sanitary Engineering. (3) II.

Mr. Oswald
Prerequisite: upper division standing in public health, science, or engineering. Not open to civil engineering majors.
Water supply, sewerage, solid waste disposal and waste reclamation.

145. Chemistry of Water Purification and Sewage Treatment. (2) I.

Mr. Thomas
Prerequisite: Chemistry 1A–1B.
Application of physical and analytical chemistry to problems of water purification and waste treatment.

146. Sanitary Chemistry Laboratory. (3) I and II.

Mr. Thomas
Prerequisite: Chemistry 1A–1B.
Chemical analysis of water and sewage; laboratory control of water purification and waste treatment processes.

147. Sanitary Engineering Chemistry. (2) II.

Mr. Thomas
Prerequisite: Chemistry 1A–1B.
Application of organic chemistry to problems of water purification, atmospheric pollution and waste disposal.

149. Municipal Engineering Services. (2) II.

Mr. Hamburger, 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 instructor.
Relation of municipal engineering organization, planning, financing, and design to comprehensive, long-range planning of urban communities.

159. Water Institutions and Economics. (2) II.

Mr. Todd, Mr. Orlob
Prerequisite: senior standing.
Economic, legal, political, institutional, and policy aspects of water resources development and conservation.

160. Hydrology. (2) I.

Mr. Todd, Mr. Orlob
Prerequisite: course 140 (may be taken concurrently), Engineering 103.
Nature of the water cycle with special emphasis on meteorological, surface water, and ground water phenomena.

161. Hydraulic Laboratory. (2) I and II. The Staff (Mr. Einstein in charge)
Prerequisite: Engineering 103.
Introductory laboratory experiments on the principles of hydraulic phenomena involved in measurement, conveyance, control and utilization of water.
166. Advanced Hydraulics. (3) I.  
Mr. Einstein  
Prerequisite: Engineering 103.  
Phenomena of flow in open channels and porous media; hydraulic models and analogies.

167. Hydraulic Engineering Design. (3) I and II.  
Mr. Harder  
Prerequisite: course 161, 140; Engineering 103.  
Principles of engineering and economic design of hydraulic structures for impounding, conveying, and controlling water.

168. Design of Open Channel Flow Systems. (2) II.  
Mr. Harder  
Prerequisite: course 166; course 167 which may be taken concurrently.  
Hydraulic and systems design and analysis applied to open channel systems. Occasional field inspection trips.

170. Highway Engineering. (3) I and II.  
Mr. Monismith  
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. Hamburger  
Prerequisite: upper division standing and one course in statistics or consent of the instructor.  
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. Polivka  
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. Keim  
Prerequisite: senior standing in engineering.  
A study of the construction industry: its development, components, 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. Snowden  
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.  
Mr. Horonjeff, Mr. Keim  
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. McGauhey 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. McGauhey 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:

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.

General Courses

270A–270B. Advanced Soil Mechanics. (3–3) I and II. 
Mr. Seed
Prerequisite: course 121 and 114, or equivalent.
Advanced theories of soil mechanics, including: theories of consolidation; stress distribution; bearing capacity analyses; lateral pressures; design of anchored bulkheads; pile foundations; shear strength of cohesive soils; slope stability analyses; foundation vibrations; effects of earthquakes and dynamic loads.

270L. Advanced Soil Mechanics Laboratory. (1) II. Mr. Seed
Prerequisite: course 270A–270B, may be taken concurrently.
Group discussions and individual experimental studies dealing with the more advanced aspects of soil properties and their applications in design. 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
Principles governing the flow of water through soils and their application in the design of earth dams.

272. Soil Stabilization. (2) II. Mr. Mitchell, Mr. Monismith
Prerequisite: graduate standing.
Purposes of soil stabilization; principles of stabilization using compaction, aggregate addition, cement, asphalt and chemicals; the nature, mechanism, advantages, disadvantages, design, construction and economics of the stabilization of soils for use in highways and airfields; special stabilization techniques; principles of pavement design.

273. Applications of Physico-Chemical Principles in Soil Engineering. (3) I. Mr. Mitchell
Prerequisite: course 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.

290. Advanced Graduate Study in Civil Engineering. I and II.
Prerequisite: consent of instructor.
Current and advanced topics in hydraulics, sanitary engineering, soil mechanics, structural engineering, structural mechanics, and transportation engineering presented by means of lectures and informal conferences. For individual course listings, see section on above divisions.

298. Group Studies, Seminars, or Group Research. (1–5) I and II.
The Staff (Mr. McGauhey 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.

† See double dagger (1) footnote, page 296.
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; and urban transportation planning, 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. Prior to each semester, topics which will form the basis of seminars are announced.

299. Individual Study or Research. (1–6) I and II.

Prerequisite: graduate standing. The Staff (Mr. McGauhey in charge)
Research or investigation in selected advanced 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).

Courses in Hydraulic and Sanitary Engineering and Water Resources Engineering

203. Ground Water Hydrology. (3) I.

Prerequisite: consent of instructor.
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.

Prerequisite: consent of instructor.
Determination of design floods, hydrometeorological analysis, unit graphs, channel and reservoir routing, flood control methods, river and flood forecasting, snow melt runoff analysis, and artificial precipitation.

205. River-Harbor Hydraulics. (3) I.

Prerequisite: Engineering 103; Civil Engineering 166 desirable (may be taken concurrently).
Fundamental principles of tidal and nonsteady channel flow, wave systems and forces, and their significance in hydraulic design.

206. Sediment Transport. (3) II.

Lectures and laboratory. Prerequisite: course 166.
Nature and behavior of sediments, and the design and management of rivers and reservoirs with respect to sediment load.

207. Advanced Hydraulic Design. (2) I.

Prerequisite: course 167 or 168.
Design of diversion works, distribution systems, special hydraulic structures.

208. Advanced Hydraulic-Structures Laboratory. (2) II.

Prerequisite: course 166 or 167 recommended.
Mathematical and empirical investigation of river, harbor, flood, beach, and wave control through hydraulic and experimental models.
211A–211B. Water and Sewage Treatment: Theory and Design. (3–3) Yr.  Mr. McGauhey (in charge), Mr. Kaufman, Mr. Orlob, Mr. Pearson, Mr. Oswald

Prerequisite: course 140, 141, and 146, which may be taken concurrently. Theory and design of unit operations and processes for water and waste treatment.

213. Advanced Sanitary Chemistry. (2) I.  Mr. Thomas

Prerequisite: course 146.

Theory of advanced chemical techniques such as spectrophotometry, polarography, and chromatography, and their application to water, waste and air pollution problems.

215. Advanced Sanitary Engineering Laboratory. (2) II.  Mr. Pearson

Lectures and laboratory. Prerequisite: course 145 or 211A. Unit operations and processes for municipal and industrial water and waste treatment.

216. Industrial Wastes. (2) II.  Mr. Pearson

Prerequisite: course 211A or consent of instructor. Principles and methods of treatment and disposal of industrial wastes that may adversely affect water or air resources.

218. Atmospheric Pollution. (2) I.  Mr. Tebbens

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.

290K. Air Pollution Control. (2) II.  Mr. Tebbens

Prerequisite: course 218.

290L. Water Resources Development. (2–3) II.  The Staff (Mr. Todd in charge)

290M. Coastal Engineering. (3) II.  Mr. J. W. Johnson, Mr. Wiegel

290N. Applications of Digital Computers to Hydraulic and Sanitary Engineering Problems. (2) I.  Mr. Harder

Prerequisite: graduate standing and consent of instructor.

Courses in Structural Engineering and Structural Mechanics

220. Statically Indeterminate Structures. (3) I.  Mr. Scordelis

Prerequisite: graduate standing.

Classical theorems of Clapeyron, Betti, Castigliano, Maxwell, Mohr, and Muller-Breslau. Virtual work, real and complementary energy. Analysis of indeterminate structures by force (flexibility) methods and by displacement (stiffness) methods; relaxation and distribution procedures; methods suited for digital computer solution.

221. Experimental Structural and Stress Analysis. (3) I.  Mr. Clough

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, instrumentation for dynamic strain measurements, stress coat analysis, analogy methods, photoelasticity, photostress and Moire.

230A–230B. Advanced Mechanics of Materials. (3–3) Yr.  Mr. Popov

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
Prerequisite: course 137, and Mechanical 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. McNiven
Prerequisite: course 230B or Mechanical Engineering 185, 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 nonhomogeneous 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) I. 
Mr. Raphael
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 Analysis and Design of Bridges. (3) II.
Prerequisite: course 136 or equivalent.
Selection and proportioning of movable and long span types; elastic and nonlinear theory of arches and suspension bridges; secondary stresses; analysis of grid and orthotropic plate deck systems; dynamics of bridges and aerodynamic stability of suspension bridges; use of prestressed concrete, alloy steels and light alloys in bridges; and other selected topics from current research.

237. Mechanics of Solids. (3) I.
Prerequisite: course 230A or Mechanical Engineering 185, 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. Three Dimensional Elasticity. (3) II. 
Mr. McNiven
Prerequisite: course 230A or consent of instructor.
Static and dynamic elasticity of the infinite domain and the half-space. Static problems are solved using both potential theory and integral transforms. Dynamic elasticity includes dilatational and rotational waves in an infinite domain; wave reflection, refraction and dispersion in the half-space; Rayleigh and Love waves.

290A. Advanced Dynamics of Structures. (3) I. 
Mr. Penzien
290B. Advanced Concrete Technology. (2) II. 
Mr. Polivka
290C. Matrix Analysis of Structures. (2) II. 
Mr. Clough
290D. Advanced Prestressed Concrete. (2) II. 
Mr. Lin
Prerequisite: course 135 and elementary knowledge of prestressed concrete as given in course 234.
290E. Design of Concrete Shells and Slabs. (1–3) II.  Mr. Scordelis
Prerequisite: basic course in reinforced concrete. Course in statically indeterminate structures similar to Civil Engineering 220 is recommended.

290F. Advanced Topics in Structural Theory. (3) II.  Mr. Baron

290G. Applications of Digital Computers to Structural Problems. (2) I.

290H. Plastic Analysis of Structures. (2) II.  Mr. Bertero

290J. Vibrations of Ship Structures. (2) I.  Mr. Clough
To be offered in even-numbered years.
Prerequisite: graduate standing and consent of instructor.

Courses in Transportation Engineering

250. Analysis of Transportation Systems. (6) I.
The Staff (Mr. Kennedy in charge)
Prerequisite: course 170, Engineering 120, Statistics 130E.
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. Monismith
Location and design of various types and classes of highways. Emphasis on advanced theory and practice in design of alignment; highway cross sections, intersections, interchanges, multilane expressways and arterial highways in urban areas.

255. Traffic Engineering: Operations. (3) II.  Mr. Kennedy
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, Mr. Kell
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
Prerequisite: graduate standing in engineering, except when special provision is made for students in certain programs of study.
Functions of government agencies in airport planning and financing of public airports; evaluation of community airport requirements; 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
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.

290P. Design, Construction and Performance of Asphalt Pavements. (2 or 3) II.  Mr. Monismith

290Q. Advanced Topics in Soil Mechanics. (1) II.  Mr. Mitchell

290S. Statistical Theories of Traffic Flow. (1–3) II.  Mr. Oliver

290T. Administration of Transportation Functions. (1) II.  Mr. Davis
ELECTRICAL ENGINEERING

Upper Division Courses†

100. Electrical Circuits and Machines. (4) I and II. Mr. Black

Three hours of lecture and one three-hour laboratory per week.
Prerequisite: Mathematics 2B or 14B, Physics 4B, Engineering 17 (may be taken concurrently). Not for students in Electrical Engineering.
Transient and steady-state analysis of circuits; applications of vacuum and semiconductor electronic devices; electrical machinery discussed primarily in terms of basic principles of operation; associated laboratory experiments.

101A. Circuits, Electronics, and Electrical Machines. (3) I and II.
Prerequisite: Mathematics 2A–2B, Physics 4B.
Theory and applications of electronics and electrical circuits. Single-phase and polyphase circuits, electromechanical energy conversion. Vacuum-tube and semiconductor characteristics; amplifiers. Designed for students in civil and mining engineering.

101B. Electronic Circuits and Instrumentation Systems. (3) I and II.
Prerequisite: Mathematics 2A–2B, Physics 4B.
Mr. Studer, Mr. Woodyard
Theory and applications of electronics and electrical circuits. Vacuum-tubes and semiconductors. Basic concepts of electronic instrumentation systems. Designed for students in chemical engineering and in mineral technology except mining engineering, and for students in the physical sciences.

102. Electrical Engineering Laboratory. (1) I and II.

One three-hour period per week.
Prerequisite: course 101A or 101B (should be taken concurrently if possible).
Experiments illustrating electrical theory and practice. Designed to accompany, and supplement course 101A or 101B.

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).
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.

104. Electric Circuits. (4) I and II. Mr. Desoer, Mr. Kuh
Prerequisite: Engineering 17 (may be taken concurrently) and Mathematics 2B, Physics 4B.

105. Introduction to Electronic Circuits. (3) I and II.
Prerequisite: course 104 or 100.
Mr. Pederson, Mr. Pepper
Charge control concepts and models for electronic devices; single stage and cascaded low pass amplifiers, gain, bandwidth, output power, distortion; simple feedback amplifiers; selective amplifiers, transformers; basic oscillator and wave shaping circuits, discrete state circuits, logic, memory and trigger circuits.

106. Basic Electronics. (4) II.
Prerequisite: course 100A or 101A or 101B, 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.

† See dagger (†) footnote, page 295.
§107B. Electrical Engineering. (7) I. Mr. Robertson, Mr. Lichtenberg
Prerequisite: former courses 107A or 109A.
Passive and active linear circuits in transient and steady state. Applications of vacuum and semiconductor electronic devices. Applications of solid-state magnetic devices and magnetic circuits.

108A–108B. Electronics and Circuits Laboratory. (2–2) Yr. beginning each semester. Mr. Vogelhut
Prerequisite: 108A: course 104 and Engineering 17 (both may be taken concurrently). 108B: course 105 to be taken concurrently.
108A. Experiments illustrating fundamental principles of electron ballistics, semiconductor materials and devices, the basic laws of circuit design and analysis.
108B. Experiments illustrating design and operation of amplifiers, coupling networks, magnetic amplifiers, analog and digital logic circuits, and magnetic storage elements.

111A–111B. Electrical Machinery. (3–3) Yr. Mr. Saunders
111A: I and II. 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 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. Mr. Saunders
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. Electric Power Transmission and Generation. (3–3) Yr. Mr. Dalziel
Prerequisite: course 105 and 108B (or 107B or 109B); 119 (may be taken concurrently).
A study of distributed constant transmission lines with emphasis on energy transmission. A study of transient and steady-state behavior of power based on an understanding of the electric and magnetic fields associated with energy transmission.

116. Electronic Communication Systems. (3) I and II. Mr. Angelakos, Mr. Everhart
(Formerly numbered 116B.)
Prerequisite: course 117A plus one of the following: course 124, 126 or 160.
Microwave frequency sources and amplifiers; radiation and propagation; noise; systems applications.

117A–117B. Electromagnetic Fields and Waves. (3–3) Yr. Beginning each semester. Mr. Mei, Mr. Rumsey, Mr. Susskind, Mr. Van Duzer, Mr. White
Prerequisite: course 104 or 106 or 107A.

119. Linear Systems Analysis. (3) I and II. Mr. Eisenberg, Mr. Gill, Mr. Kuh, Mr. Sakrison, Mr. Wong
Linear electrical, electromechanical and mechanical systems, System behavior from equilibrium equations, classical methods, and Laplace transform techniques. Elements of feedback and stability theory. Analysis of communication and control systems in time and frequency domains.

§ Approved for one offering only. 107B to be offered for the last time, fall, 1964.
123. Principles of Circuit Synthesis. (3) I and II. Mr. Frisch, Mr. Kuh
Prerequisite: course 119.
The properties of linear lumped element circuits and their network functions; development of synthesis methods for one-port and two-port circuits; techniques for the design of filters, filter amplifiers, and equalizers.

124. Principles of Communication Systems. (3) I and II. Mr. Sakrison, Mr. Turin, Mr. Wong
Prerequisite: course 105 or 107B. Not open to students who have already taken 116A or are taking course 160. Senior students in other departments who have completed a substantially equivalent preparatory program may be eligible for admission to this course even though they have not fulfilled the exact prerequisites listed here.
Signal descriptions, Fourier series, integral and spectrum; fundamentals of amplitude, angular and pulse modulation, requirements in time and frequency domain; representative examples of transmission systems including circuits; noise in components and transmission media, effect of noise on various modulation systems.

125. Principles of Electronic Circuits. (3) I and II. Mr. Pepper
Prerequisite: * course 107B, not open to those enrolled in course 116A.
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. Sloan, Mr. Woodyard
Prerequisite: course 105 or 106 or 107B, or Physics 110B or 121.
Physical principles and theory underlying solid-state electronics, plasma electronics, and vacuum electronics, including microwave applications.

127. Elemental Control. (1) I. Mr. Hopkin (in charge)
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. Chang, Mr. Eaton, Mr. Hopkin
Prerequisite: course 119. Course 127 and 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. (3) I. Mr. English, Mr. Muller
Prerequisite: Physics 121.
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.

131. Solid-State Electronic Devices. (3) II. Mr. English, Mr. Muller
Prerequisite: course 130 or Physics 140.
Introduction to the theory and design of semiconductor, magnetic dielectric, and other solid-state devices.

* Senior students in other departments who have completed a substantially equivalent preparatory program may be eligible for admission to this course even though they have not fulfilled the exact prerequisites listed here.
132A–132B. Electrical Communications Laboratory. (2–2) I and II.
Mr. Angelakos, Mr. Welch, Mr. Van Duzer

Prerequisite: 132A: course 124 or 125 or 160 (may be taken concurrently).
Prerequisite: 132B: course 132A, 117A; 116 or 117B (either may 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. Dalziel in charge)

Prerequisite: course 111A (may be taken concurrently with 133A).
Experiments on magnetic amplifiers and rotating electric machinery designed to illustrate the theory of power modulators.

133B. Advanced Electrical Machinery Laboratory. (2) II.
The Staff

Prerequisite: course 133A, 111B (may be taken concurrently).
Experiments on a-c and d-c machinery.

134. Solid-State Electronics Laboratory. (2) II. Mr. English, Mr. S. Wang

Prerequisite: course 130 or Physics 140.
Experiments for measuring physical parameters and observing and interpreting fundamental phenomena in solid-state materials and devices.

148. Introduction to Computers and Information Processing. (3) II.
Mr. Evans, Mr. Harrison, Mr. Morton


151A–151B. Switching and Computing Circuits. (3–3) Yr.
Mr. Gill, Mr. Morton, Mr. Wattenburg

Prerequisite: course 105 or 107B.
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. Evans, Mr. Morton, Mr. Wattenburg

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.

160. Communication of Continuous Data. (3) II. Mr. Turin, Mr. Wong

Prerequisite: Statistics 134 and course 105 or 107B. Not open to students who have received credit or are concurrently enrolled for credit in course 124.
Description and origins of random processes. Response of linear systems to deterministic and random inputs. The sampling theorem. Modulation systems for continuous-time signals. Comparison of modulation systems, discussing threshold effects and exchange of bandwidth for signal-to-noise ratio.

*161. Communication of Digital Data. (3) II. Mr. Sakrison, Mr. Thomasian

Prerequisite: course 160.
Transmission of digital information through randomly disturbed channels; optimum detection for such channels. Capacity of a bandlimited channel with additive noise. Simple codes for the binary symmetric channel. Modulation of telemetry data viewed in the context of coding.

* Not to be given, 1964–1965.
163. Finite-State Systems. (3) I. Mr. Gill, Mr. Harrison
Prerequisite: Mathematics 2B.

198. Directed Group Studies for Advanced Undergraduates. (1–5) I and II. The Staff
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
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‡

205. Electron Optics and Beam Dynamics. (3) I. Mr. Van Duzer
Prerequisite: courses 116A, 117A or Physics 110A; Mathematics 122 recommended. 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. Susskind
Prerequisite: course 117A–117B or Physics 110A–110B; 205 recommended. Interchange of energy between electromagnetic fields and various electron streams operating under transient-time conditions, with applications to the theory of space-charge-controlled tubes, velocity-modulation tubes, magnetrons, and traveling wave tubes.

Prerequisite: course 117A–117B or Physics 110A–110B. Mr. Rumsey, Mr. Welch. Classical electromagnetic theory and its application to engineering problems. Electrodynamics, magnetostatics, time varying fields. Interactions between electromagnetic fields and moving charges.

211. Electrical Machinery. (3) I.
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.
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, Mr. Rumsey
Prerequisite: course 117A–117B. Application of Maxwell’s equations to single antennas and antenna arrays used in transmission and reception of radio waves.

† See footnote, page 296.
217. Microwave Networks. (3) I.
Prerequisite: course 117A–117B or Physics 110A–110B.
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.
Prerequisite: course 117A–117B or 123.
Vibrating systems; principles and apparatus involved in the production, propagation, measurement, and reception of sound.

222. Techniques of Linear System Theory. (3) I and II.
Mr. Eaton, Mr. Polak
Prerequisite: course 119; Mathematics 185 or Mathematics 104 or Mathematics 111 (may be taken concurrently).
Basic systems concepts: input-output relation, state, linearity. Systems with finite dimensional state spaces, including time-varying and discrete-time systems. State space techniques. Laplace and Z transformations. Examples from electric circuits, control systems and other fields.

223. Linear Network Theory. (3) I.
Mr. Frisch
Prerequisite: course 123 and Mathematics 185 (may be taken concurrently).
Generalized analysis of linear works; topological derivation of network functions; energy relations in passive networks and fundamental properties of physically realizable driving point and transfer functions; two-element kind canonical forms and equivalent networks; characterization and properties of passive N-port networks.

224. Network Synthesis. (3) II.
Prerequisite: courses 123 and Mathematics 185.
General synthesis methods of driving point impedance and transfer functions; approximation methods in the frequency and time domains.

227. Nonlinear Feedback Control Systems. (3) II. Mr. Hopkin
Prerequisite: course 128, 222.

230. Solid-State Electronics. (3) II.
Mr. English
Prerequisite: course 130 and Physics 121.
Relations between the electrical, magnetic and radiation properties of solid-state electronic devices and the basic science of the solid state. Semiconductors (rectifiers, transistors, photodetectors), phosphors (electroluminescence), electron emission with emphasis on recent research.

231. Solid State Devices. (3) I.
Mr. Wang
Prerequisite: course 130 or Physics 140 or equivalent.
Semiconductor and microwave magnetic devices. Typical subjects include: diodes, transistors, tunnel diodes, avalanche transistors, parametric devices, thermoelectric effects, nonreciprocal microwave magnetic devices, and nonlinear magnetic effects, microwave and optical masers.
240. Nonlinear Active Circuits. (3) I.  Mr. Kuh
Prerequisite: course 119 and 125.
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.

241. Linear Active Circuits. (3) II.  Mr. Kuh
Prerequisite: course 123 and 125.
Fundamental properties of linear active circuits; gain-bandwidth limitations and optimum performance of amplifiers; theory and design of feedback amplifiers; noise study; application to vacuum tube, transistor, negative-resistance and parametric circuits.

251A–251B. Digital Computer Systems. (3–3) Yr.  Mr. Evans, Mr. Huskey, Mr. Morton, Mr. Wattenburg
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.

252A–252B. Applications and Programming of Digital Computers.  (2–2) Yr.  Mr. Evans, Mr. Huskey, Mr. Morton, Mr. Wattenburg
Prerequisite: course 152.
types available, order codes, and checking procedures. Preparation and use of subroutine libraries. Logical design of computers.

260. Stochastic Processes in Electrical Engineering. (3) II.  Mr. Turin, Mr. Wong
Prerequisite: course 116A or 119 or 124 or consent of instructor; Statistics 134 or 202A.

261. Statistical Communication Theory. (3) I.  Mr. Sakrison
(Formerly numbered 290G.)
Prerequisite: course 260.
Decision-theoretic formulation of the design of communication and radar systems. Application to digital and analog communication, and to radar detection and ranging.

263. Switching and Automata Theory. (2) II.  Mr. Gill, Mr. Harrison, Mr. Zadeh
Prerequisite: course 163 or consent of instructor.
Unified treatment of finite-state systems. Decomposition theory, group invariance, reliability, and state assignment. Other models of automata with applications to coding and programming. Probabilistic automata.

264. Modular Sequential Circuits. (2) II.  Mr. Gill, Mr. Harrison
Prerequisite: consent of instructor.

265. Information Theory. (3) I.  Mr. Thomasian
Prerequisite: Statistics 134 or 202A.
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.
270A–270B. Plasmas. (3–3) Yr.  Mr. Trivelpiece

Prerequisite: course 117A–117B.

Methods of analysis, applications and theory of measurement of plasmas. Studies of plasma sources, oscillations and waves in plasma, concepts of controlled fusion plasma containment schemes, and other related topics.

290. Advanced Graduate Study in Electrical Engineering.  The Staff

Current and advanced topics in electrical engineering, primarily for advanced graduate students.

290A. System Theory. (2) II.  Mr. Bergen, Mr. Desoer, Mr. Frisch, Mr. Gill, Mr. Thomasian, Mr. Zadeh

Prerequisite: course 223 and 224.

290C. Active Circuit Theory. (1) I and II.  Mr. Kuh

Prerequisite: course 222 or 228 or 229 or 227.

290D. Quantum Electronics. (3) I.  Mr. Jury

Prerequisite: course 117A, 130 or equivalent solid state course and Physics 115.

290E. Theory and Applications of the z-Transform Method. (1) I.  Mr. Mei

Prerequisite: Mathematics 220D; Electrical Engineering 210A–210B or Physics 210A–210B.

290F. Boundary Value Problems in Electromagnetic Theory. (3) I.  Mr. Mei

Prerequisite: course 222 or 228 or 229 or 227.

290G. Wave Propagation in Slow-Wave and Periodic Structure. (3) I.  Mr. Lichtenberg

Prerequisite: course 117A, 117B or equivalent.

290H. Topics in Noise Theory. (2) I.  Mr. Wong

Prerequisite: course 260.

290I. Characterization, Identification, and Interconnection of Systems. (2) II.  Mr. Zadeh

Prerequisite: course 222 or 229 (may be taken concurrently).

290J. Theory of Optimal Control. (2) I.  Mr. Chang, Mr. Desoer, Mr. Polak

Prerequisite: course 222. Recommended: course 229, Mathematics 104, Statistics 134.

290L. Electron-Phonon Interactions. (3) II.  Mr. Zadeh

Prerequisite: course 117A; course 126, and Physics 115 are recommended.

298. Group Studies, Seminars, or Group Research. (1–5) I and II.  The Staff

Prerequisite: specific preparation as determined by the instructor in each group.

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 1964–1965 are: Seminar on stochastic and optimal control, electron dynamics and microwave tubes, mirror machine seminar, seminar in integrated circuits and solid-state electronics, seminar in electrical machine theory, the logical design of digital systems, electromagnetic theory and antennas, problem oriented languages.

299. Individual Study or Research. (1–6) I and II.  The Staff (Mr. Zadeh in charge)

Investigation of electrical engineering problems.

INDUSTRIAL ENGINEERING

Upper Division Courses†

130. Principles of Metal Removing. (3) I.  Mr. Kobayashi

Prerequisite: course 101 or consent of instructor.

Analysis of the mechanics of metal removing and application of the theory of plasticity to metal cutting processes, with emphasis on prediction of forces and power. Analysis of friction, wear, tool life and role of cutting fluids. Analysis of newer machining processes, such as: electrolytic grinding, electro spark, erosion, ultrasonic, plasma jet and others.

* Not to be given, 1964–1965.
† See footnote, page 295.
131. Principles of Metal Forming. (3) II. Mr. Kobayashi
Prerequisite: Materials Science 124. Industrial Engineering 101 recommended.
Application of the theory of plasticity to the solution of forming problems, such as rolling, roll forming, coining, beading, contour flanging, spinning, piercing and blanking, and others. Forming forces, power and distribution of stresses and strains for work-hardening and non-work-hardening metals will be discussed.

132. Principles and Metallurgy of Welding. (3) I. Mr. Hazlett
Prerequisite: Engineering 45 or consent of instructor.
An analysis of welding processes with emphasis on the nature of the heat source, heat flow in the work, shielding medium employed, composition and metallurgical structures produced, residual stresses, and mechanical properties of welded joints.

133. Principles of Metal Casting. (3) II. Mr. Campbell, Mr. Hazlett
Prerequisite: Engineering 45 or consent of instructor. Industrial Engineering 101 recommended.
An analytical treatment of metal casting factors with emphasis on the essential metallurgy: melting, pouring, solidification; gating; mold and pattern considerations; design factors and defects.

141. Introduction to Industrial Engineering and Organization. (2) I.
Prerequisite: junior standing in Engineering. The Staff
Evolution of industrial engineering and organization; functional organization of production; organization structures; industrial engineering functions.

142. Work Systems Design and Measurement. (3) II. Mr. Keachie
Prerequisite: course 101, 141; Statistics 135 (may be taken concurrently), or consent of instructor.
An introductory course in methods of analysis, design, experimentation, and measurement of work systems. Performance standards; analysis of work components of human activities; bio- and psycho-technical capacities and limitations.

142L. Work Systems Design and Measurement Laboratory. (1) II.
Prerequisite: course 142 (it is recommended that course 142 be taken concurrently). Laboratory exercises and experiments in work systems design and measurement. To accompany and supplement course 142.

143. Work Systems Analysis. (3) I. Mr. Keachie
Prerequisite: consent of instructor.
Principles of work methods study, standard setting, layout, planning, and performance evaluation. Design of jobs and organizations for various types of enterprises.

144. Ergonomics. (3) I. Mr. L. E. Davis
Prerequisite: course 142 or consent of instructor.
Human factors in work, machine control and equipment design; experimentation and methods of analysis; human capacity data and design criteria; man-machine interactions and control displays.

146. Wage and Incentive Systems. (3) I. Mr. Keachie
Prerequisite: course 142 or 143.
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.

147. Job and Organization Design. (3) II. Mr. L. E. Davis
Prerequisite: course 142, 151, 160, 161 (course 151 may be taken concurrently).
Elements, theories and structures of job and organization design; constraints and limitations; criteria development; models of jobs; measurement of job and organizational effectiveness.
151. Production Systems Analysis and Design. (3) I. Mr. Lapsley, Mr. Grassi
Prerequisite: course 142; 160, 161; Business Administration 150; Mechanical Engineering 112 (Business Administration 120 and Mechanical Engineering 112 may be taken concurrently).
Design and operations analysis of integrated production systems, with emphasis on quantitative treatment and use of operating models—application of the methods of operations research to complex systems.

152. Facilities Planning. (2) II.
Mr. Grassi, Mr. Lapsley
(Formerly numbered 148.)
Prerequisite: course 151; Engineering 120 (may be taken concurrently).
Analysis and planning of industrial plants. Consideration of technical and economic aspects and use of operations research techniques in the design of industrial facilities.

153. Analysis and Design for Automated Manufacturing. (3) II. Mr. Grassi
Prerequisite: course 151 or consent of instructor.

198. Directed Group Studies for Undergraduates. (1-5) I and II.
The Staff (Mr. Shephard 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. Shephard 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‡
230. Advanced Metal Cutting. (3) I. Mr. Kobayashi
Prerequisite: Materials Science 124, Industrial Engineering 130, or consent of instructor.
Metal cutting theories, heat transfer and temperature distribution in cutting zone, tool chatter, tool wear, and problems in machining economics.

231. Advanced Metal Forming. (3) II. Mr. Thomesen
Prerequisite: Materials Science 124, Industrial Engineering 131, or consent of instructor.
Solution of forming problems using slip-line theory and other approximate methods.

240. Policy-level Problems in Industrial Engineering. (3) II. Mr. DeGarmo
Prerequisite: graduate standing in industrial engineering.
Past and current factors which contribute to policy-level problems and decisions in industrial engineering practice. Case studies of problems arising from, and currently affecting industrial engineering practice. Current issues.

242. Advanced Topics in Work Systems Design and Work Measurement. (3) I. Mr. L. E. Davis
Prerequisite: course 142, 147, 151, 152. Recommended: Industrial Engineering 144, 145; Psychology 185; Sociology 229.
Advanced study of topics in work systems design and work measurement; integrated design of work systems; macro- and micro-work measurement; performance standards and reward and control systems; research methods and experiments in work systems.

† See footnote, page 296.
298. Group Studies, Seminars, or Group Research. (1-5) I and II.

   The Staff (Mr. Shephard 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. Shephard in charge)

   Individual investigation of advanced industrial engineering problems.

Courses in Operations Research

Upper Division Courses†

160. Deterministic Models of Operational Analysis. (3) I. Mr. Wolff

   Prerequisite: Mathematics 2B or 14B.
   An introductory course in deterministic model structures and related methods of analysis,
   including linear programming. Problem sessions.

161. Stochastic Models of Operational Analysis. (3) II. Mr. Wolff

   Prerequisite: Statistics 134.
   An introductory course in stochastic model structures and related methods of analysis,
   including queueing theory. Problem sessions.

162. Mathematical Programming. (3) I and II. Mr. Shephard, Mr. Barlow

   Prerequisite: course 160 or consent of instructor. It is recommended that Mathematics
   111 be taken concurrently.
   A systematic treatment of the theory of linear programs and extensions to network
   flows and related combinatorial problems, with applications to industrial and engineering
   systems.

163. Markov Processes, Queuing and Inventory Theory. (3) II. Mr. Oliver

   Prerequisite: course 161; Statistics 134, or consent of instructor.
   A systematic treatment of stochastic methods of analysis of service and storage systems
   for determination of optimal policies in steady-state operations, with applications to in-
   dustrial and engineering systems.

Graduate Courses‡

262. Advanced Problems in Mathematical Programming. (3) I. Mr. Dantzig

   Prerequisite: course 162; Statistics 134, or consent of instructor.
   Decomposition principle for large scale programs. Decentralized control. Multistage

263. Advanced Problems in Applied Stochastic Processes. (3) I. Mr. Jewell

   Prerequisite: course 163; Mathematics 111, or consent of instructor.
   Transient behavior. Operating statistics. Method of embedded Markov chains. Kolmo-
   gorov equations for Markovian processes. Generating functions and transforms. Takacz
   theory. Arbitrary distributions for inter-arrival and service times. Algorithms for policy
   determination.

264. Process Analysis. (3) II.

   Prerequisite: course 160.
   Analysis, with use of digital computer, of process planning, scheduling and control.

265. Reliability and Quality Control. (3) I. Mr. Barlow

   Prerequisite: Statistics 134 or consent of instructor.
   Exponential distribution as failure law of complex equipment. Failure distributions with
   monotone hazard rate. Optimal maintenance policies. Optimal allocation of redundancy.
   S-shaped properties of monotonic structures. Sampling inspection and control charts.

† See footnote, page 295.
‡ See footnote, page 296.
290. Advanced Graduate Study in Industrial Engineering.
Prerequisite: consent of instructor. The Staff (Mr. Shephard in charge)
Topics in operations research, manufacturing processes and industrial administration.

290A. Nonlinear Programming. (3) II. Mr. Eisenberg
Prerequisite: consent of instructor.

290B. Inventory Theory. (3) II. Mr. Shephard
Prerequisite: course 262 (may be taken concurrently).

290C. Network Flows. (3) I. Mr. Oliver
Prerequisite: course 262.

290D. Discrete Programming. (3) I. Mr. Dantzig
Prerequisite: course 262, 290A.

290E. Programming of Large Scale Systems. (3) II. Mr. Dantzig
Prerequisite: course 262, 290A.

MECHANICAL ENGINEERING

Upper Division Courses†

100. Introduction to Dynamics. (2) I and II. The Staff (Mr. Hsu in charge)
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.

101. Manufacturing Processes. (3) I and II. Mr. Thomsen
(Formerly Industrial Engineering 101.)
Prerequisite: Engineering 28, 35, 36, 45.
Principles of manufacturing: casting, shaping of metals, machining, joining, general purpose and production tools, tooling, jigs and fixtures; introduction to the theory of plasticity and application to machining and shaping of metals; prediction of forces and energy in metal working.

102. Dynamics. (3) I and II. The Staff (Mr. Brown in charge)
Prerequisite: Engineering 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.

105A. Thermodynamics. (3) I and II. The Staff (Mr. H. A. Johnson in charge)
Prerequisite: Chemistry 1B; Physics 4C; Mathematics 2B.
Energy transformations, properties, reversibility, availability; cycles and devices for energy conversion.

105B. Thermal Systems. (3) I and II. The Staff (Mr. H. A. Johnson in charge)
Prerequisite: course 105A.
Cycles for power and refrigeration; combustion and reactive systems; compressible flow; introduction to heat transfer.

107. Mechanical Laboratory. (2) I and II. The Staff (Mr. Laird in charge)
Prerequisite: course 105A and either 105B and Engineering 103, or Mechanical Engineering 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. The Staff (Mr. Giedt in charge)
Prerequisite: course 105A. No credit allowed if either Engineering 103 or Mechanical Engineering 105B is taken.
The principles of conduction, convection and radiation heat transfer and one-dimensional flow of incompressible and compressible fluids.

† See footnote, page 295.
110. Mechanism and Dynamics of Machinery. (3) II. Mr. Radcliffe
Prerequisite: course 102.
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. Mr. Levens
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. Hauser in charge)
Two lectures and one three-hour laboratory period per week. Prerequisite: course 101; 102 or 104; Civil Engineering 130.
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. Refrigeration and Cryogenics. (3) I. Mr. Hutchinson
Prerequisite: course 105B.
Production of low temperature fluids and regions; thermodynamic systems, thermoelectric and magnetic effects.

116. Air Conditioning. (3) II. Mr. Hutchinson
Prerequisite: course 105B.
Production of atmospheric and thermal environments for human activity; special systems for space and underwater applications.

118. Power Production. (3) II. Mr. Howe
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.

123. The Internal Combustion Engine. (3) I. Mr. Starkman
Prerequisite: course 105B; Mathematics 14B.
Design parameters and performance characteristics of rotating and reciprocating internal combustion engines.

124. Mechanical Engineering Systems. (3) I and II.
Prerequisite: course 112 and 131A. The Staff (Mr. Howe 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. Beginning each semester. The Staff (Mr. Iversen 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.

145. An Application of the Mechanical Behavior of Materials in Design. (3) II. Mr. Finnie
Prerequisite: Civil Engineering 130.
Introduction to brittle, ductile, and transitional fracture, fatigue, creep, and wear. Case studies to illustrate the selection of materials and design criteria for various conditions of load and environment.
151. Heat Transfer. (3) I and II.  
Mr. H. A. Johnson, Mr. Tien  
Prerequisite: course 105B and Engineering 103. Recommended: Mathematics 14B.  
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. Mass Transfer Processes. (3) II.  
Mr. Stewart  
Prerequisite: course 105B or 151, and Engineering 103 or Chemical Engineering 146A.  
Diffusion theory and analysis of mass transfer. Water cooling and purification, gas absorption, solvent recovery, treatment of dust and aerosols.

154. Thermodynamics. (3) I and II.  
Mr. Tien, Mr. Greif  
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. Turbomachinery. (3) II.  
Mr. Iversen  
Prerequisite: course 105A and Engineering 103.  
Pumps, turbocompressors, hydraulic and gas turbines. Analysis of fluid machinery performance with emphasis on the applications to fluid systems.

163. Fluid Mechanics. (3) I.  
Mr. Laird  
Prerequisite: course 105A; Engineering 103 or Chemical Engineering 146A.  
Fundamental mechanics of ideal and viscous, incompressible and compressible, laminar and turbulent flows.

164. Automatic Control. (3) I and II.  
Mr. Takahashi, Mr. Thal-Larsen  
Prerequisite: Mathematics 2B.  
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. Thal-Larsen  
Prerequisite: course 164 or Electrical Engineering 128, may be taken concurrently.  
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. Brown, Mr. Steidel  
Prerequisite: course 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. Frisch  
Prerequisite: course 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. Elasticity and Stress Analysis in Design. (3) I.  
Mr. Cunningham  
Prerequisite: course 102; Civil Engineering 130; Mathematics 14A–14B (or consent of instructor).  
Application of the basic equations of elasticity to mathematical and experimental methods of stress analysis with applications to modern design problems.

173. Noise Control. (3) I.  
Mr. Soroka  
Prerequisite: course 102 and Engineering 103 or Mechanical Engineering 109.  
175. **Advanced Mechanics.** (3) I and II.  
Mr. Hsu, Mr. Rosenberg  
Prerequisite: course 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: course 102 or the equivalent; Electrical Engineering 100A–100B or equivalent; 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.

185. **Theory of Elasticity.** (3) I and II.  
Mr. Hsu, Mr. Naghdi  
Prerequisite: Mathematics 14B.  
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.

198. **Group Studies for Advanced Undergraduates.** (1–5) I and II. The Staff  
Prerequisite: upper division standing in engineering, plus particular courses to be specified by the instructor for each group.  
Group studies of selected topics.

199. **Individual Study and Research for Advanced Undergraduates.** (1–5) I and II. The Staff (Mr. Steidel for Mechanical Design; Mr. Seban 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‡**

Graduate standing is required for admission to these courses. In addition, graduate students must have completed at least Mathematics 2A–2B or the equivalent before undertaking any of the following courses, except as noted.

210. **Advanced Kinematics and Mechanisms.** (3) I.  
Mr. Radcliffe  
Prerequisite: course 110 or 175 recommended.  
Analysis and synthesis of plane and space mechanisms. Constraint criteria. Complex variable methods in motion analysis. Advanced analytical and graphical techniques for the design of mechanisms to guide a plane or point through multiple positions.

211. **Graphical Analysis.** (3) II.  
Mr. Levens  
Prerequisite: course 111 or consent of the instructor.  
Graphical and numerical methods showing the application of calculus and ordinary differential equations to problems in mechanical engineering systems. Advanced methods of nomography applied to the interrelationships among three or more variables. Transformations and validity tests on experimental data.

† See footnote, page 296.
212. Optimal Design of Mechanical Elements. (3) II.  
Mr. Frisch  
Prerequisite: graduate standing in engineering.  
Statistical considerations of failure theories and factors of safety. Probability evaluation of manufacturing errors and reliable usage of materials. Optimization of designs for normal, redundant and incompatible specifications showing the application of primary and subsidiary design equations. Use of reliability evaluation in analysis and synthesis of mechanical designs.

214. Lubrication and Friction. (3) II.  
Prerequisite: course 163 recommended.  
Hydrodynamic theory of lubrication for advanced analysis and design of various types of bearings operating with liquids and air. Discussion of materials, lubricants, corrosion and wear of modern bearings. Dry and boundary friction; effect of materials, surface, pressure, velocity, temperature and atmosphere.

232. Experimental Mechanics. (3) I.  
Prerequisite: course 170 or 164.  
Mr. Brown, Mr. Cunningham, Mr. Goldsmith  
Development of the methods of experimental mechanics. Measurement systems for static, steady state vibratory and transient situations. Studies of the basic types of transducers and circuitry for measuring displacement, strain, velocity, acceleration, force, temperature, and time.

245. Mechanical Behavior of Engineering Materials. (3) I.  
Prerequisite: consent of the instructor.  
Mr. Finnie and Mr. Hauser  
Basic principles governing structure of materials. Relationship of structural features to the mechanical properties of ceramics, metals and polymers. Methods of determining mechanical properties for different conditions of load and environment. Application of both theoretically and experimentally determined properties to quantitative prediction of service performance.

260. Coded Data Control Systems. (3) I.  
Mr. Costanza  
Prerequisite: course 164 or equivalent.  
Synthesis and analysis of feedback control systems in which the control intelligence appears in a coded digital form. Boolean algebra is introduced as a design tool to aid in the synthesis of comparator, counting and encoding elements.

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 or 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. Tien  
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.
290. Advanced Graduate Study in Mechanical Engineering.
Current and advanced topics in Mechanical Engineering. For individual course listings on Applied Mechanics, see Courses in Applied Mechanics.

290M. Random Vibrations. (3) II.
Mr. Brown
290R. State Space Method in Automatic Control. (3) II.
Mr. Thal-Larsen
Prerequisite: course 164 or Electrical Engineering 128, or consent of instructor.

*290S. Informtion. Theory and Thermodynamics. (3) I.
Mr. Tien
Prerequisite: course 154 or Physics 112.

290T. Photoelasticity. (3) II.
Mr. Brown
Prerequisite: course 232 or Civil Engineering 221.

290U. Corrosion. (3) I.
Mr. Cornet
Prerequisite: graduate standing.

290V. Boiling Heat Transfer. (2) II.
Mr. H. A. Johnson
Prerequisites: course 151 and Engineering 230.

298. Group Studies, Seminars, or Group Research. (1–5) I and II. The Staff
Advanced study in various fields of mechanical engineering on topics which may vary from year to year.

299. Individual Study or Research. (1–6) I and II.
The Staff (Mr. Steidel for Mechanical Design; Mr. Seban for Heat-Power Systems)
Investigation of advanced mechanical engineering problems.

Courses in Applied Mechanics

(3) II.
Mr. Atkinson
Prerequisite: graduate standing in engineering, physical sciences, mathematics or consent of instructor.
Application of analog and digital computers to ordinary and partial differential equations and to the simulation of physical systems: laboratory work with analog computers; programming of digital computers; comparison of analytic, analog computer and digital computer solutions of selected problems.

281. Methods of the Calculus of Variations and Applications. (2) I.
Mr. Rosenberg, Mr. Leitmann
Prerequisite: graduate standing in engineering, mathematics, physics, chemistry or astronomy, or consent of instructor.
Methods of the calculus of variations to fixed, free and moveable endpoint problems without and with side conditions and inequality constraints. Applications to stationarity and minimum principles and to problems of optimal control and design of dynamical systems.

282. Wave Propagation in Elastic Media. (3) II.
Mr. Goldsmith
Prerequisite: course 185.
The propagation of waves in unbounded elastic media. Analysis of surface waves due to point and distributed sources. Wave reflection and transmission at bounding surfaces. Pulses in infinite and finite rods and plates.

283A–283B. Oscillations in Nonlinear Systems. (3–3) Yr.
283A: II.
Mr. Rosenberg, Mr. Hsu
Prerequisite: Mechanical Engineering 170 or Electrical Engineering 109B.

* Not to be given, 1964–1965.
284A. Oscillations of Linear Systems 1. (3) I.  Mr. Soroka
Prerequisite: graduate standing in engineering, mathematics or physical sciences.
One-degree-of-freedom damped and undamped oscillatory systems under arbitrary
time-dependent loads. Equivalence of transient and frequency response. Impedance, mo­
bility concepts. Multi-degree-of-freedom damped and undamped discrete systems. General­

284B. Oscillations of Linear Systems 2. (3) II.  Mr. Soroka
Prerequisite: course 284A.
Description systems. Strings, shafts, beams, membranes, frames. Gyroscopic coupling,
Timoshenko beam. Time dependent boundary conditions. Self-excited oscillations. Root­
Hurwitz and nyquist stability criteria. Frequency spectra of periodic, nonperiodic and
random excitation and response functions. Power spectral densities.

285A. Theory of Elasticity 1. (3) II.  Mr. Naghdi, Mr. Hsu
Prerequisite: Mechanical Engineering 185.
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.

285B. Theory of Elasticity 2. (3) II.  Mr. Naghdi, Mr. Hsu
The general theory of bending of elastic shells with small displacements. Various approxi­
mate theories and application with special reference to shells of revolution. Non­
linear theories of shells.

286A. Theory of Plasticity 1. (3) I.  Mr. Naghdi
Prerequisite: Mechanical Engineering 185.
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 visco­
elasticity and viscoplasticity with application.

287A. Advanced Dynamics. (3) II.  Mr. Goldsmith, Mr. Rosenberg
Prerequisite: Mechanical Engineering 175, or consent of instructor, and graduate
standing.
Axioms of mechanics, statics of constrained systems, holonomic, nonholonomic, finite,
infinitesimal constraints. Development based on principles of d’Alembert, Newton, La­

287B. Impact. (3) I.  Mr. Goldsmith
Prerequisite: Mechanical Engineering 175, Civil Engineering 130. Mechanical Engi­
neering 185 recommended.
Collision of solid bodies. Wave propagation and contact processes produced in elastic,
plastic, and viscoelastic media by impulsive or impact loading. Penetration, perforation
and hydrodynamic phenomena. Response of materials to impact. Applications to spheres,
rods, bars, beams, plates and semi-finite solids.

288A. The Dynamics of Projectiles. (3) I.  Mr. Leitmann
Prerequisite: course 175 (or the equivalent).
Projectile (shell and unpowered rocket) exterior ballistics, particle trajectories in
vacuum and air with constant gravity, equations of motion, Siauci method, numerical
integration, differential correction theory, effects of wind, etc., motion of spinning pro­
jectile, stability criteria.

* Not to be given, 1964–1965.
288B. The Dynamics of Rockets. (3) II. Mr. Leitmann
Prerequisite: Mechanical Engineering 175 (or equivalent); Variational Principles, The Dynamics of Projectiles recommended.
Topics in exterior ballistics of rockets, approximate motion equations, long-range rockets and satellite carriers, optimum trajectories, performance analysis, guided missile kinematics.

*289A. Foundations of the Theory of Continuous Media 1. (3) I. Mr. Naghdi
Prerequisite: a course in elasticity (Mechanical Engineering 185) or a course in fluid mechanics (Aeronautical Sciences 162).
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 Kirchhoff double vector. The consequence 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.

*290D. The Principles of Mechanics. (3) I. Mr. Lieber
Underlines the foundations and formulation of various principles of corpuscular mechanics, and a critical examination of their interconnections in which the question of equivalence and completeness is central. Differential and integral variational principles and the geometrization of mechanics emphasized.

*290E. Theory of Elastic Stability. (3) II. Mr. Hsu

290F. Acoustic Wave Propagation. (3) II. Mr. Soroka

290G. Wave Propagation in Solids. (3) II. Mr. Goldsmith
Propagation of waves in unbounded elastic media. Surface waves due to point, line and area sources. Reflection of waves at interfaces of solids and free and fixed surfaces. Vibrations of infinite elastic circular cylinders and thin plates.

*290H. General Dynamics and Dynamical Systems. (3) I. Mr. Lieber
Prerequisite: 287A or equivalent.
Fundamental aspects of dynamical systems and general dynamics are considered. These include the dynamics of Euler, Lagrange, Hamilton, Jacobi, Poincare, Sandman, Kiovlioule and Birkhoff. The problem of three bodies is examined in detail.

290L. Relativistic Mechanics. (3) I. Mr. Lieber
Prerequisite: consent of instructor.
Presentation of empirical, conceptual basis of theory of relativity. The relativistic evolution of mechanics is traced to clarifying transition from classical scheme to relativistic one. The mechanics of fluids and of planetary motion are examined from a relativistic viewpoint.

* Not to be given, 1964–1965.
290J. Variational Principles of Fluid Mechanics and Thermodynamics.  
(3) II.  
Mr. Lieber  
Prerequisite: course 290F, or consent of instructor.  
Variational principles governing macro-states of many-body systems modeled according to the continuum hypothesis are formulated and applied. These pertain to hydrodynamics, visco-elasticity, plasticity and thermodynamics. These will be examined from a unified standpoint based on the mechanics of Gauss-Hertz.

290K. Topics in Nonlinear Continuum Mechanics. (3) II.  
Mr. Green  
Prerequisite: course 289A or equivalent.  
Basic invariance principles applicable to all continua. Restrictions due to symmetries of a continuum in some preferred state. Nonlinear constitutive equations for special types of continua. Memory functionals. Reduction of constitutive equations to canonical forms. Simple applications.

298. Group Studies, Seminars, or Group Research. (1–5) I and II.  
The Staff  
Advanced study in various fields of applied mechanics on topics which may vary from year to year.

299. Individual Study or Research. (1–6) I and II.  
The Staff  
Prerequisite: graduate standing in engineering, physics, or mathematics. Investigations of advanced problems in applied mechanics.

Aeronautical Sciences

Upper Division Courses†

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. Starkman, Mr. Oppenheimer  
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. Schaaf, Mr. Talbot  
Prerequisite: Engineering 103, Mathematics 14B.  
Stream function, potential function, and conformal transformation with applications to engineering problems.

Graduate Courses‡

223. Dynamics of Reactive Fluids. (3) I.  
Mr. Oppenheimer  
Studies of processes involving mutual interaction between fluid dynamic, chemico-kinetic, heat- and mass-transfer phenomena.

270. Wing Theory. (3) II.  
Mr. Berger  
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) I and II.  
Mr. Berger, Mr. Willis  
Prerequisite: Engineering 230. Recommended: Mechanical Engineering 161 and Aeronautical Sciences 162.  

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* Not to be given, 1964–1965.
† See footnote, page 295.
‡ See footnote, page 296.
277. Compressible Fluids. (3) I and II. Mr. Sherman, Mr. Holt
Prerequisite: Engineering 230. Recommended: Aeronautical Sciences 162 or Mathematics 270.
Fundamentals of subsonic and supersonic flow, shock waves, different theoretical methods, laboratory equipment, and procedures for supersonic investigations.

290. Advanced Graduate Study in Aeronautical Sciences.
290A. Experimental Methods in Aerodynamics. (3) I. Mr. Malsach
290B. Advanced Propulsion Systems. (3) II. Mr. Starkman
290C. Rarefied Gas Dynamics. (3) II. Mr. Schaal, Mr. Willis
290D. Magnetohydrodynamics. (3) II.
290E. High Flux Heat Transfer. (3) I. Mr. Giedt
290F. Turbulence. (3) I.
290G. Upper Atmosphere Studies. (3) II.
290H. Kinetic Theory. (3) I.
Prerequisite: course will ordinarily be taken in the third semester following completion of course 290C. Physics 121, Atomic Physics, is strongly recommended.

298. Group Studies, Seminars, or Group Research. (1–5) I and II.
The Staff (Mr. Laitone in charge)
Advanced study in various fields of aeronautical sciences on topics which may vary from year to year.

299. Individual Study or Research. (1–6) I and II.
Prerequisite: graduate standing.
The Staff (Mr. Laitone in charge)
Investigation of advanced problems in aeronautical sciences.

MINERAL TECHNOLOGY
Ceramic Engineering†
Geological Engineering‡
Materials Science§
Upper Division Courses¶

100. Industrial Ceramics and Metallurgy. (1) I.
Prerequisite: Engineering 45. (Course may be repeated once for credit.)
Lectures, field trips, and reports on topics related to the ceramic and metallurgical industries.

101. Material and Energy Balances. (3) II. Mr. Ravitz
Prerequisite: Chemistry 110A.
Material and energy balances of metallurgical and ceramic processes; fuels; combustion heat utilization; introduction to unit processes.

102. Phase Changes. (3) II. Mr. Searcy
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. Crystal Structure and Diffraction. (4) I and II. Mr. Washburn, Mr. Thomas
Prerequisite: Chemistry 110A and Physics 121 (may be taken concurrently).
Crystallography; perfect and imperfect crystals and the theory of diffraction for X rays, electrons and neutrons. Relation between crystal structure and physical and chemical properties. Laboratory: X-ray and electron diffraction techniques.

† For courses in ceramic engineering, see Materials Science, page 326.
‡ For courses in Geological Engineering, see Mineral Engineering, page 329.
§ Includes courses in ceramic engineering and metallurgy.
¶ See footnote, page 295.
104. Metallurgical Thermodynamics. (3) I. 
Prerequisite: Chemistry 110B and senior standing.
The principles of thermodynamics with emphasis on their application to metallurgical and ceramic problems.

Mr. Hultgren

111. Physical Ceramics. (2) I.
Prerequisite: course 102 or consent of instructor.
Structure, chemical and physical properties of inorganic nonmetallic materials. Emphasis on glasses and refractories.

Mr. Pask

111L. Physical Ceramics Laboratory. (2) I.
Prerequisite: open only to students who have had or are enrolled in course 111.
The laboratory part of course 111.

Mr. Pask

112. Chemical Ceramics. (3) I.
Prerequisite: course 102 or consent of instructor.
Fundamentals of inorganic and physical chemistry applied to materials of ceramic interest: colloids, clays, glasses, oxides, and high melting materials.

Mr. Fulrath, Mr. Searcy

113. Principles of Ceramic Engineering. (4) II.
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 analysis.

Mr. Pask

114. Seminar in Ceramic Engineering. (2) II.
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.

Mr. Fulrath

121. Physical Metallurgy. (2) I and II. 
Prerequisite: Chemistry 1B, Physics 4B and 4C. Not open to majors in metallurgy or ceramic engineering.
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.

Mr. Washburn, Mr. Thomas

121L. Physical Metallurgy Laboratory. (1) I and II.
Prerequisite: open only to students who have had or are enrolled in course 121.
The laboratory part of course 121.

Mr. Washburn, Mr. Thomas

122. Advanced Physical Metallurgy. (3) II.
Prerequisite: course 102 or consent of 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.

Mr. Parker

123. Mechanical Metallurgy. (3) II.
Prerequisite: course 121 and 121L (or Engineering 45).
Analysis of effects of structure on the mechanical properties of metals.

Mr. Dorn

124. Plasticity and Metal Forming. (3) I.
Prerequisite: Civil Engineering 130.
The theory of plasticity and the plastic forming of metals.
132. Unit Processes for Mineral Industries. (3) I.  
Mr. Ravitz  
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  
Prerequisite: Chemistry 110A may be taken concurrently.  
Principles of comminution, size distributions, sizing; solid-liquid separations by thickening and filtration; solid-solid separations based on such physical characteristics as size, density, surface, electrical, and magnetic properties; unit operations of mineral dressing.

198. Directed Group Studies for Advanced Undergraduates. (1-5) I and II.  
The Staff (Mr. Pask and Mr. Washburn in charge)  
Prerequisite: courses 101 and 103.  
Group study of selected topics.

199. Individual Studies or Research for Advanced Undergraduates. (1-5) I and II.  
The Staff (Mr. Pask and Mr. Washburn in charge)  
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:

206. Nuclear Materials. (3) I.  
Mr. Fulrath  
The behavior of fuel, moderator, control and structural materials in nuclear reactor environments with emphasis on the mechanism of irradiation damage and the effect of irradiation damage on the properties of materials.

230. Surface Properties of Materials. (3) I.  
Mr. Fuerstenau  
Prerequisite: Chemistry 110A–110B.  
Thermodynamics of surface and phase boundaries, surface tensions of solids and liquids, surface activity, adsorption, conditions for 3-phase stable contact, electrochemical double layer at interfaces, interaction between double layers, adsorption on semiconductors, applications of surface phenomena.

232. High Purity Materials. (2) II.  
Mr. Ravitz  
Prerequisite: course 104 or equivalent.  
Physical-chemical principles of ion exchange, solvent extraction, zone refining, electron-beam melting, and other processes used in the preparation of high-purity materials.

240. Metallurgical Thermodynamics. (3) II.  
Mr. Kelley  
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.  
A theoretical study of the metallic state, emphasizing those properties of technologic importance; chemical bonding forces, crystal structures and metals and alloys, compressibility, specific heat, magnetism, electrical and thermal conductivity, thermodynamics.

256. Reaction Kinetics. (3) II.  
Mr. Dorn  
Prerequisite: course 121, 121L; Chemistry 110A–110B.  
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.

† To be offered in even-numbered years.
†† See footnote, page 296.
258. Statistical Thermodynamics. (3) I.  
Mr. Dorn  
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  
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  
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. Searcy  
Prerequisite: Chemistry 110B; Physics 121.  
Theories on the structure, bonding and reactions in various classes of inorganic solids analyzed.

275. High Temperature Thermodynamics. (3) II.  
Mr. Searcy  
To be offered in odd-numbered years.  
Prerequisite: course 104 or Chemistry 114H.  
Methods for measuring and estimating thermodynamic data for high temperature materials. Application to prediction of the behavior of materials in high temperature environments.

280. Applications of Electron Diffraction and Microscopy. (3) I.  
Mr. Thomas  
Prerequisites: course 103, instructor's consent.  
Kinematical theory of electron diffraction: perfect and imperfect crystals; relationship to electron optical images. Implications of dynamical theory of scattering and absorption. Theoretical and experimental microscope resolution units. Applications to research problems in Materials Science.

290. Advanced Graduate Study in Materials Science.  
Consent of the instructor.  
Current and advanced topics in ceramics, extractive metallurgy, physical metallurgy.  
*290A. Microstructure of Ceramic Systems. (3) I.  
Prerequisite: course 111, 113 or consent of the instructor.  
Mr. Pask  
*290B. Surface Properties of Engineering Materials. (3) I.  
Mr. Fuerstenau  
*290C. The Electrical and Magnetic Properties of Materials. (3) II.  
Mr. Thomas  
290D. Electron Microscopy in Metallurgy. (2) II.  
Mr. Thomas

298. Group Studies, Seminars, or Group Research. (1-5) I and II.  
The Staff (Mr. Thomas in charge)

299. Individual Study or Research. (1-5) I and II.  
The Staff (Mr. Ravitz and Mr. Searcy in charge)

Metallurgy†  
Mineral Engineering‡  
Upper Division Courses†

100. Petrophysics. (3) I.  
Mr. Goodman, Mr. Witherspoon  
Prerequisite: Physics 4C and Mathematics 14B; Chemistry 110A and Geology 5 (both may be taken concurrently).  
Engineering study of rocks from the standpoint of their mineral content, texture, fluid distribution, conductivity, and elastic behavior.

* Not to be given, 1964–1965.  
† See footnote, page 295.  
‡ For courses in metallurgy, see Materials Science, page 326.  
§ Includes courses in geological engineering, mining and petroleum engineering.
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; Mineral Engineering 105, 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  
Laboratory exercises in the application of fluid mechanics and thermodynamics to mineral engineering systems.

104. Physical Properties of Rocks. (1) II.  Mr. Ward, Mr. Witherspoon  
Prerequisite: course 100, 105 (may be taken concurrently).  
Measurement of physical properties of solid and fluid phases encountered in mineral engineering systems.

105. Thermodynamics of Mineral Engineering Systems. (3) II.  Mr. Putnam  
Prerequisite: Chemistry 110A; Physics 4C; Mathematics 14B.  
Thermodynamics, heat transfer, combustion, and volumetric behavior.

106. Applied Geophysics. (3) I.  Mr. Ward  
Prerequisite: Geology 150 or equivalent; Physics 4B.  
Introduction to the theory, methods and applications of geophysics in mining and petroleum exploration and in civil engineering.

107. Computer Applications in Mineral Engineering. (3) II.  Mr. Somerton  
Prerequisite: senior standing in engineering.  
Condensed coding systems, techniques of problem solution and applications to problems in student’s field of interest.

120. Fundamentals of Geological Engineering. (2) I.  Mr. Goodman  
Prerequisite: Geology 150 or equivalent.  
The influence of geological factors on the design and construction of engineering structures founded on soil and rock or located underground, and on the use of soil and rock as construction materials. Primarily for students from outside the College of Engineering.

121. Introduction to Geological Engineering. (3) I.  Mr. Goodman  
Prerequisite: Geology 5 or equivalent; Engineering 35.  
A course in geological engineering design as related to construction and design of dams, tunnels, transportation routes, harbors, and beach protection structures. Sources of naturally occurring engineering construction materials.

140. Introduction to Mining. (3) II.  Mr. Shaffer  
Prerequisite: Geology 150 (may be taken concurrently).  
The discovery, production, processing, and marketing of mineral materials other than petroleum.

143A–143B. Exploration for Mineral Deposits. (3–3) Yr.  Mr. Hawkes  
Prerequisite: Geology 150 or equivalent.  
Application of principles of geology, geophysics, geochemistry, aerial photography, and statistics in the exploration for deposits of metals and industrial minerals.

* Not to be given, 1964–1965.
144. Mine Economic Analysis and Reports. (3) II.  
Mr. Shaffer

Prerequisite: course 140 and 101. Course 143 may be taken concurrently.

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

Prerequisite: Geology 150 or equivalent.

Introduction to the principles and practice of geochemical methods of prospecting for deposits of metallic and industrial minerals.

161. Petroleum Engineering—Development. (3) I.  
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.  
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.  
Mr. Fatt

Prerequisite: Course 105, 100, Chemistry 110A, Engineering 103, 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.  
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) II.  
Mr. Witherspoon

Prerequisite: consent of 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

Prerequisite: upper division standing in engineering or consent of the instructor.

Group studies of selected topics in geological engineering, mining, mineral exploration and petroleum engineering which vary from year to year.

199. Individual Study or Research for Advanced Undergraduates. (1–5) I and II.  
Mr. Goodman for Geological Engineering;
Mr. Shaffer for Mining;
Mr. Hawkes for Mineral Exploration;
Mr. Fatt for Petroleum Engineering

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.

* Not to be given, 1964–1965.
Graduate Courses‡

220. Rock Mechanics. (2) II. Mr. Lang
Prerequisite: consent of instructor.
Fundamentals of engineering construction in rock. Physical properties of rock specimens and rock masses; behavior of rock around excavations underground and on the surface; rock support and reinforcement; basic aspects of the design and construction of underground openings.

221A. Geological Engineering. (2) I. Mr. Goodman
Prerequisite: knowledge of principles of geology and consent of instructor.
Lectures and field exercises on the application of geology to engineering construction. Air photo identification and engineering properties of sediments; rock construction materials; landslides and slope stability; geological engineering for transportation routes; permafrost; coastlines, geological engineering aspects of engineering seismology.

221B. Geological Engineering. (2) II. Mr. Goodman
Prerequisite: knowledge of principles of geology and consent of instructor.
Mineral Engineering 221A is not prerequisite for 221B. Lectures and field exercises on the application of geology to the planning, design, and construction of large engineering works. Exploration techniques; geological engineering for dams and reservoirs, and for tunnels and for underground installations.

222. Case Histories and Current Problems in Geological Engineering. (2) II.
Prerequisite: course 121 or 220 or consent of instructor.
An analysis of geological aspects of engineering construction problems by means of studies of case histories and review of current literature.

241A–241B. Investigations in Mining Practice. (2–3; 2–3) Yr. Mr. Shaffer
Prerequisite: consent of instructor. 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.

242. Advanced Mineral Economic Analysis. (2) I. Mr. Shaffer
Prerequisite: consent of instructor.
Economic analysis of mineral properties based on actual case histories.

243. Advanced Mineral Exploration. (2) I. Mr. Hawkes, Mr. Ward
Prerequisite: course 143, 145, 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.

265. Kinetic Theory of Fluids and Surfaces. (2) I. Mr. Fatt
Prerequisite: course 105, 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.

268. Advanced Reservoir Engineering. (3) II. Mr. Fatt
Prerequisite: course 162, 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.

272. Flow in Porous Media. (3) II. Mr. Putnam
Prerequisite: Recommended: Aeronautical Sciences 162 or Mathematics 270.
Applications of fluid mechanics and thermodynamics to flow of single-phase and multiphase fluids in porous media, with application to reservoir problems.

* Not to be given, 1964–1965.
‡ See footnote, page 296.
273. Valuation of Oil- and Gas-Producing Properties. (2) I.
Prerequisite: graduate standing or consent of the instructor. Mr. Witherspoon
A study of the physical and economic factors underlying the appraisal of oil-producing properties. Estimation and evaluation of oil and gas reserves.

290. Advanced Graduate Study. I and II.
The Staff
Prerequisite: consent of the instructor.
Advanced graduate study in geological engineering, mining, mineral exploration, and petroleum engineering.

290B. Explorations for Industrial Minerals. (2) II.
Mr. Hawkes

290C. Applied Geochemistry. (2) II.
Mr. Hawkes

*290D. Geophysical Problems in Electromagnetic Theory. (3) II.
Mr. Ward

*290E. Geophysical Problems in Potential Theory. (3) II.
Offered in odd numbered years only.
(Formerly Geological Engineering 290E.)
Mr. Ward

290F. Advanced Natural Gas Engineering. (2) II. Mr. Witherspoon
(Formerly Petroleum Engineering 290A.)
Prerequisite: course 265 or 268 or consent of instructor.

298. Group Studies, Seminars, or Group Research. (1-5) I and II. The Staff
(Formerly Geological Engineering 298.)
Prerequisite: consent of instructor.
Advanced study in various fields of geological engineering, mining, mineral exploration, and petroleum engineering, on topics which may vary from year to year.

299. Individual Study or Research. (1-5) I and II.
Mr. Goodman for Geological Engineering,
Mr. Shaffer for Mining,
Mr. Hawkes for Mineral Exploration,
Mr. Fatt for Petroleum Engineering
(Formerly Geological Engineering 299, Mining 299, and Petroleum Engineering 299.)
Individual study or research in geological engineering, mining, mineral exploration, and petroleum engineering.

Mining
Petroleum Engineering

NAVAL ARCHITECTURE
Upper Division Courses

151. Statics of Naval Architecture. (3) I. Mr. Schade
Prerequisite: Engineering 103, Civil Engineering 130.
Geometry of the ship's form; buoyancy and stability in intact and damaged conditions; subdivision, freeboard, measurement rules and requirements; grounding and launching; strength and stiffness.

* Not to be given, 1964–1965.
† See footnote, page 295.
‡ For courses in petroleum engineering, see Mineral Engineering, page 329.
§ For courses in mining, see Mineral Engineering, page 329.
152. Dynamics of Naval Architecture. (3) I. Mr. Wehausen
Prerequisite: course 151 which may be taken concurrently.
Resistance: dimensional laws, use of model-test data, computation of frictional re­
sistance from tables, interpolation in standard series. Elementary theory of propellers,
theory of open-water and self-propelled model tests, use of propeller charts for selection
of propellers. Hydrodynamics of rudders and their selection; steering properties of ships.
Elementary theory of the motion of a ship in a seaway.

153. Marine Engineering. (3) II. Mr. Tichvinsky
Prerequisite: Mechanical Engineering 102, 105B. Recommended: course 151.
Power requirements and selection of power plants for various types of vessels and
necessary auxiliaries for steam and motor ships will be considered.

154. Applied Naval Architecture. (3) II. Mr. Schade, Mr. Paulling
Prerequisite: course 151, 152.
Preparation of a preliminary ship design, starting with a prescribed set of owner’s
requirements or military requirements. Determination of optimum dimensions and co­
efficients 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‡

240A–240B. Theory of Ship Structures. (3–3) Yr. Mr. Schade
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 dis­
placements; and interpretation of large-scale experiments and performance data.

241A–241B. Hydrodynamics of Ships. (3–3) Yr. Mr. Wehausen
Prerequisite: Aeronautical Sciences 162, Mathematics 14A–14B, and Naval Archi­
tecture 151, 152, or permission of instructor.
Theory of similarity and model testing. Boundary-layer theory and frictional resistance.
on course. Motion of ships in calm water and waves.

242. Advanced Ship Design. (3) I and II. The Staff
Prerequisites: course 240A–240B, 241A–241B.
Each student will execute a design project involving part or the whole of a ship.
Instead of classic, standardized or codified methods, advanced (more speculative) tech­
niques of rational mechanics, deriving from the analyses of Naval Architecture 240 and
241 will be applied.

† See footnote, page 296.
290. Advanced Graduate Study in Naval Architecture.
Current and advanced topics in theory and design of screw propellers, hydrodynamics of free surfaces, ship vibrations, and other specialized studies in related areas of naval architecture.

290A. Theory and Design of Screw Propellers. (3) II. Mr. Paulling
290B. Ship Dynamics. (3) II. Mr. Wehausen
Prerequisite: graduate standing and consent of the 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. (1–6) I and II.
The Staff (Mr. Schade in charge)
Investigation of selected advanced naval architecture subjects.

Related Course in Another Department
Mathematics 270. Technical Hydrodynamics. (3) I. Mr. Lewy

NUCLEAR ENGINEERING
Upper Division Courses†

101A–101B. Engineering Science Laboratory. (2–2) Yr.
Mr. Mark, Mr. Kaplan
Prerequisite: Physics 121. 101A is not prerequisite to 101B.
Laboratory for upper division students in engineering science program. Design of experiments, measurements and interpretation of physical phenomena of importance in many of the new areas of applied science.

165. Introduction to Nuclear Reactor Theory. (3) I and II. Mr. Pigford
Prerequisite: Physics 4C, Mathematics 14B.
Review of atomic and nuclear physics as applied to nuclear reactors; nuclear reaction rates; diffusion and slowing down of neutrons; criticality conditions; reactor kinetics and control; shielding; thermal characteristics; reactor systems and nuclear fuel cycles.

166. Introduction to Nuclear Engineering Laboratory. (1) I. Mr. Grossman
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 (Mr. Pigford in charge)
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.

199. Individual Studies or Research for Advanced Undergraduates.
(1–5) I and II.
The Staff (Mr. Pigford 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.
Individual study and/or research on a problem chosen by the student and carried out under guidance of an instructor.

† See footnote, page 295.
Graduate Courses‡

250A–250B. Nuclear Reactor Theory. (3–3) Yr. Mr. Amster
Prerequisite: Physics 121 and 124 or 129A, Mathematics 120A and 120B or equivalent. (Mathematics 120B may be taken concurrently with consent of instructor.)
The physical principles governing the behavior of nuclear fission chain reactors. Neutron reactions; neutron slowing down; diffusion theory; age theory; transport theory; reflected and heterogeneous reactors; reactor kinetics; perturbation theory.

251A–251B. Nuclear Engineering Laboratory. (2–2) Yr. Mr. Grossman
Prerequisite: course 250A–250B (may be taken concurrently) and/or consent of instructor.
Nuclear electronics and instrumentation, the experimental study of interactions of nuclear radiations with matter. Problems in experimental neutronics, utilizing a nuclear reactor, subcritical reactor assemblies, and accelerators as pulsed-neutron sources.

260. Thermal Aspects of Nuclear Reactors. (3) I. Mr. Schrock
Prerequisite: Physics 112, Mechanical Engineering 105A or Chemical Engineering 144.
Fluid mechanics, thermodynamics and heat transfer applied to nuclear reactor systems. Thermal stress analysis of nuclear reactors.

262. Reactor Fuel Cycles and Shielding. (3) II. Mr. Ruby
Prerequisite: course 250A (may be taken concurrently).
Reactivity lifetime and fuel burnout; fuel cycles; breeder and converter reactors. Gamma ray and neutron shielding of nuclear reactors.

264. Dynamics of Nuclear Systems. (3) I. Mr. Smith
Prerequisite: course 250A.
Development of dynamic models of reactor systems. Methods of measuring dynamic parameters. Various techniques of control system analysis and synthesis including noise analysis as applied to reactor systems. Nonlinear analysis of reactor systems.

270A–270B. Neutron Transport Theory. (3–3) Yr. Mr. Goldstein
Prerequisite: course 250A–250B.
The theory of the distribution in space, angle, and energy of neutrons in migration through bulk media. Discussion of physical assumptions and mathematical techniques for solving the equations relevant to reactor theory.

290. Advanced Graduate Study in Nuclear Engineering.
Advanced group study in various fields of nuclear engineering; topics vary from year to year.

290A. Theronuclear Reactions. (3) I. Mr. Pyle
290B. Biological Effects of Radiation and Radiation Safety. (3) I. Mr. Wallace
290D. Thermoelectric and Thermionic Power Systems. (3) II. Mr. Pigford
290E. Special Use of Nuclear Energy-Explosives and Large Transients. (3) II. Mr. Teller
290F. Nuclear Propulsion and Power Systems for Space. (3) I. Mr. Smith
290G. Neutron Thermalization in Crystalline Solids. (3) I. Mr. Amster
Prerequisite: consent of the instructor, based on knowledge of statistical mechanics and quantum mechanics at the upper division level.
290I. Controlled Thermonuclear Reactions. (3) II. Mr. Pyle
Prerequisite: course 290A and either Electrical Engineering 117A or Physics 110A–110B.
290J. Applied Scattering Theory. (3) II. Mr. Amster
Prerequisite: Physics 115 or equivalent.
290K. Neutron Thermalization in Crystalline Solids. (3) II. Mr. Amster
Prerequisite: course 290G or consent of the instructor based on knowledge of statistical mechanics and quantum mechanics at the upper division level.

298. Seminars. (1-5) I and II.
The Staff (Mr. Pigford in charge)
Advanced group study in various fields of nuclear engineering; topics vary from year to year.

‡ See footnote, page 296.
LABORATORY FACILITIES

Electronics Research Laboratory

Research in electrical sciences covers a very large range of activities, and the need for electrical knowledge and equipment is central to research in almost every other area of creative effort. The research in the Electronics Research Laboratory reflects this breadth, with investigations in six separate areas: (1) circuit and system theory; (2) electromagnetic problems in antennas and propagation; (3) solid-state and semiconductor materials, mechanisms and devices, including quantum electronics; (4) electron-stream interactions; (5) high- and low-temperature plasmas; (6) magnetic mechanisms and electromechanical energy conversion. The work is largely supported by contracts with the Federal Government, notably the Department of Defense and the National Science Foundation. The Electronics Research Laboratory coordinates the various research projects, aids in the establishment of new projects, and furnishes research facilities. The personnel of the laboratory include faculty members, principally from the Department of Electrical Engineering, research assistants, and other graduate students, together with a number of full-time research support persons. All of the work is intimately related to graduate study programs of the faculty and students.

Hydraulic Engineering Laboratory

The Hydraulic Engineering Laboratory, situated in the new addition to Hesse Hall, is equipped for experimental work in general fluid mechanics, general hydraulics, hydraulic machinery, surface and ground water hydrology, water resources, hydraulic structures, and sediment transportation. There are special facilities for research on pumps, sediment transportation, and waves. Extensive research facilities are available for studies on various river, harbor, and coastal problems at the Richmond Field Station. A large model basin is used for model studies of rivers, harbors, wave phenomena, and related problems. A wind-wave channel is available for studies of wind tides and the generation of wind waves in shallow water. A large wave channel, which also serves as a towing tank, as described in connection with the facilities of naval architecture, is available for wave action studies on a large scale. Flumes and other facilities are also available for investigations of sediment transportation in open channels.

Industrial Engineering Laboratories

The Department of Industrial Engineering maintains several laboratories; machine tool laboratory, welding laboratory, metal casting laboratory, gaging laboratory, and human factors in technology laboratory. Beyond these
laboratories, a computing facility is provided in conjunction with the Computing Center of the University for undertaking analyses of great complexity.

The machine tool laboratory contains basic metal working machines and forming presses; the welding laboratory contains arc and spot welding equipment; the metal casting laboratory contains equipment for the melting of ferrous and nonferrous metals and devices for making sand, shell and plaster molds; the gaging laboratory contains precision gaging and measuring equipment for making direct measurements to 0.00001"; the human factors in technology laboratory is equipped to make a variety of work measurements and experiments on human performance in control tasks. These laboratories contain extensive specialized equipment and instrumentation for graduate study and research.

Advanced study in operations research is carried on in conjunction with the Operations Research Center. See p. 340 for more detailed information.

Inorganic Materials Research Laboratory

In recognition of the pressing need for improved understanding of materials of possible application in nuclear reactors, jet and rocket engines, space craft frames, and electronic devices, the Inorganic Materials Research Laboratory has been organized as a division of Lawrence Radiation Laboratory. Research is conducted by 25 faculty members and more than 100 graduate students as well as by post doctoral students and some permanent research personnel in the departments of Mineral Technology, Nuclear Engineering and Chemistry.

Studies of the laboratory encompass a spectrum of research in fundamental properties of metals and inorganic, or ceramic, materials. A partial list includes: synthesis of inorganic materials; kinetic and thermodynamic studies of high temperature chemical reactions; evaluation of influences of microstructure, composition, temperature, pressure and other variables on electrical and mechanical properties; radiation-effects studies; solid state diffusion studies; and spectroscopic and mass spectroscopic investigations of high temperature vapors.

Mechanical Engineering Laboratories

The Department of Mechanical Engineering has combined teaching and research laboratories in Hesse Hall and in the Mechanics Building, with additional facilities for instruction and research at the Richmond Field Station.

The campus laboratories have facilities and services for undergraduate laboratory study and for graduate research programs in all phases of mechanical engineering; acoustics, aerodynamics, air conditioning, analog computers, automatic controls, propulsion dynamics, combustion, dynamic stress, fluid flow, fluid mechanics, fluid machinery, heat-power, heat transfer, impact, instrumentation, lubrication, refrigeration, stress analysis and experimental mechanics, thermal radiation, thermodynamics, and vibration. These laboratories are kept flexible to meet the progress of technology and science, and
many of the pioneer research equipments are incorporated into the undergraduate laboratory program upon completion of the initial original research.

Research efforts that are too large to be accommodated on campus are conducted at the Field Station. The major facilities are low pressure aerodynamic wind tunnels for the study of upper atmosphere flight phenomena of high speed aircraft, missiles, and space craft; combustion and detonation systems for rocket thrust research; wind tunnels for convective heat transfer programs related to space-craft re-entry into the earth's atmosphere; and anechoic and reverberation chambers and related sound rooms for noise isolation, identification, and insulation.

Berkeley Thermodynamics Laboratory

United States Bureau of Mines

The Berkeley Thermodynamics Laboratory of the United States Bureau of Mines is housed in the Hearst Mining Building and is closely associated with the Department of Mineral Technology of the University. This station has as its major function the measurement and correlation of thermodynamic values (heat capacities at low and high temperatures, entropies, heats of reaction, and free energies of reaction) of pure metallurgical and ceramic substances.

The chief of the laboratory serves as a University lecturer in alternate years and offers a course (Materials Science 240) in advanced metallurgical thermodynamics. He also serves formally as a consultant for the University's project on thermodynamic properties of metals and alloys and informally as a consultant for other projects of the Department of Mineral Technology and for research of graduate students.

The personnel of the laboratory consists of ten full-time professional employees and two full-time clerical employees.

Naval Architecture Laboratory

The Naval Architecture Laboratory at the Richmond Field Station includes several facilities for ship structural and hydrodynamics research.

The principal hydrodynamics facility is the ship model towing tank, 200 feet in length by 8 feet wide and 6 feet deep. This tank is equipped with a carriage for towing ship models at constant speed and in accelerated motion. A wave generating machine is installed which is capable of producing regular or irregular seas. Instrumentation is provided for measurements of forces, motions, and pressures on surface or submerged models moving in calm water or waves.

For static structural investigations, a bending machine has been constructed which can apply to a ship structural model nearly any desired bending moment or shear force distribution to represent the loading on a ship in a seaway. Associated instrumentation is provided for measurement of strain and deflection throughout the model undergoing test.

A third facility is intended for research in the hydrodynamic and structural
areas associated with water impact which is an especially important problem for high speed ships operating in rough seas. In this machine, a large-scale model is dropped into a water filled tank while instruments record the motion, pressure, strain and deflection at selected points throughout the model.

**Nuclear Engineering Laboratory**

The Nuclear Engineering Laboratory serves as an instructional and research center for the graduate students and staff of the Department of Nuclear Engineering. Portions of the laboratory are also used for undergraduate laboratory instruction in Engineering Physics. The laboratory facilities include small accelerators for pulsed neutron experiments, sources of ionizing radiation, nuclear instrumentation for detecting and analyzing ionizing radiation, a small nuclear reactor, and subcritical assemblies moderated by light water and graphite. Data analysis is facilitated by three 400-channel pulse-height and time analyzer and one two-dimensional 4096-channel analyzer. The latter is connected through tape and card-punch equipment to the campus IBM 7090 digital computer. A new high-flux research reactor with pulsing capability will soon be installed in a new on-campus laboratory now under construction.

Current research investigations include the study of the energy and spatial transport of neutrons in homogeneous and heterogeneous media, neutron spectrometers, radiation in outer space, ion erosion of solid surfaces, direct energy conversion by thermionic emission and semiconducting materials, transient boiling phenomena, pulsed-neutron kinetics in multiplying systems, diffusion of fission gases in nuclear fuel bodies, plasma physics of thermonuclear reactions, chemonuclear reactions and separations, and magnetohydrodynamics. Several of these investigations are supported by facilities of the Lawrence Radiation Laboratory.

**Operations Research Center**

The activities of the Operations Research Center are broadly concerned with the science of decision and its application; that is, the formulation and solution in mathematical terms of planning and control problems of man-machine systems.

Typical research topics are: integer programming, convex programming, solution of large-scale linear programming systems, life-test sampling plans, reliability theory, generalized networks, multicommodity networks, critical-path scheduling, Markov-renewal programming, mathematical methods of traffic and transportation systems, programming under uncertainty. Applied areas include forest management and fire control, biomathematical systems and air pollution.

The Center is closely associated with Industrial Engineering. Related graduate courses are listed under that department and also listed as part of the Engineering Science curriculum under the Operations Research options. Faculty, visiting scholars, post graduate research fellows and graduate research assistant participate in the program of the Center.
Sanitary Engineering Research Laboratory

The function of the Sanitary Engineering Research Laboratory is to provide a facility for the independent research requirements of graduate students in sanitary and public health engineering and related environmental health sciences, as well as an opportunity for members of the instructional staff to pursue their interests and to develop in professional and academic stature and to serve the State through research. It offers no academic program of its own, but is coordinated at the graduate level with the instructional laboratories of the Hydraulic and Sanitary Engineering Division of the Department of Civil Engineering and the Environmental Health Sciences Division of the School of Public Health. Both contract and University-sponsored projects are pursued in the Laboratory under the guidance of the faculty. The wide variety of projects in environmental sanitation in progress at all times is concerned with the treatment and reclamation of industrial and domestic waste waters and with problems of water pollution, radioactive wastes, air pollution, water resources, solid wastes, and other environmental factors. Its activities include publication of technical bulletins and the sponsoring of technical conferences. Its staff includes all members of the instructional staff in sanitary and public health engineering and related environmental health sciences, together with some seventy to eighty professional and technical personnel, including graduate students employed on a part-time basis.

Sea Water Conversion Laboratory

The Sea Water Conversion Laboratory, located at the Richmond Field Station, consists of a series of experimental units connected with the demineralizing of sea water. Experimental work is carried on by graduate students and full-time research personnel in the fields of distillation (including solar), electrodialysis, ion exchange, and other schemes.

Soil Mechanics and Bituminous Materials Laboratory

The Soil Mechanics and Bituminous Materials Laboratory situated at the Richmond Field Station provides extensive facilities for research on soil properties, soil mechanics, foundation engineering, and the behavior and properties of asphalts and asphaltic mixtures. Graduate students working towards master's or doctoral degrees in the Department of Civil Engineering conduct individual research in the laboratory while a continuing program of research is conducted by faculty members in the Department of Civil Engineering and research engineers in the Institute of Transportation and Traffic Engineering. Current research studies are concerned with the strength and deformation characteristics of soil under dynamic and repeated loading, effects of earthquakes on embankments and foundations, the supporting capacity of pile foundations, soil compaction, soil stabilization with admixtures, permeability of compacted clays, characteristics and mechanisms of soil creep, and rheologic characteristics and fatigue behavior of asphalt mixtures. The
laboratory provides special facilities for work in these areas, in addition to equipment for standard tests on soils, asphalts and asphaltic mixtures.

**Structural Engineering Materials Laboratory**

The Structural Engineering Materials Laboratory comprises the principal teaching and research facilities of structural engineering and structural mechanics, a Division of the Department of Civil Engineering. Located in the Engineering Materials Laboratory building, it contains facilities for class instruction and for research in materials of construction and in behavior of structures. The study of structures and structural models includes elastic displacement methods, strain measurements, and photoelastic procedures.

A wide variety of testing machines and measuring apparatus is available, including a universal testing machine with a capacity of four million pounds in compression. Facilities for determining dynamic effects on structural models include a large shaking table for simulating earthquakes and oscilloscopes, oscillographs, and strain-gage amplifiers for measuring the response.

For study of materials, control rooms are provided for tests over a wide range of temperature and humidity. The Laboratory operates an experimental plant, with a chemical laboratory, for the manufacture of cements, limes, and lightweight aggregates.

### ENGLISH

*(Department Office, 2125 Dwinelle Hall)*

Travis M. Bogard, Ph.D., *Professor of English and Professor of Dramatic Art.*

Myron F. Brightfield, Ph.D., *Professor of English.*

Bertrand H. Bronson, Ph.D., D. ès L. (hon.), *Professor of English.*

James R. Caldwell, Ph.D., *Professor of English.*

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 (Vice-Chairman of the Department).*

Gordon McKenzie, Ph.D., *Professor of English.*

§Josephine Miles, Ph.D., *Professor of English.*

Charles Muscatine, Ph.D., *Professor of English.*

*Absent on leave, 1964–1965.*


*In residence fall semester only, 1964–1965.*
Thomas F. Parkinson, Ph.D., Professor of English.
John H. Raleigh, Ph.D., Professor of English.
David W. Reed, Ph.D., Professor of English and Professor of Linguistics.
Mark Schorer, Ph.D., Litt.D., Professor of English (Chairman of the Department).

*Wayne Shumaker, Ph.D., Professor of English.
†Henry N. Smith, Ph.D., Professor of English.
Ernest Tuveson, Ph.D., Professor of English.
Arthur G. Brodeur, Ph.D., LL.D., Professor of English and Germanic Philology, Emeritus.

Willard E. Farnham, Ph.D., LL.D., Professor of English, Emeritus.
Benjamin H. Lehman, Ph.D., LL.D., Professor of English, Emeritus.
George R. Stewart, Ph.D., L.H.D., Professor of English, Emeritus.
Jonas A. Barish, Ph.D., Associate Professor of English.

*Frederick C. Crews, Ph.D., Associate Professor of English.
Thomas B. Flanagan, Ph.D., Associate Professor of English.
Norman Grabo, Ph.D., Associate Professor of English.
Howard E. Hugo, Ph.D., Associate Professor of English.
Robert L. McNulty, Ph.D., Associate Professor of English.
John Paterson, Ph.D., Associate Professor of English.
Constantinos A. Patrides, D. Phil, Associate Professor of English.

†Ralph W. Rader, Ph.D., Associate Professor of English.
Alain Renoir, Ph.D., Associate Professor of English and Associate Professor of Comparative Literature.

*Hugh M. Richmond, D. Phil, Associate Professor of English.

Thomas Arp, Ph.D., Assistant Professor of English.
Robert Bloom, Ph.D., Assistant Professor of English.
Richard Bridgman, Ph.D., Assistant Professor of English.

Richard Bridgman, Ph.D., Assistant Professor of English.

Jones A. Barish, Ph.D., Associate Professor of English.

Paul K. Alkon, Ph.D., Assistant Professor of English.
Paul J. Alpers, Ph.D., Assistant Professor of English.
Thomas Arp, Ph.D., Assistant Professor of English.


Donald M. Friedman, Ph.D., Assistant Professor of English.
Barbara Garlitz, Ph.D., Assistant Professor of English.
*Thomson W. Gunn, M.A., Assistant Professor of English.
Robert Haller, Ph.D., Assistant Professor of English.
Martin Halpern, Ph.D., Assistant Professor of English.
*Ulrich Knoepflmacher, Ph.D., Assistant Professor of English.
Jay A. Levine, Ph.D., Assistant Professor of English.
David Littlejohn, Ph.D., Assistant Professor of English.
Ellen McIlroy, Ph.D., Assistant Professor of English.
Stuart Miller, Ph.D., Assistant Professor of English.
Masao Miyoshi, 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.
§Paul H. Piehler, Ph.D., Assistant Professor of English.
Norman Rabkin, Ph.D., Assistant Professor of English.
Sheldon Sacks, Ph.D., Assistant Professor of English.
John D. Seelye, Ph.D., Assistant Professor of English.
George A. Starr, Ph.D., Assistant Professor of English.
Gardner D. Stout, Jr., Ph.D., Assistant Professor of English.
Herbert L. Sussman, Ph.D., Assistant Professor of English.
Paul Theimer, Ph.D., Assistant Professor of English.
Robert Tracy, Ph.D., Assistant Professor of English.
William Whitehead, Ph.D., Assistant Professor of English.
Michael Zimmerman, Ph.D., Assistant Professor of English.
*Alex Zwerdling, Ph.D., Assistant Professor of English.

Stephen W. Booth, M.A., Acting Assistant Professor of English.
Julian C. Boyd, M.A., Acting Assistant Professor of English.
James E. Breslin, M.A., Acting Assistant Professor of English.
Charles B. Cox, M.Lit., Visiting Associate Professor of English.
Mary C. Davison, M.A., Acting Assistant Professor of English.
George Farr, M.A., Acting Assistant Professor of English.
Dorothee Finkelstein, Ph.D., Lecturer in English.
Alan Friedman, M.A., Associate in English.
Hamlin Hill, Ph.D., Visiting Assistant Professor of English for the spring semester.
Richard E. Hutson, M.A., Acting Assistant Professor of English.
Joseph E. Kramer, M.A., Lecturer in English.
Ojars Kratins, M.A., Acting Assistant Professor of English.

\††In residence fall semester only, 1964–1965.
John Montagu, M.A., Lecturer in English for the spring semester.
Morton D. Paley, M.A., Acting Assistant Professor of English.
Ted Reed, M.A., Lecturer in English.
Elinor Stoneman, M.A., Acting 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 91.

*Departmental Major Advisers:* Consult Department Office.

**The Major. First Year**—Required: course 1A–1B (3–3), Composition and Study of Literature. Second Year—Required: course 46A–46B (4–4) and 3 additional units to be elected from 17 (3), 25 (3), 30 (3), 41 (3), 44A–44B (3–3), 49 (3). Recommended lower division electives in other departments: Art 1B, 1C; Classics 10A–10B, 28, 34, 35, 36; French 4R; History 4A–4B; Music 27A–27B; Philosophy 20A–20B; Slavic 39.

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; one course in British literature of the eighteenth or nineteenth century. The requirement in one of these areas may be met, however, by an appropriate 2-unit summer session 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.

**Honors Program.** Students with an over-all grade-point average of 3.0 may apply to the departmental honors committee for admission to the honors program. Application should be made through the student’s major adviser not later than the end of the student’s junior year. Candidates for Honors in English will be required to write a bachelor’s thesis in their senior year, beginning the work in a section of English 151 and completing it in English H195 or H197.

**Teaching Training.** Consult Mr. Parkinson, Mr. Hugo, or Mr. Evans; see also the Announcement of the School of Education.

**Higher Degrees.** Consult Mr. Barish; see also the Announcement of the Graduate Division, Berkeley.
Lower Division Courses

Freshman Course

1A–1B. First-Year Reading and Composition. (3–3) Yr. Beginning each semester.
The Staff (Mr. Muscatine in charge)
Prerequisite for the English major.
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

17. Shakespeare. (3) I.
Mr. Bogard
May be taken by English majors as a lower division elective; will not satisfy the Shakespeare requirement.
Lectures on selected plays of Shakespeare.

25. Language. (3) II.
Mr. Sacks
Designed for sophomores, but open to students in the upper division.
The origins and symbols of human speech; pattern, 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) I and II.
Mr. Arp, Mr. Hill

33A–33B. American Studies. (3–3) Yr.
Mr. Ziff
Open to sophomores with the consent of 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, drawing on material from history, literature, political science, philosophy, and other fields. Discussion, the writing of essays, and occasional joint meetings with the staff and students of the two equivalent courses (History 33A–33B and Political Science 33A–33B).

40. Intermediate Expository Writing (3) I and II.
Mr. Paterson, Mr. Miyoshi
Prerequisite: course 1A–1B or Speech 1A–1B or equivalent.

41. Writing in Connection with the Reading of Important Books of the Nineteenth and Twentieth Centuries. (3) I and II.
Mr. Paterson, Mr. Seelye
Prerequisite: course 1A–1B or Speech 1A–1B, or consent of instructor.

43. Introduction to the Study of Poetry. (3) I.
Miss Garlitz
Lectures on poetry intended to develop the student’s ability to read, understand, and evaluate a poem. Designed primarily for students whose major is not English.

44A–44B. Masterpieces of Literature. (3–3) Yr.
Mr. Rabkin, Mr. Hugo
44A is not prerequisite to 44B.
44A. I: Mr. Rabkin.
44B. II: Mr. Hugo.
Lectures on great works of the world’s literature.

46A–46B. Survey of English Literature. (4–4) Yr. Beginning each semester.
The Staff (Mr. Rader in charge)
Close study of typical works of major authors from Chaucer to the twentieth century 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 Language

110. The English Language. (3) I and II.  
Miss Closs, Mr. Boyd

131. American English. (3) II.  
Mr. Reed


#### 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.

*114B. The English Drama from 1660 to 1850. (3) II.*

114C. British and American Drama from 1850 to the Present. (3) II.  
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) II.  
Mr. Jordan

117A-117B. Shakespeare. (3-3) Yr.  
Mr. McNulty, Mr. Kramer

Limited to twenty-five students. Studies of selected plays, with practice in various critical approaches; e.g., establishing text, relation to source, changing concepts of comedy and tragedy, influence of physical conditions on technique.

117S. Shakespeare. (3) I and II.  
Mr. Barish, Mr. Richmond

Lectures on Shakespeare and reading of his best work.

119. The Age of Johnson. (3) II.  
Mr. Littlejohn

120-120B. Medieval Literature. (3-3) Yr.  
Mr. Jones

Students may receive credit for 120A without taking 120B.

120A. Development of literary form and idiom throughout the Christian West from the first to the fifteenth centuries.

*120B. Close study of selected classics in translation, including the Nibelungenlied and Dante's Comedy.*

121. The Romantic Period. (3) I.  
Mr. Hugo

122. The Victorian Period. (3) II.  
Mr. McKenzie

123. Nineteenth-Century British Prose. (3) II.  
Mr. Sussman

125B. The Novel in Western Civilization. (3) I.  
Mr. Raleigh

* Not to be given, 1964–1965.
125C–125D. The English Novel. (3–3) Yr. Mr. Rader, Mr. Paterson
125C is not prerequisite to 125D.
125C: Defoe to Scott.
125D: Dickens to Conrad.

125E. The American Novel. (3) II. Mr. Ziff

*128. Regional Literature: California and the West. (3) II. Mr. Hart

130A. American Literature before 1840. (3) II. Mr. Grabo

130B. American Literature, 1840–1885. (3) I and II.

130C. American Literature: 1885 to the Present. (3) I. Mr. Hart

132. The American Renaissance. (3) II. Mr. Tuveson.

*149. The English Lyric. (3) I.

152. Chaucer. (3) I. Mr. Muscatine

155. The Age of Chaucer. (3) II.

*156. Backgrounds of English Literature in the Continental Renaissance. (3) II. Mr. Eskin

A survey of the principal continental documents which are important to an understanding of the English Renaissance.

158A–158B. The English Renaissance. (3–3) Yr. Mr. Orgel, Mr. Fish
158A. Beginnings of the English Renaissance, and literature of the sixteenth century.
158B. Literature of the seventeenth century.
158B satisfies the English major requirement of a course on Milton or the Age of Milton.

160. British Literature from 1900 to the Present. (3) I. Mr. Schorer

161. Recent British and American Poetry. (3) I and II. Mr. Cox

166. The Augustan Age. (3) II. Mr. Traugott

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. The Staff (Mr. Alkon in charge)

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 English majors.

Intensive study of the more important works of a major author and the writing of a long essay.

* Not to be given, 1964–1965.
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<tr>
<th>Course Code</th>
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<th>Editions</th>
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<tbody>
<tr>
<td>151A</td>
<td>Arnold</td>
<td>(3) II</td>
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<td>151B</td>
<td>Byron</td>
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<td>151Br</td>
<td>Browning</td>
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<td>151C</td>
<td>Conrad</td>
<td>(3) II</td>
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<td>151Ch</td>
<td>Chaucer</td>
<td>(3) I and II</td>
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(Formerly numbered 151L.)

Mr. Whitehead, Mr. Bronson, Mr. Cline, Mr. Theiner

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<td>151Cl</td>
<td>Coleridge</td>
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<td>151D</td>
<td>Dryden</td>
<td>(3) I</td>
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<td>151F</td>
<td>Fielding</td>
<td>(3) II</td>
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<td>151GE</td>
<td>George Eliot</td>
<td>(3) I</td>
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<td>151H</td>
<td>Hawthorne</td>
<td>(3) I</td>
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<td>151J</td>
<td>Henry James</td>
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<td>151Jn</td>
<td>Ben Jonson</td>
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<td>151K</td>
<td>Keats</td>
<td>(3) II</td>
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<tr>
<td>151M</td>
<td>Melville</td>
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<td>151Mi</td>
<td>Milton</td>
<td>(3) I and II</td>
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(Formerly numbered 151J.)

Mr. Fish, Mr. O Hehir, Mr. Shumaker, Mr. McNulty

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<th>Author</th>
<th>Editions</th>
</tr>
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<tbody>
<tr>
<td>151P</td>
<td>Pope</td>
<td>(3) II</td>
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<tr>
<td>151S</td>
<td>Shakespeare</td>
<td>(3) I and II</td>
</tr>
</tbody>
</table>

Mr. Alpers, Mr. Booth, Miss Davidson, Mr. Kramer

<table>
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<tr>
<th>Course Code</th>
<th>Author</th>
<th>Editions</th>
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<tbody>
<tr>
<td>151SJ</td>
<td>Samuel Johnson</td>
<td>(3) I</td>
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<tr>
<td>151Sp</td>
<td>Spenser</td>
<td>(3) I</td>
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<tr>
<td>151Sw</td>
<td>Swift</td>
<td>(3) I</td>
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<tr>
<td>151T</td>
<td>Thomas Hardy</td>
<td>(3) II</td>
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<tr>
<td>151Te</td>
<td>Tennyson</td>
<td>(3) I and II</td>
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<tr>
<td>151W</td>
<td>Whitman</td>
<td>(3) II</td>
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<tr>
<td>151Wd</td>
<td>Wordsworth</td>
<td>(3) I</td>
</tr>
<tr>
<td>151X</td>
<td>Contemporary Authors</td>
<td>(3) I and II</td>
</tr>
</tbody>
</table>

(Formerly numbered 151K.)

O'Neill. I.

Joyce. II.

* Not to be given, 1964–1965.
C. Honors Courses

H195. Honors Course. (3) I and II. The Staff (Mr. Rabkin in charge)
Prerequisite: open only to students in the Honors Program who have completed a section of English 151.
In this course the English major student will complete the bachelor’s thesis, begun in a section of English 151.

*H197. Honors Course. (3) I and II. The Staff (Mr. Rabkin in charge)
Prerequisite. Open only to students in the honors program who have completed a section of English 151.
Students in honors program may substitute this course 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. Rabkin in charge)
Open to honor students who have completed 9 or more units of upper division English in the junior year with an average grade of not less than B. Reading and conferences with the instructor in a field that shall not coincide with that of any regular course and shall be specific enough to permit the student to write a significant essay based upon his study.
Not open to students in the honors program (see courses H195 and H197).

E. Advanced Composition

(Open only to upper division students who have the consent of instructor. With the consent of instructor, courses numbered 142 and 143 may be repeated without duplication of credit.)

141. Modes of Writing (Exposition, Fiction, Verse, etc.). (3) I and II.
Mr. Parkinson, Mr. Burgess
Prerequisite: course 1A–1B or Speech 1A–1B, or consent of instructor.
Writing in connection with readings in recent English literature and its continental backgrounds.

142A. Advanced Composition. (3) I and II. Mr. Crews, Mr. T. Reed
(Formerly numbered 106L.)
Primarily for candidates for the Certificate of Completion of the teacher-training curriculum whose teaching major is English.

142B. Advanced Composition. (3) I and II. Mr. Evans, Mr. Haller, Mr. T. Reed
(Formerly numbered 106M.)
Specifically for candidates for the Certificate of Completion of the teacher-training curriculum whose teaching major is not English.

142C. Advanced Composition. (3) II. Mr. Parkinson
(Formerly numbered 106N.)
For candidates for the general elementary credential with any major. Review of elements of composition, writing in connection with discussion of books suitable for elementary and junior high school.

142D. Advanced Prose. (3) I and II. Mr. Rader, Mr. Stout
(Formerly numbered 106P.)
Prerequisite: consent of instructor.
Special section in advanced prose for teaching assistants, readers, and honor students in departments other than English.

* Not to be given, 1964–1965.
143A. Short Fiction. (3) I and II.
(Formerly numbered 106A.)
Mr. Burgess

143B. Verse. (3) II.
(Formerly numbered 106B.)
Mr. Montague

*143C. Long Narrative. (3) II.
(Formerly numbered 106E.)
The student will work throughout the semester on a single project, either fiction (novel) or nonfiction (biography, history).

143D. Expository and Critical Writing. (3) II.
(Formerly numbered 106H.)
Mr. Kratins

Teachers’ Course

300. Problems in Teaching English Literature and Composition in Secondary Schools. (2) I and II.
Mr. T. Reed

For seniors and graduate students undertaking an English teaching major or minor, ordinarily completed before practice teaching. Accepted in partial satisfaction of the 22-unit requirement in education for the general secondary credential.

*344. Problems and Methods in Teaching World Literature. (2) I. Mr. Hugo
Prerequisite: one course in the literature of a language other than English in the original, or consent of the instructor.
Studies of various texts, chiefly European, from Greek tragedy to the present, with emphasis on philosophical, historical, and biographical backgrounds.

Graduate Courses

(Concerning conditions for admission to graduate courses, see page 165)

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.

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 graduate survey courses: 203A, 203E, 203ER, 203F, 203M, 203N, 203R, 203RV.

200. Techniques of Literary Scholarship. (3) I and II.
Mr. Brightfield, Mr. Stout

*202. The History of English Criticism. (3) II.
Mr. Brightfield

203A. Readings in American Literature. (3) I and II.
Mr. Smith, Mr. Hill
(Formerly numbered 203F.)
Prerequisite: open to graduate students and (with consent of the instructor) to advanced undergraduates.

203E. Readings in Elizabethan Drama. (3) I.
Mr. Rabkin
Prerequisite: open to graduate students and (with consent of the instructor) to advanced undergraduates.

203ER. Readings in Fifteenth- and Early Sixteenth-Century Literature. (3) I.
Mr. Fish
Prerequisite: open to graduate students and (with consent of the instructor) to advanced undergraduates.

* Not to be given, 1964–1965.
203F. Readings in the British and American Novel. (3) II. Mr. Burgess
Prerequisite: open to graduate students and (with consent of the instructor) to advanced undergraduates.

203M. Readings in Modern British and American Literature. (3) I and II.
Mr. Parkinson, Mr. Raleigh
Prerequisite: open to graduate students and (with consent of the instructor) to advanced undergraduates.

203N. Readings in English Literature of the Neo-Classical Period.
(3) I and II.
Mr. O Hehir, Mr. Levine
Prerequisite: open to graduate students and (with consent of the instructor) to advanced undergraduates.

203R. Readings in Renaissance Literature. (3) II.
(Former course 203M.)
Prerequisite: open to graduate students and (with consent of the instructor) to advanced undergraduates.

203RV. Readings in British Literature of the Romantic and Victorian Periods. (3) I.
Mr. Tracy
Prerequisite: open to graduate students and (with consent of the instructor) to advanced undergraduates.

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.
205A. I: Mr. Sacks; 205B. II: Mr. Reed.
Mr. Reed, Mr. Sacks
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.

208. Problems in the Study of Literature. (3) I and II.
Mr. Tracy, Mr. Levine, Mr. Rader, Mr. Raleigh, Mr. Traugott, Mr. Starr, Mr. Muscatine
Textual analysis, discussion of scholarly approaches based on secondary reading; problems in the presentation of materials.
Topics will vary from year to year. The program for 1964–1965 will be as follows: Nineteenth-Century Backgrounds (I, Mr. Flanagan), Early Novels (I, Mr. Rader), Comedy (I, Mr. Traugott), Seventeenth-Century Literature (I, Mr. Starr), American Literature (I, Mr. Tuveson), Romantic Critical Theory (II, Mr. Jordan), Comic Novel (II, Miss McIlroy), Literary Stylistics (II, Mr. Muscatine), Twentieth-Century Literature (II, Mr. Bloom), Shakespeare on the Stage (II, Mr. Tracy).

210. Readings in Medieval Latin. (3) II.
Mr. Jones
(Formerly numbered 220A.)
Prerequisite: Latin 2 or equivalent.
An introduction to the central language and literature of the Middle Ages.

211A. Introduction to Old English. (3) I and II.
Mr. Hutson, Mr. Haller
Open to seniors with consent of the instructor.
Rapid reading of Old English texts.

211B. The Beowulf. (3) I and II.
Mr. Renoir, Mr. Hutson

213. Readings in Middle English. (3) I and II.
Mrs. Finkelstein, Mr. Kratins, Mr. Theiner, Mr. Whitehead
Rapid reading of selections in Middle English, and perhaps some entire poems, from the twelfth century to the fifteenth.
### Seminars

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>220</td>
<td>The Medieval Mind. (3) II.</td>
<td>Mr. Jones</td>
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<tr>
<td></td>
<td>(Formerly numbered 220B.)</td>
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<td></td>
<td>Prerequisite: course 210 or equivalent.</td>
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<td></td>
<td>Literary culture of Western Europe without accent on geographical or linguistic distinctions.</td>
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<td>221A</td>
<td>The Old English Language. (3) II.</td>
<td>Miss Closs</td>
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<td></td>
<td>(Formerly numbered 211G.)</td>
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<td></td>
<td>Prerequisite: recommended: a reading knowledge of German. Designed for students whose special interest is linguistics.</td>
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<td>Old English and its Indo-European and Germanic backgrounds.</td>
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<td>221B</td>
<td>The Middle English Language. (3) I.</td>
<td>Mr. Theiner</td>
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<td></td>
<td>(Formerly numbered 211I.)</td>
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<td></td>
<td>Designed for students whose special interest is linguistics.</td>
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<td>The history of the English language from Late West Saxon to Chaucer.</td>
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<td>221C</td>
<td>The Modern English Language. (3) II.</td>
<td>Mr. Boyd</td>
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<td>(Formerly numbered 211J.)</td>
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<td></td>
<td>Designed for students whose special interest is linguistics.</td>
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<td></td>
<td>The history of the English language from Chaucer to the present. Rapid survey of contemporary dialects and of the structure of standard English.</td>
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<td>222</td>
<td>Forms and Techniques of Old English Literature. (3) II.</td>
<td>Mr. Renoir</td>
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<tr>
<td></td>
<td>(Formerly numbered 212.)</td>
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<td></td>
<td>Prerequisite: two semesters of Old English.</td>
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<td>223</td>
<td>Studies in Middle English Literature. (3) I.</td>
<td>Mr. Pielher</td>
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<td>225A-225B</td>
<td>The Popular Ballad. (3–3) Yr.</td>
<td>Mr. Bronson</td>
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<td>227</td>
<td>Linguistics and Literary Analysis. (3) II.</td>
<td>Mr. Sacks</td>
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<tr>
<td></td>
<td>(Formerly numbered 207.)</td>
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<td></td>
<td>Prerequisite: course 205A–205B. Students whose interest is contemporary literature may take 227 concurrently with 205B.</td>
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<td></td>
<td>The application of linguistic knowledge and methods of analysis to literary works.</td>
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<td>*228</td>
<td>Regional Literature: California and the West. (3) II.</td>
<td>Mr. Hart</td>
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<td>230A: Mr. Hart, Mr. Tuveson; 230B: Mr. Ziff, Mr. Hart.</td>
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<td>230A is not prerequisite to 230B.</td>
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<td>*231</td>
<td>Linguistic Geography. (3) I.</td>
<td>Mr. Reed</td>
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<td></td>
<td>Analysis of American dialect materials.</td>
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<td>232</td>
<td>Anglo-American Literary Relations. (3) II.</td>
<td>Mr. Grabo</td>
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<td>234</td>
<td>American Drama. (3) II.</td>
<td>Mr. Bogard</td>
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<td></td>
<td>(Formerly numbered 214.)</td>
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<td>Prerequisite: consent of the instructor.</td>
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<td></td>
<td>Studies in American drama from the colonial period to the present.</td>
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<td>235</td>
<td>Mark Twain. (3) I.</td>
<td>Mr. Smith</td>
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<td>245</td>
<td>Spenser. (3) I.</td>
<td>Mr. Alpers</td>
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<td>247</td>
<td>Theory of Poetry. (3) I.</td>
<td>Miss Miles</td>
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<td>*251A–251B</td>
<td>Romantic Period. (3–3) Yr.</td>
<td>Mr. Caldwell</td>
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<td></td>
<td>251A is not prerequisite to 251B</td>
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* Not to be given, 1964–1965.
252. Chaucer. (3) II.  Mr. Muscatine
(Formerly numbered 210.)
Prerequisite: basic knowledge of Chaucer and his language is presupposed.

253. Studies in Shakespeare. (3) I and II.  Mr. Evans
(Formerly numbered 217.)

254A-254B. Elizabethan Drama. (3-3) Yr.  Mr. Barish, Mr. Rabkin
254A is not prerequisite to 254B.

255. Restoration and Eighteenth-Century Drama. (3) II.  Mr. Traugott
Problems of bibliography, text, dramaturgy, performance, theatrical history in the English drama of the period 1660-1800.

256. Milton and His Contemporaries. (3) I.  
(Formerly numbered 218)

257. Literary Criticism. (3) I.  Mr. McKenzie
(Formerly numbered 257A.)

258. Johnson and His Contemporaries. (3) I.  Mr. Rader

260. Modern British Literature. (3) II.  Mr. Parkinson
From 1900 to the present.

262. Victorian Period. (3) II.  Mr. Brightfield

264. The Metaphysical Poets. (3) II.  Mr. Richmond

266. Period from 1600 to 1744. (3) I.  

269. Theory of Fiction. (3) II.  Mr. Schorer

297. Individual Study. (1-6) I and II.  The Staff (Mr. Barish in charge)
Prerequisite: a Master's degree from another institution or completion of at least 24 semester hours beyond the A.B.
Individual study, in consultation with the graduate adviser, intended to provide opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D.

298. Special Studies. (3-6) I and II.  The Staff (Mr. Barish in charge)
Normally reserved for students directly engaged upon the doctoral dissertation.

299. Special Study. (1-3) I and II.  The Staff (Mr. Barish in charge)
Primarily for students engaged in preliminary exploration of a restricted field, involving research and the writing of a report. May not be substituted for available seminars.

Related Courses in Other Departments
See listings for departments of Comparative Literature, Romance Philology, and Linguistics.
Attention is directed also to courses in foreign literature in translation. See pages 359-360.

ENTOMOLOGY AND PARASITOLOGY
(Department Office, 122 Giannini Hall)
John E. Casida, Ph.D., Professor of Entomology.
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.
Carl B. Huffaker, Ph.D., Professor of Entomology.
Dilworth D. Jensen, Ph.D., Professor of Entomology.
E. Corton Linsley, Ph.D., Professor of Entomology.
John W. MacSwain, 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).
Edward S. Sylvester, Ph.D., Professor of Entomology.
Robert L. Usinger, Ph.D., Professor of Entomology.
Edward O. Essig, M.S., Professor of Entomology, Emeritus.
William M. Hoskins, Ph.D., Professor of Entomology, Emeritus.
Abraham E. Michelbacher, Ph.D., Professor of Entomology, Emeritus.
Mauro E. Martignoni, Ph.D., Associate Professor of Invertebrate Pathology.
Ronald W. Stark, Ph.D., Associate Professor of Entomology.
John R. Anderson, Ph.D., Assistant Professor of Parasitology.
Howell V. Daly, Jr., Ph.D., Assistant Professor of Entomology.
James H. Oliver, Jr., Ph.D., Assistant Professor of Entomology.
Rudolph L. Pipa, Ph.D., Assistant Professor of Entomology.
Clarence J. Weinmann, Ph.D., Assistant Professor of Parasitology.
David L. Wood, Ph.D., Assistant Professor of Entomology.

Merlin W. Allen, Ph.D., Professor of 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.
Paul D. Hurd, Jr., Ph.D., Lecturer in Entomology.
Carlton S. Koehler, Ph.D., Lecturer in Entomology.
*Powers S. Messenger, Ph.D., Lecturer in Insect Ecology.
Thomas E. Mittler, Ph.D., Lecturer in Entomology.
Edward S. Ross, Ph.D., Lecturer in Entomology.
Yoshinori Tanada, Ph.D., Lecturer in Insect Pathology.

Letters and Science List. Courses 10, 100, 106, 110, 112, 117, 119, 125, 126, 127, 127L, 129, 131, 133 are included in the Letters and Science List of Courses. For regulations governing this list, see page 91.

Departmental Major Adviser: Mr. Wood.

The Major in Entomology and Parasitology. To obtain a B.S. degree in this major, the following five items must be satisfied: 1. General University requirements. 2. College of Agriculture requirements (see page 65). 3. Entomology and Parasitology Curriculum requirements: (a) General—Bacteri-
ology, 4 units. Botany and zoology, 19 units. Chemistry, 13 units. English and/or speech, 6 units. Geography, geology, or paleontology, 3 units. Physics, 3 units. (b) Agriculture—Agriculture (other than entomology and parasitology) and/or forestry, 6 units. Genetics, 3 units. Plant or animal pathology, 4 or 3 units. Plant or animal physiology, nutrition, or biochemical, 3 units. Entomology and parasitology courses for the major, 22 units. Summer practice course, 0 units. 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), 38 or 39 units. 5. Certain courses are required for the major and, where applicable, may be used in partial satisfaction of 3 above. For details, see the ANNOUNCEMENT OF THE COLLEGE OF AGRICULTURE, BERKELEY, available without charge.

Honors. Information concerning honors may be obtained from the Dean's Office, College of Agriculture.

Lower Division Courses

10. Natural History of the Insects. (3) I. Mr. MacSwain
Lectures, demonstrations, and one or more field trips. For students not specializing in the zoological sciences.

49. Entomology Field Practice Course. (No credit) Mr. MacSwain, Mr. Bohart, Mr. Hurd
Five weeks, daily. Prerequisite: one course in entomology.

Upper Division Courses

100. General Entomology. (4) II. Mr. Daly
Lectures and laboratory. 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. Gross and microscopic anatomy with emphasis on comparative and functional relationships.

110. Insect Physiology. (3) II. Mr. Craig
Lectures and laboratory. Prerequisite: course 106; Chemistry 8 or the equivalent.

112. Systematic Entomology. (4) II. Mr. Usinger
Lectures and laboratory. Prerequisite: course 100. Classification of insects, taxonomic categories and procedure; bibliographical methods; nomenclature; museum practices.

114. Introductory Forest Entomology. (3) I. Mr. Stark, Mr. Wood
Lectures and laboratory. Not open to entomology majors. Interrelationships of insect populations, forest stands, and forest practices. Identification, life histories, ecology, and control of insects affecting western forests and forest products.

115. Principles of Forest Entomology. (3) I. Mr. Stark, Mr. Wood
Lectures and field trips. Prerequisite: course 100 or 114.

117. Helminthology. (4) I. Mr. Furman, Mr. Weinmann
Lectures and laboratory. Helminthic infections of man and domestic animals. Biology, host-parasite interrelationships, identification, prophylaxis, and therapeutics.
118. Plant Nematology. (4) II.
Lectures and laboratory.
Identification, morphology, biology, and distribution of plant parasitic and associated nematodes. Symptomatology, pathology, and control of nemic infections in cultivated crops.

Mr. M. W. Allen

119. Acarology. (3) I.
Lectures and laboratory. Prerequisite: course 112. Taxonomy, biology, and ecology of mites and ticks.

Mr. Oliver

124. Economic Entomology. (4) I.
Lectures and laboratory.
Life histories, habits, and principles involved in manipulating populations of injurious and beneficial insects and arachnids affecting plants and animals.

Mr. Middlekauff, Mr. Koehler

125. Insect Vectors of Plant Pathogens. (4) I.
Lectures and laboratory. Prerequisite: Plant Pathology 120.
Role of insects in transmission and causation of plant diseases.

Mr. Freitag, Mr. Sylvester, Mr. Jensen, Mr. Frazier

126. Medical Entomology. (4) II.
Lectures and laboratory.
Role of insects and other arthropods in transmission and causation of diseases of humans and domestic animals.

Mr. Furman, Mr. Anderson

127. Insect Ecology. (3) II.
Prerequisite: upper division standing in one of the biological sciences.
Ecology, with examples from the insects; insect behavior; analysis of the insect environment; population dynamics.

Mr. Smith, Mr. Huffaker, Mr. Messenger

127L. Laboratory in Insect Ecology. (2) II.
Prerequisite: courses 100, 127 (may be taken concurrently). Enrollment limited to ten students.
Laboratory and field studies demonstrating principles. Emphasis on population dynamics and analysis of the insect environment.

Mr. Smith, Mr. Huffaker, Mr. Messenger

128. Chemistry of Insecticides and Fungicides. (4) I.
Lectures and laboratory. Prerequisite: Chemistry 8.
Chemical composition and reactions of insecticides and fungicides, and their physiological effects on plant and animal tissues.

Mr. Gordon

129. Biological Control of Insect and Weed Pests. (3) I.
Lectures and laboratory. Prerequisite: course 100.
Population phenomena; biology of entomophagous insects; theory and practice of biological control.

Mr. Doutt

130A–130B. Agricultural Entomology. (3–3) Yr.
Mr. W. W. Allen, Mr. Middlekauff
Lectures and field trips. Prerequisite: course 124. 130A is not prerequisite to 130B.
130A. Bionomics and principles involved in control of insects and mites. Side effects to vertebrates and invertebrates following insecticide usage. Primary emphasis on field and vegetable crops. Mr. W. W. Allen, Mr. Middlekauff.
130B. Plot design, sampling techniques, control programs, and equipment. Examples primarily from deciduous fruit and nut pests. Mr. W. W. Allen.

131. Insect Pathology. (4) I.
Lectures and laboratory. Prerequisite: course 100, and at least one course in a microbiological science.
Principles of insect pathology and insect microbiology, and their applications; infectious and noninfectious diseases of insects.

Mr. Martignoni, Mr. Tanada
133. Biology of Aquatic Insects. (4) II.  Mr. Usinger, Mr. Anderson
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.

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 165)

210. Insect Biochemistry. (3) I.  Mr. Casida, Mr. Craig, Mr. Gordon
Lectures and laboratory. Prerequisite: courses 110, 128. Recommended: courses 106, 112, 127; Biochemistry 102. May be taken twice for credit.
Selected topics.

212. Principles of Systematic Entomology. (3) II. Mr. Linsley, Mr. Usinger
Prerequisite: course 112.
Theory and philosophy of systematic entomology with emphasis on phylogeny, zoogeography, and nomenclature.

226. Advanced Medical Entomology. (2) I.  Mr. Furman, Mr. Anderson
Prerequisite: course 126. Recommended: course 117 or Zoology 111.
The genesis of arthropod-borne diseases.

227. Population Ecology. (2) I.  Mr. Smith, Mr. Huffaker, Mr. Messenger
Prerequisite: course 127.
Population dynamics, regulation, and mensuration, theory of natural control.

231. Advanced Insect Pathology. (3) II.  Mr. Martignoni, Mr. Tanada
Lectures and laboratory. Prerequisite: course 106 and 131, or consent of instructor.
Advanced consideration of infectious and noninfectious diseases of insects, diagnosis, symptomatology, morphopathology, physiopathology, and epizootiology.

232. History of Entomology. (3) II.  Mr. Jensen
Prerequisite: course 100.
Development of influential ideas and principles in biology with special reference to entomology. Consideration given to effects of philosophy, religion, political and economic factors on evolution of scientific method.

250. Principles and Methods of Entomological Research. (3) I.  Mr. Sylvester
Techniques and purposes of the scientific method in entomology, with emphasis on problem selection and the collection, evaluation, and presentation of data.

290. Seminar. (2) I and II.  The Staff (Mr. Smith in charge)
Simultaneous enrollment for credit in more than one seminar permitted. May be repeated for credit.
Advanced study in various fields of entomology and parasitology. Topics will vary from year to year. Program for 1964–1965 will probably include seminars in: (a) Agricultural Entomology (Middlekauff, W. W. Allen, Koehler); (b) Parasitology (Furman, Anderson, Weinmann); (c) Insect Physiology and Toxicology (Craig, Casida, Gordon); (d) Insect Pathology (Usinger, Martignoni, Tanada); (e) Systematic Entomology (I. MacSwain, Hurd; II. Usinger, Daly); (f) Insect Ecology (Smith, Doutt, Huffaker, Messenger); (g) Forest Entomology (I. Stark, Wood); (h) Insect Biology (I. Pia, Daly).

299. Research in Entomology and Parasitology. (1–9) I and II.
(Formerly numbered 200A–200B.)  The Staff (Mr. Smith in charge)
Original study on special topics in laboratory, field, and museum. Credit awarded according to work accomplished.
Staff Seminar in Entomology. (No credit) Yr. The Staff (Mr. Smith in charge)
Biweekly meetings for presentation of special topics.

**FAMILY SOCIOLOGY**
For courses in Family Sociology, see Department of Nutritional Sciences.

**FOOD SCIENCE**
For courses in Food Science, see Department of Nutritional Sciences.

**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.
100A–100B. Greek and Latin Literature in Translation.
178. Mythology.

**Comparative Literature**
151A–151B. The Literature of the Renaissance in Western Europe.

**English**
120A–120B. Medieval Literature.

**French**
142A–142B. French Literature of the Middle Ages.
146A–146B. Readings in Contemporary French Literature.

**German**

**Italian**
130. Dante's Divine Comedy.
140. Dante, Petrarch, and Boccaccio.

**Near Eastern Languages**

**Oriental Languages**
22. Indonesian Civilization.
38A–38B. Great books of Eastern Asia.
142C. Civilizations of Eastern Asia: China.
142J. Civilizations of Eastern Asia: Japan.
142K. Civilizations of Eastern Asia: Korea.
152. Japanese Literature and the West.
154E. The Mongols, Their Language and Literature.
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 Literatures
39. Great Writers of Russian Literature.
130A–130B. Survey of Russian Literature and Intellectual Trends.
132. Russian Literature since 1917.
133A. The Russian Novel to 1850 and Its Relations to West European Literatures.
133C. Dostoevsky.
133D. Tolstoy.
133F. Chekhov.
134. Russian Folklore.
135. The Russian Drama from the Seventeenth Century to the Twentieth.
140. Survey of Western and Southern Slavic Literatures.
151. The Reformation and Counter-Reformation in Polish Literature.
153. The Polish Novel.
154. Polish and Russian Romanticism.
155. Mickiewicz.
160. Survey of Czech and Slovak Literatures.
161. Czech and Slovak Literature of the Nineteenth Century.
170A–170B. Survey of Serbian and Croatian Literatures.
180A. Survey of Russian Culture to 1800.
180B. Survey of Russian Culture from 1800 to the Present.
182A–182B. Survey of Polish Culture.

Spanish
FORESTRY

(Department Office, 145 Walter Mulford Hall)

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.
Rudolf F. Grah, Ph.D., Professor of Forestry.
Harold F. Heady, Ph.D., Professor of Forestry.
* Dietrich Muelder, D.F., Professor of Forestry.
Edward C. Stone, Ph.D., Professor of Forestry.
Henry J. Vaux, Ph.D., Professor of Forestry (Chairman of the Department).
Robert A. Cockrell, 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, Emeritus.
Myron E. Krueger, M.S., Sc.D. (hon.), Professor of Forestry, Emeritus.
Woodbridge Metcalf, M.S.F., Associate Professor of Forestry, Emeritus.
Arthur W. Sampson, Ph.D., Professor of Forestry, Emeritus.
Paul J. Zinke, Ph.D., Associate Professor of Forestry.
William J. Libby, Ph.D., Assistant Professor of Forestry.
Dennis E. Teeguarden, Ph.D., Assistant Professor of Forestry.

Arthur B. Anderson, Ph.D., Lecturer in Wood Chemistry.
David L. Brink, Ph.D., Lecturer in Wood Chemistry.
Paul Casamajor, M.F., Lecturer in Forestry.
Joseph E. Marian, D. Tech. Sci., Lecturer in Forestry.
Helmuth Resch, Ph.D., Lecturer in Forestry.
Herbert C. Sampert, M.F., Lecturer in Forestry.
Arno P. Schniewind, Ph.D., Lecturer in Forestry.
Eugene Zavarin, Ph.D., Lecturer in Wood Chemistry.

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 91.

Lower Division Courses

1. Elements of Forestry. (3) II.
   Forests in relation to national life; principles of forestry.
   Mr. Grah

The extra-session courses 46, 47, 48 listed below are offered only at the U.C. Forestry Camp, Meadow Valley, and cover approximately ten weeks of summer work.

46. Ecology of Forests and Associated Wildlands. (3) Mr. Stone
   Prerequisite: Botany 1.
   This course is prerequisite to all required courses in the curriculum in forestry.

47. Measurement and Utilization of Forests and Associated Wildland Resources. (4) Mr. Colwell
Prerequisite: mechanical drawing, one-half year; Engineering 21. This course is prerequisite to all required courses in the curriculum in forestry.

48. Management of Forests and Associated Wildlands. (3) Mr. Grah
Prerequisite: mechanical drawing, one-half year; Engineering 21, Botany 1. This course is prerequisite to all required courses in the curriculum in forestry.

Upper Division Courses

Courses 46, 47, 48, are prerequisite to all required courses in the School of Forestry.

103. Principles of Forest Ecology. (4) II. Mr. Stone
Lectures and laboratory. Prerequisite: Botany 140 or Botany 142; Soil Science 100; students from other departments may be admitted with consent of instructor.

104. Silviculture. (4) I.
Lectures, laboratory, field trips. Prerequisite: course 103. Methods of governing growth and reproduction of forest stands.

106. Forest Planting. (3) I.
Lectures, laboratory, or field trips. Prerequisite: Botany 1. Artificial establishment of forest stands from collection of seed to planting of trees.

108. Dendrology. (3) II. Mr. Libby
Lectures, laboratory, field trips. Prerequisite: Botany 1. Taxonomy, identification, and silvical properties of forest trees; the genetic structure of forest tree populations.

110. Forest Mensuration. (4) I.
Lectures and conferences. Prerequisite: a course in elementary statistics. Principles underlying log scaling and the estimation of timber volume and value; growth of stands; the application of statistical analysis to forest measurements.

112A–112B. Processing of Wood. (3–3) Yr.
(Formerly numbered 112.)
Prerequisite: Physics 2A–2B; Chemistry 8 or Chemistry 12; seniors or graduate students in chemistry, engineering, chemical engineering or other departments accepted with consent of instructor. Course 112A is not prerequisite to 112B.

112A. Physical processes of converting wood into solid products or laminates. Mr. Dickinson.
112B. Chemical processes for production of wood pulp, paper, paperboard and silvichemicals. Mr. Brink.

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.

115A–115B. Physical Properties of Wood. (3–3) Yr.
(Formerly numbered 115.)
Lectures and laboratory. Prerequisite: course 114. Engineering 18A–18B or equivalent is prerequisite to 115B.

115A. Density, variability, durability of wood; responses of wood to liquids, gases, electricity, heat, sound and light. Mr. Resch.
115B. Elasticity, strength, rheology of wood; factors affecting mechanical behavior; working stresses; mechanics of joints; mechanical behavior of composites. Mr. Schniewind.

118. Forest Engineering. (3) II. Mr. Sampert
Lectures and laboratory. Prerequisite: Engineering 21 and Physics 2A–2B. Engineering methods involved in logging and forest management.
120. Management of Forest Properties. (4) II.  
Lectures and laboratory. Prerequisite: courses 104 and 110.  
Economic and regulatory principles involved in managing forest lands for continuous production.

121. Forest Economics. (3) I.  
Prerequisite: 6 units of economics and senior standing. Senior and graduate students from other departments may be admitted with consent of the instructor.  
The economic and regulatory principles involved in managing forest lands for continuous production.

122. Forest Policy. (3) II.  
Prerequisite: 6 units of economics and senior standing.  
The evolution of forest policy in the United States. State and national forest policies. Analysis of current policy problems.

123. Forest Influences. (3) I.  
Lectures and laboratory. Prerequisite: course 103, Physics 2A-2B, senior standing.  
The influence of forests and brush on soil moisture, run-off, stream flow, floods, erosion, local climate, and soil productivity for forest growth.

124. Production Methods in the Forest Industries. (3) II.  
Prerequisite: 6 units of economics and senior standing.  
Production methods and principles involved in logging; cost analyses.

125. Forest Protection. (3) I.  
Lectures and one field trip. Prerequisite: course 103, Physics 2A-2B, senior standing.  
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.  
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.  
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.
203. Seminar in Forest Ecology. (2) II.
Prerequisite: course 103 and Botany 142.

204. Seminar in Silviculture. (2) I.
Prerequisite: course 104.

206. Seminar in Forest Management. (2) II.
Prerequisite: course 120 and 6 units of economics.

207A–207B. Seminar in Forest Economics. (2–2) Yr.
Prerequisite: 12 units of economics, agricultural economics, or forest economics. 207A
is not prerequisite to 207B.

208. Seminar in Wood Chemistry. (2) II.
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.
Prerequisite: course 125 and consent of the instructor.

228. Fire Behavior and Fire Management. (2) II.
Lectures and one or more field excursions. Prerequisite: course 128 and consent of
instructor.
Advanced analysis of forest fire behavior; meteorological effects; fuel effects; manage­
ment of fire control activities; techniques of forest fire control.

241. Seminar in Wood Anatomy. (2) I.
(Formerly numbered 205.)
Prerequisite: course 114.

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.

Related Courses in Other Departments
Economics of Natural Resources (Agricultural Economics 175)
Taxonomy of Seed Plants (Botany 120)
General Plant Physiology (Botany 142)
Cost Accounting (Business Administration 122)
Production Organization and Management (Business Administration 140)
Introduction to Structural Analysis (Engineering 18A–18B)
Route Surveying (Civil Engineering 102)
Hydrology (Civil Engineering 160)
Introductory Forest Entomology (Entomology 114)
Principles of Forest Entomology (Entomology 115)
Principles of Genetics (Genetics 100)
Descriptive Meteorology (Geography 111)
Natural Resources, Population, and Conservation (Geography 153)
Park and Recreation Area Planning (Landscape Architecture 134)
Forest Pathology (Plant Pathology 100)
Natural Resources Policy and Administration (Political Science 185A)
Introduction to Probability and Statistics in Biology and Public Health (Public Health 160A, 160B)
Soil Characteristics (Soil Science 100)
The Soil as a Medium of Plant Growth (Soil Science 110)
Statistical Inference (Statistics 130A–130B)
Wildlife Biology and Management (Zoology 116)

For a description of special facilities for graduate study at the Forest Products Laboratory and in the Wildland Research Center, see page 111.

FRENCH

(Department Office, 4125 Dwinelle Hall)

Alexandre E. Calame, Docteur ès Lettres, Professor of French.
Francis J. Carmody, Ph.D., Professor of French.
Alvin A. Eustis, Jr., Ph.D., Professor of French.
*Irving Putter, Ph.D., Professor of French.
Warren Ramsey, Ph.D., Professor of French and of Comparative Literature.
Manfred M. G. Sandmann, Litt.D., Professor of French and Romance Philology.
Ronald N. Walpole, Ph.D., Professor of French.
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.
*Basil Guy, Ph.D., Associate Professor of French.
Edward F. Meylan, Ph.D., Associate Professor of French.
John H. Atherton, Ph.D., Assistant Professor of French and of Comparative Literature.

Paul M. Bertrand Augst, Ph.D., Assistant Professor of French.
Lionel R. Duïsit, Ph.D., Assistant Professor of French.
Robert W. Greene, Ph.D., Assistant Professor of French.
John L. Grigsby, Ph.D., Assistant Professor of French.
*Leonard W. Johnson, Ph.D., Assistant Professor of French.
Walter E. Rex, Ph.D., Assistant Professor of French.

Marie-Louise Dufrenoy, Ph.D., Lecturer in French.
Joseph J. Duggan, Ph.D., Acting Instructor in French.
Francine S. Laloue, Diplôme d'Etudes Supérieures, Acting Instructor in French.

* In residence spring semester only, 1964–1965.
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 91.

Departmental Major Advisers: Mr. Augst, Mr. Grigsby (Plan B), Mr. Rex (Plan A), Mr. Duisit (transfers and Bordeaux students).

The Majors. Two majors are offered: Plan A, emphasis on literature; Plan B, emphasis on language and culture. Candidates for the teaching credential must take Plan B. Required: courses 1, 2, 3, 4, 25, or their equivalents. (Students who receive grade A or B in French 4 will be admitted to upper division courses without 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, 109A-109B and at least four semesters chosen from 112A, 112B, 120A, 120B, 121A, 121B. Courses 108, 142, 146 are not accepted. Course 104 is recommended.


Honors Program. Honor students may enroll in the honors program. Students in the honors program must complete French H197A-H197B with a grade of B or better, and pass the comprehensive examination.

Lower Division Courses

Duplication of Credit. A student will not be allowed credit for that part of French 1, 2, or 3 which duplicates courses previously completed in high school or at another institution of collegiate grade. The first two years of work in a foreign language in high school is considered to be equivalent to one semester in college (4 units); each successive year in a foreign language in high school is equal to one additional semester in college (4 units).

1. Elementary French. Beginners’ Course. (4) I and II. Mr. Greene in charge

2. Elementary French (continuation of 1). (4) I and II. Prerequisite: course 1 or its equivalent. Mr. Vrooman in charge

3. Intermediate French. (4) I and II. Prerequisite: course 2 or equivalent. Mr. Taylor in charge

4. Intermediate French. Composition and Conversation. (4) I and II. Prerequisite: course 3 (conversation) or equivalent. Mr. Nettelbeck in charge
4R. Intermediate French. Reading. (4) I and II. Mr. Taylor in charge
Prerequisite: course 3 or equivalent.
Reading of short, representative works with classroom analysis in English. Not for prospective majors in French.

20. Intermediate French Pronunciation. (1) I and II. Mr. Nettelbeck in charge
Prerequisite: course 2 or equivalent.

25. Advanced French. (3) I and II. Mr. Nettelbeck in charge
Prerequisite: course 4, or a grade of A or B in course 4R.

Upper Division Courses

The prerequisite to all upper division courses except 142, 146 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 104, 108, and 125.

Courses 101A, 130A, 131A, 134A, are prerequisite respectively to 101B, 130B, 131B, 134B.

101A–101B. Intensive Reading, Grammar, and Composition. (3-3) Yr. Mr. Duisit in charge
Beginning each semester.

104. Methods of Literary Study. (2) I and II. Mr. Augst
Should be taken as early as possible.

108A–108B. Readings in French Literature. (3-3) Yr. Mr. Meylan
Prerequisite: course 4 or 4R, or equivalent.
Masterpieces of recent French literature read in French; classroom work in English.

109A–109B. A Survey of French Literature. (3-3) Yr. Beginning each semester. Mr. Rex in charge

109A. Middle Ages Through Seventeenth Century.
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. 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. Vrooman

125. Advanced French Pronunciation. (1) I and II. Mr. Duisit in charge

130A–130B. Advanced Grammar and Composition. (3-3) Yr. Beginning each semester. Mr. Meylan
Prerequisite: course 101A–101B.

131A–131B. Advanced Literary Composition. (3-3) Yr. Miss Dufrenoy, Mr. Duisit
Prerequisite: course 101A–101B. Required of all candidates for the M.A. degree.

* Not to be given, 1964–1965.
134A–134B. French Culture and Institutions. (3–3) Yr. Miss Dufrenoy
Prerequisite: course 101A–101B.

*160. Contemporary Literature. (2) II.

H197A–H197B. Honors Course. (2–2) I and II.

Mr. Grigsby (in charge), Mr. Augst, Mr. Rex
Prerequisite: H197B open only to students who complete H197A with a grade of B or better.
Writing of papers, followed at the end of the senior year by a comprehensive examination. To be undertaken not later than the beginning of the senior year. May not be substituted for any part of Plan A or Plan B major program.

199. Special Study for Advanced Undergraduates. (1–3) I and II.
The Staff (Mr. Meylan in charge)
Prerequisite: restricted to senior honor students.

Courses in Which No Knowledge of French Is Required

Lectures (in English); reading of representative works in English translation.
39A. To the End of the Eighteenth Century. (2) I. Mr. Grigsby in charge.
39B. The Nineteenth Century. (2) II. Mr. Grigsby in charge.
39C. The Contemporary Period. (2) I. Mr. Ramsey.
Prerequisite: course 39B or consent of instructor.

142A–142B. French Literature of the Middle Ages (2–2) Yr. Mr. Grigsby
142A. Epic, romance, history.
142B. Drama, lyric and allegorical poetry.

*146A–146B. Readings in Contemporary French Literature. (2–2) Yr.

Mr. Carmody

Graduate Courses
(Concerning conditions for admission to graduate courses, see page 165)
Course 201A or 206A is required for 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. Mr. Walpole

203A–203B. Studies in French Language. (2–2) Yr. Mr. Sandmann
203A. Grammar and Style: from the Seventeenth Century to the Present Day.
203B. Introduction to the Theory and History of French Syntax.

*204A–204B. Studies in the Eighteenth Century. (2–2) Yr. Mr. Carmody
204A. Voltaire and the Philosophers.
204B. Rousseau.

206A–206B. Reading and Interpretation of Typical Old French Texts.
(2–2) Yr. Mr. Grigsby


(2–2) Yr. Mr. Putter

*210A–210B. Studies in the Eighteenth-Century Drama. (2–2) Yr.

Mr. Niklaus

* Not to be given, 1964–1965.
214A-214B. Seminar on Modern French Drama. (2-2) Yr. Mr. Augst
Prerequisite: consent of instructor.

A study of the main developments in modern French literature, apart from the surrealism since Rimbaud.

216A-216B. French Poetry of the Renaissance. (2-2) Yr.

217A-217B. Humanism in the French Renaissance. (2-2) Yr. Mr. Meylan

218A-218B. French Classicism. (2-2) Yr. Mr. Calame

Mr. Atherton
An examination of the works of novelists (i.e. Balzac, Stendhal, Flaubert) and other writers in French such as historians, philosophers, etc. (i.e. Michelet, Taine, Renan) who are important for an understanding of nineteenth-century French literature.

220A-220B. Explication de Textes. (2-2) Yr. Mr. Calame, Mr. Duisit

225. Studies in Seventeenth-Century Religious Texts. (2) II. Mr. Rex

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.

241A-241B. Studies in French Surrealism. (2-2) Yr. Mr. Carmody
Studies in various authors writings in different literary forms representative of the movement beginning after Rimbaud known in France as Surrealism.

298. Special Study for Graduate Students. (1-4) I and II.
The Staff (Mr. Eustis in charge)

1G. French for Graduate Students, Beginning. (No credit) I and II.
Mr. Greene in charge
Preparation for graduate reading examinations. Course must be taken on a pass or fail basis.

2G. French for Graduate Students, Advanced. (No credit) I and II.
Mr. Greene in charge
Preparation for graduate reading examinations. Course must be taken on a pass or fail basis.

Related Courses in Other Departments
See courses listed under Comparative Literature and Romance Philology.

**GENETICS**

(Department Office, 345 Mulford Hall)
Spencer W. Brown, Ph.D., Professor of Genetics.
Donald R. Cameron, Ph.D., Professor of Genetics.

* Not to be given, 1964–1965.
Everett R. Dempster, Ph.D., Professor of Genetics (Acting Chairman of the Department).
James A. Jenkins, Ph.D., Professor of Genetics.
I. Michael Lerner, Ph.D., D.Sc. (hon.c), Professor of Genetics.
Curt Stern, Ph.D., D.Sc., Professor of Genetics and of Zoology.
Patricia St. Lawrence, Ph.D., Assistant Professor of Genetics.

Letters 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 91.

Department Major Adviser: Miss St. Lawrence.

The student may obtain a Bachelor of Science degree in genetics in the College of Agriculture, or a Bachelor of Arts degree in the genetics group major in the College of Letters and Science.

The Bachelor of Science degree may be obtained by fulfilling the requirements for either the animal science curriculum or the plant science curriculum.

The Major in Animal Genetics. To obtain the B.S. degree in this major, the following five items must be satisfied: 1. General University requirements. 2. College of Agriculture requirements (see page 65). 3. Animal science curriculum requirements: (a) General—Bacteriology or botany, 4 units. Chemistry and/or biochemistry, 16 units. Economics, 3 units. English and/or speech, 6 units. Physics, 6 units. Zoology 8 units. (b) Agriculture—animal nutrition, 3 units. Animal pathology, parasitology, or additional zoology, 3 units. Animal physiology, 5 units. Genetics, 4 units. Upper division courses in either the major or a closely related field, with approval of major adviser, 12 units.
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), 54 units. 5. Certain courses are required by the major and, where applicable, may be used in partial satisfaction of 3 above. For details, see the ANNOUNCEMENT OF THE COLLEGE OF AGRICULTURE, BERKELEY, available without charge.

The Major in Plant Genetics. To obtain the B.S. degree in this major, the following five items must be satisfied: 1. General University requirements. 2. College of Agriculture requirements (see page 65). 3. Plant science curriculum requirements: (a) General—botany and plant physiology, 9 units. Chemistry, 13 units. Economics, 3 units. English and/or speech, 6 units. Physics, 3 units. (b) Agriculture—entomology and parasitology, 4 units. Genetics, 4 units. Irrigation, plant nutrition, or soils, 3 units. Plant pathology, 4 units. Upper division courses in either the major or a closely related field with approval of major adviser, 12 units. (c) Electives (restricted)—selected from the two areas listed below (16 units): Natural sciences: At least 9 units to be selected from animal physiology, bacteriology, biochemistry, botany or plant physiology, foreign language, physical science, zoology, or any course in the major as listed above. 13 units, where a unit is defined as 60 minutes of work, as determined by the major adviser. The Planet (see page 65). Environmental studies course(s) totaling 12, Biology, 2, Statistics, 1, Zoology, 1, Botany, 1, Plant physiology, 1, 100G, 1, 101C, 1. Additional sciences (see above). 18 units with approval of major adviser.

Honors courses (see page 103).
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 units. 5. Certain courses are required for the major and, where applicable, may be used in partial satisfaction of 3 above. For details, see the ANNOUNCEMENT OF THE COLLEGE OF AGRICULTURE, BERKELEY, available without charge.

The Bachelor of Arts degree in genetics may be obtained by fulfilling, in addition to the breadth requirements of the College of Letters and Science (see page 00), the following requirements for the group major in genetics: Bacteriology 2 and 4 (or 1 and 4, or 104), Botany 1, Chemistry 8 (or 8L or 12), Biochemistry 102 (or 101A, 101B), Physics 2A, 2B (or 4A, 4B, 4C), Statistics 1 or 2 or Public Health 160A or Psychology 5 or Mathematics 111, Zoology 1A. (Recommended: Mathematics 3A, 3B, or 16A, 16B, Chemistry 5.) Botany 130 or Zoology 107, 107C, Genetics 100 or Zoology 114, Genetics 100C, 101, 104; 6 units of upper division electives in the biological or physical sciences from the Letters and Science list of courses, approved by the major adviser.

Honors. Information concerning honors in Agriculture may be obtained from the Dean’s Office, College of Agriculture.

Lower Division Course

10. Heredity and Evolution. (3) II. Mr. Lerner

For students not specializing in biology. No credit to students who have had or are taking upper division genetics, botany, or zoology courses.

Inheritance, variation, and evolution in plants, animals, and man.

Upper Division Courses

100. Principles of Genetics. (3) II. 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.

100C. Principles of Genetics Laboratory. (1) I and II. Mr. Jenkins

Prerequisite: course 100 or Zoology 114 (may be taken concurrently).

101. Cytogenetics. (3) II. Mr. Brown

Prerequisite: course 100; general cytology.

102. Biometrical Genetics. (4) II. Mr. Dempster

Lectures and laboratory. Prerequisite: course 100, Statistics 2.

103A–103B. Organic Evolution. (2–2) Yr.

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.

* Not to be given, 1964–1965.
† Not including Mathematics C or D.
‡ In addition to University requirements.
104. Introduction to Biochemical Genetics. (3) I.
Miss St. Lawrence
Prerequisite: course 100, Chemistry 8, or their equivalents. Recommended: a course in biochemistry.

105. Principles of Population Genetics. (2) II.
Mr. Dempster
Prerequisite: course 100 and elementary statistics. Offered in odd-numbered years. Genetic forces in Mendelian populations, with emphasis on selection.

107. Chromosome Morphology and Behavior. (3) II.
Mr. Cameron
Lectures and laboratory. Prerequisite: course 101 (may be taken concurrently) or consent of instructor.

198. Lectures in Advanced Genetics. (3) I and II.
Mr. Beale
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 (Miss St. Lawrence in charge)

Graduate Courses
(Concerning conditions for admission to graduate courses, see page 165)

*205. Advanced Population Genetics. (2) II.
Mr. Dempster
Lecture and laboratory. Prerequisite: upper division work in statistics or biometrical genetics and consent of instructor. Offered in even-numbered years. Quantitative genetic analysis and experimental design.

280. Graduate Seminar in Genetics. (1–4) I and II.
The Staff (Mr. ——— in charge)

299. Research in Genetics. (1–9) I and II.
The Staff (Mr. Dempster in charge)

Staff Seminar in Genetics. (No credit) I and II.
The Staff (Mr. Brown in charge)
Weekly meeting for the presentation of special topics.

Related Courses in Other Departments
Fossil Man (Anthropology 152)
Bacterial Genetics (Bacteriology 107)
Seminar in Microbial Genetics (Bacteriology 213)
Plants in Relation to Man (Botany 115 and 115L)
Plant Cytology (Botany 130)
Biological Effects of Radiation (Medical Physics 131)
Behavioral Genetics (Psychology 147)
Cytology (Zoology 107 and 107C)
Genetics (Zoology 114)
Human Genetics (Zoology 115)
Animal Evolution (Zoology 126)
Genetics Review (Zoology 244)
Seminar in Advanced Genetics (Zoology 245)

* Not to be given, 1964–1965.
GEOGRAPHY

(Department Office, 501 Earth Sciences Building)

Clarence J. Glacken, Ph.D., Professor of Geography.
James J. Parsons, Ph.D., Professor of Geography (Chairman of the Department).
Hilgard O’R. Sternberg, Ph.D., Professor of Geography.
Paul Wheatley, Ph.D., Professor of Geography.
John E. Kesseli, Ph.D., Professor of Geography, Emeritus.
John B. Leighly, Ph.D., LL.D., Professor of Geography, Emeritus.
Carl O. Sauer, Ph.D., D.Phil. (hon.c.), LL.D., Professor of Geography, Emeritus.
James E. Vance, Jr., Ph.D., Associate Professor of Geography.
Herbert M. Eder, Ph.D., Assistant Professor of Geography.
Theodore M. Oberlander, Ph.D., Assistant Professor of Geography.
Allan R. Pred, Ph.D., Assistant Professor of Geography.

Robert N. Colwell, Ph.D., Professor of Forestry.
David J. M. Hooson, Ph.D., Visiting Associate Professor of Geography for the fall semester.
Daniel B. Luten, Ph.D., Lecturer in Geography.
J. Murray Mitchell, Jr., Ph.D., Lecturer in Geography for the spring semester.
Philip Wagner, Ph.D., Associate Professor of Geography, Davis.

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 91.

Departmental Major Adviser: Mr. Vance.

The Major. Required: Geography 1 and 4; Geography 2 or Geography 100A or Geography 100B; Geography 5A or Geography 5B or Geography 150; Geography 102 (or Geography 101 by special permission); Geography 105A; Geography 121A or Geography 121B; Geography 151.

Each student’s program should normally include 24 units of upper division work in geography, or from 18 to 24 units in geography and from 3 to 6 units chosen from related fields with the approval of the major adviser.

Honors Program. An overall grade-point average of at least 3.0 is required for acceptance in the honors program. A student in the honors program must complete course H195.

Lower Division Courses

1. Introduction to Physical Geography. (3) I and II.
   Mr. Eder, Mr. Oberlander, Mr. Sternberg, Mr. Mitchell
   Two lectures and two section meetings per week.
2. Introduction to Cultural and Historical Geography. (3) I and II.
   Two lectures and two section meetings per week.
   Mr. Eder, Mr. Glacken

4. Map Reading and Map Interpretation. (3) II.
   One lecture and two two-hour laboratory periods per week.
   Mr. Oberlander

5A–5B. Economic Geography. (3–3) Yr.
   Three lectures and one section meeting per week. 5A is not prerequisite to 5B.
   5A. Geography of world agriculture.
   5B. Forest and mineral resources, manufacturing regions, trade routes, and trade centers.

   Upper Division Courses

100A–100B. Principles of Cultural Geography. (3–3) Yr.
   Either half of the course may be taken independently.
   The theory of geographical inquiry; major themes in the relationships among culture, society, and environment; attitudes to nature illustrated from contemporary and historical sources.
   Mr. Glacken, Mr. Wheatley

101. Field Geography. (3) I.
   Field trips Saturdays. Prerequisite: course 155 or consent of instructor.
   Analysis of the structural components of the urban environment of the San Francisco–Oakland Metropolitan Area.
   Mr. Vance

102. Field Geography. (3) II.
   Field trips Saturdays. Prerequisite: senior standing. Required of Geography majors.
   A geographical survey of selected physical and cultural landscapes in the Bay Area and adjacent parts of Northern California.
   Mr. Parsons

105A–105B. Cartography. (3–3) Yr.
   One lecture hour and two three-hour laboratory periods per week.
   Prerequisite: consent of instructor.
   105A. Cartographic representation.
   105B. Map projections.
   Mr. Oberlander

108. Analysis of Land Forms. (3) I.
   Origin of land forms. Review of varied interpretation of processes involved, with emphasis on recent views.
   Mr. Oberlander

109. Topographical Photo Interpretation. (3) II.
   Lecture and laboratory. Prerequisite: consent of the instructor.
   The identification and classification of data on air photographs; the solution of selected problems in photogrammetry.
   Mr. Colwell

110. Descriptive Meteorology. (3) I.
   Not open to those having the prerequisites for 112.
   Nature of the atmosphere and of weather processes, including radiative, temperature, pressure, wind, and moisture conditions as related to the structure and circulations of the atmosphere. (Courses 111 and 112 normally to be given in alternate years.)

112. Physical Meteorology. (3) I.
   Prerequisite: Physics 2B, and Mathematics 1B, or equivalent. No credit allowed to students who have had Geography 111.
   Same subject matter as 111, but at a more advanced level. (Courses 111 and 112 normally to be given in alternate years.)

113. Climatology. (3) II.
   Mr. Mitchell

119. The Arid Lands. (3) I.
   A comparative survey of the arid and semi-arid regions of the world. Climate, landforms, water, soils, and vegetation; population and resources.
   Mr. Sternberg

* Not to be given, 1964–1965.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>121A</td>
<td>Geography of Eastern North America</td>
<td>Mr. Pred</td>
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<tr>
<td>121B</td>
<td>Geography of Western North America</td>
<td>Mr. Vance</td>
</tr>
<tr>
<td>122A</td>
<td>Geography of Middle America</td>
<td>Mr. Eder, Mr. Parsons</td>
</tr>
<tr>
<td>122B</td>
<td>Geography of South America</td>
<td>Mr. Parsons, Mr. Sternberg</td>
</tr>
<tr>
<td>123A</td>
<td>Geography of Mediterranean Europe</td>
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<tr>
<td>123B</td>
<td>Geography of Northwest Europe</td>
<td>Mr. Wagner</td>
</tr>
<tr>
<td>124</td>
<td>Geography of the Soviet Union</td>
<td>Mr. Hooson</td>
</tr>
<tr>
<td>125A</td>
<td>Geography of Southeast Asia</td>
<td>Mr. Wheatley</td>
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<tr>
<td>125B</td>
<td>Geography of East Asia</td>
<td>Mr. Wheatley, Mr. Glacken</td>
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<tr>
<td>125C</td>
<td>Geography of South Asia (India, Pakistan, Nepal, and Ceylon)</td>
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<tr>
<td>126</td>
<td>The Geography of the Middle East</td>
<td>Mr. Oberlander</td>
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<tr>
<td>129</td>
<td>Geography of the Pacific Islands</td>
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<td>130</td>
<td>Geography of the Tropics</td>
<td>Mr. Sternberg</td>
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<tr>
<td>131</td>
<td>Geography of California</td>
<td>Mr. Parsons, Mr. Eder</td>
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<tr>
<td>140</td>
<td>Transportation Geography</td>
<td>Mr. Vance</td>
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<tr>
<td>141</td>
<td>Economic Geography: Primary Production</td>
<td>Mr. Parsons</td>
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<tr>
<td>142</td>
<td>Economic Geography: Industrial Localization</td>
<td>Mr. Pred</td>
</tr>
<tr>
<td>145</td>
<td>Economic Geography: Sources and Utilization of Energy</td>
<td>Mr. Luten</td>
</tr>
<tr>
<td>150</td>
<td>Principles of Economic Geography</td>
<td>Mr. Pred</td>
</tr>
<tr>
<td>151</td>
<td>American Geographic Thought</td>
<td>Mr. Eder</td>
</tr>
</tbody>
</table>

* Not to be given, 1964–1965.
153. Natural Resources, Population, and Conservation. (3) II. Mr. Luten
Conservative and destructive uses of habitat by cultures throughout human times with
emphasis on interplay of resources and population.

155. Urban Geography. (3) I. Mr. Vance
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.

176. The Relations Between Nature and Culture. (2) II. Mr. Glacken
A history of the great ideas in Western thought, from antiquity to the present, concern­ing
the relationship of human culture to the natural environment.

H195. Honors Course. (1–3) I and II. The Staff

199. Special Study for Advanced Undergraduates. (1–3) I and II.
Prerequisite: restricted to senior honor students. The Staff (Mr. Vance in charge)

Graduate Courses
(Concerning conditions for admission to graduate courses, see page 165)

For facilities for research, see the ANNOUNCEMENT OF THE GRADUATE DIVI­
SION, BERKELEY.

200. Advanced Field Study in Geography. (1–3) I and II.
The Staff (Mr. Parsons in charge)
Prerequisite: course 102 or equivalent and consent of instructor.

201. Seminar in Latin-American Geography. (3) II. Mr. Sternberg
Seminar two hours, additional consultation hour to be arranged.

202. Seminar in Historical Geography. (3) I. Mr. Wheatley
Seminar two hours, additional consultation hour to be arranged.

203. Seminar in Cultural Geography. (3) II. Mr. Wheatley
Seminar two hours, additional consultation hour to be arranged.

205. Seminar in Physical Geography. (3) I and II.
Seminar two hours, additional consultation hour to be arranged.
Biogeography. I.
Climatic Change. II.

207. Seminar in History of Geography. (3) I. Mr. Glacken
Seminar two hours, additional consultation hour to be arranged.

208. Seminar in Economic Geography. (3) I. Mr. Vance, Mr. Pred
Seminar two hours, additional consultation hour to be arranged.

219A–219B. Research. (1–5; 1–5) Yr. The Staff (Mr. Glacken in charge)

*250A–250B. The Evaluation and Analysis of Geographic Information.
(3–3) Yr. The Staff (Mr. Wheatley in charge)

250A is not prerequisite to 250B.
250A: Basic source and reference materials; the interpretation of evidence, including
historical accounts and field observations.
250B: Cartographic and graphic materials; numerical data; the application of statistical­
methods in geographic research.

* Not to be given, 1964–1965.
GEOLOGY AND GEOPHYSICS

(Department Office, 301 Earth Sciences Building)

Bruce A. Bolt, Ph.D., Professor of Seismology and Director of the Seismographic Stations.
Garniss H. Curtis, Ph.D., Professor of Geology.
Jack F. Evernden, Ph.D., Professor of Geology and Geophysics.
William S. Fyfe, Ph.D., Professor of Geology.
Charles M. Gilbert, Ph.D., Professor of Geology.
Charles Meyer, Ph.D., Professor of Geology.
Adolf Pabst, Ph.D., Professor of Mineralogy.
Francis J. Turner, Sc.D., Professor of Geology.
John Verhoogen, M.E., Ph.D., Professor of Geophysics (Chairman of the Department).
Lionel E. Weiss, Sc.D., Ph.D., Professor of Geology.
Howel Williams, Sc.D., Professor of Geology.
Perry Byerly, Ph.D., Professor of Seismology, Emeritus, and Director of the Seismographic Stations, Emeritus.
Frederick A. F. Berry, Ph.D., Associate Professor of Geology.
Richard L. Hay, Ph.D., Associate Professor of Geology.
Clyde Wahrhaftig, Ph.D., Associate Professor of Geology.
Mark N. Christensen, Ph.D., Assistant Professor of Geology.

Letters and Science List. All undergraduate courses in geology and geophysics, except Geology 150, are included in the Letters and Science List of Courses. For regulations governing this list, see page 91.

MAJOR IN GEOLOGY

Departmental Major Adviser: Mr. Gilbert.

The Major. Required courses: Chemistry 1A–1B or 4A–4B; Mathematics 1A–1B or 3A–3B and 4; Physics 2A–2B and 3A–3B, or preferably 4A–4B–4C; Paleontology 1 or a course in historical geology; Geology 5 or 101, 6, 102 (2), 103, 105, 107, 118, and at least 8 units selected from either one of the following two groups of courses.

Group 1: Geology 104A–104B, 116, 117, 131, 133, and Chemistry 110A.
Group 2: Geology 116, 117; Paleontology 111, 112, 116 and 117.

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 2A–2B or 14A and additional chemistry and physics are strongly recommended. Other recommended electives include any courses listed in the two groups above. Statistics 2, Chemistry 5, Geology 106A–106B, 111A–111B, and Geophysics 122A–122B.

The Honors 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 2A, and Geology H196.

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, 123; Geology 101, 103, 104A–104B, 105, 118, 131, 133.

Engineering Geoscience. Major adviser: Mr. Christensen.

The College of Engineering with the cooperation of the Department of Geology and Geophysics offers a curriculum in engineering geoscience leading to the degree of Bachelor of Science (see section on Program of Study in Engineering Science, 75).

MAJOR IN GEOPHYSICS

Departmental Major Adviser: Mr. Everden.

The Major. Required courses: Chemistry 1A; Geology 5, 150; Geophysics 104A–104B; 121 or 122A–122B; Mathematics 1A–1B, 2A–2B; Physics 4A–4B–4C, 105A, 110A–110B.

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: Geophysics 121 or 122A–122B; Physics 105B; Mathematics 104, 185.

The Honors 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 Geophysics 121, 122A–122B, and H196.

GEOLOGY

Lower Division Courses

5. General Geology. (4) I and II. Mr. Gilbert, Mr. Meyer, Mr. Everden

Two lectures and two three-hour laboratory periods per week. Students enrolling in the course must have the entire afternoon free for field work on the days of their scheduled laboratory periods. Prerequisite: Chemistry 1A or equivalent.

For students majoring in the earth sciences. Not open to students who have credit for another course in general geology; such students can satisfy the requirements for the geology or geophysics major by completing course 101.

6. Introduction to Mineralogy. (4) I and II. Mr. Fyfe, Mr. Weiss

Two lectures and two three-hour laboratory periods per week. Prerequisite: Chemistry 1A and Physics 2A or equivalent. Physical properties of rock-forming minerals; elementary crystallography.

10. Introduction to Geology. (3) I and II. Mr. Christensen, Mr. Curtis

Designed for students not majoring in any physical science or engineering; not open to students who have completed any college course in geology.
Basic principles of geology; laboratory study of minerals and rocks, structure of rock masses in the field, earthquakes, interpretation of geologic maps, and evolution of natural landscapes.

11. Historical Geology. (3) I.
Three lectures per week and two half day field trips during semester.
Prerequisite: a college course in physical geology.
A sequel to course 10 designed for nonscience majors in the College of Letters and Science. Geological history of the earth and the evolution of its animal and plant inhabitants.

15. General Geology. (3) II.
Two lectures and one three-hour laboratory period per week.
Prerequisite: Chemistry 1A, Physics 2A-2B, Mathematics 1A-1B or 3A-3B, or consent of instructor. For majors in engineering. Not open to students who have passed course 5 or 10.
Similar in scope to course 5 but with some topics omitted.

Upper Division Courses

101. Field Geology. (3) I.  Mr. Evernden
Two four-hour meetings per week. Prerequisite: a course in general geology.
Geology of the Berkeley Hills and vicinity. Training in geologic field methods in the solution of structural problems and in the preparation of geologic reports. Not open to students who have completed course 5 at Berkeley.

102. Field Geology. (1) I and II. Mr. Wahrhaftig, Mr. Christensen
One week-long field trip, or equivalent. Prerequisite: course 5 or 101, 103, 105, or 150.
Additional training in geologic mapping and report writing; the geology of areas beyond the environs of San Francisco Bay. May be repeated for credit.

103. Igneous and Metamorphic Rocks. (3) I.  Mr. Weiss
Two lectures and one three-hour laboratory period per week. Prerequisite: course 5 and 6, or 150.
Origin, description, and classification of igneous and metamorphic rocks; laboratory study of hand specimens.

104A-104B. Microscopic Petrography Laboratory. (3-3) Yr. Mr. Williams
Lecture and two three-hour laboratory periods per week. Prerequisite: course 6; and for course 104B, course 103.

105. Sedimentary Rocks. (3) II.  Mr. Gilbert
Two lectures and one three-hour laboratory period per week. Several all-day field trips in lieu of laboratories will be scheduled on week ends. Prerequisite: course 5 and 6; Paleontology I or a course in historical geology.
Origin, classification, and relationships of stratified rocks; principles of stratigraphic measurements and correlation.

106A-106B. Mineral Deposits. (3-3) Yr.  Mr. Meyer
Two lectures and one three-hour laboratory period per week. Prerequisite: 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: course 11 and 103.
The sedimentary, igneous, and structural evolution of the continent.

111A-111B. Geology of Fluids. (3-3) Yr.  Mr. Berry
Prerequisite: course 102 (may be taken concurrently) or 150; and a course in college physics.
Petroleum and water; structure, stratigraphy, and hydrodynamics of structural basins.

* Not to be given, 1964-1965.
116A. Structural Geology. (2) I. Mr. Christensen
One lecture and one three-hour laboratory per week. Prerequisite: course 5 or 101, and 103 (may be taken concurrently).
Configuration and evolution of geologic structures.

116B. Structural Geology. (2) II. Mr. Weiss
Two lectures per week. Prerequisite: consent of instructor (116A not prerequisite to 116B).
Flow and fracture of rocks.

117. Geomorphology. (3) I. Mr. Wahrhaftig
Two lectures and one-three-hour laboratory per week; 3 one-day field trips will be scheduled. Prerequisite: course 102 (may be taken concurrently) or consent of the instructor.
Surficial processes and evolution of land forms.

118. Advanced Summer Field Course. (4).
Prerequisite: courses 102, 103, and 105; or consent of instructor.

131. Geochemistry. (3) II. Mr. Fyfe
Three lectures per week. Prerequisite: course 103 (may be taken concurrently); Chemistry 5 recommended.
Geochemical treatment of the formation and association of minerals.

133. Selected Topics in the Crystal Chemistry of Minerals. (3) I. Mr. Pabst
Three lectures per week. Prerequisite: course 103 (may be taken concurrently); Chemistry 5 recommended.

150. Geology for Engineers. (3) II. Mr. Wahrhaftig
One lecture and two laboratory periods per week; 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 101.
Laboratory and field study of minerals and rocks, covering selected topics from course 6, 103, and 105.

H196. Honors Course in Geology. (3) II. Mr. Weiss
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.

199. Special Study for Advanced Undergraduates. (1–4) I and II.
The Staff (Mr. Everden in charge)
Restricted to senior honor 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 165)

201A–201B. Seminar in Geochemistry. (2–2) Yr. Mr. Fyfe
Prerequisite: consent of instructor.
Principles and general problems of geochemistry. Course content varies from year to year.

202. Advanced Field Study. (3) I. Mr. Curtis
Prerequisite: course 101 or equivalent and consent of the instructor.
Supervised field study for graduate students with prior experience.

205. Laboratory Investigation of Ores. (3) II. Mr. Meyer
Prerequisite: courses 104A–104B, 106A–106B or equivalent, Geology 131 or the equivalent.
Application of laboratory methods and interpretive procedures to problems of metaliferous geology.
206. Seminar in Geology of Metalliferous Deposits. (3) I.
Prerequisite: course 106A-106B or equivalent.
Study of the literature of selected mining districts, with laboratory demonstration of textural and mineralogic features.

207. Seminar in Volcanology. (2) I.
Mr. Williams

209A-209B. Physical Stratigraphy and Tectonics. (2-2) Yr.
Prerequisite: consent of the instructor.
Mr. Berry, Mr. Christensen
209A. Regional sedimentary studies: preparation and interpretation of paleogeologic, isopach and lithofacies maps.
209B. Tectonics.

210. Advanced Optical Mineralogy. (3) II.
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. Advanced Geology of Fluids. (2) II.
Mr. Berry
Prerequisite: consent of the instructor. Course 111A-111B and 209A are recommended. Critical study of original literature, discussion, and occasional lectures. Topics will vary from year to year.

212. Universal-Stage Petrography. (2) I.
Prerequisite: course 210 or 214A, and consent of instructor.

213. Seminar in Geomorphology. (2) II.
Prerequisite: course 117 or equivalent.
The topics will vary from year to year.

214A-214B. Advanced Petrology. (2-4; 2-4) Yr.
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.
Problems of petrogenesis. Microscopic study of suites of rock sections.
214A. Igneous rocks.
214B. Metamorphic rocks.

215A-215B. Sedimentary Petrology. (3-3) Yr.
Prerequisite: a course in microscopic petrography and consent of instructor. Recommended: course 210.
Problems in sedimentary petrogenesis; laboratory study of sediments and sedimentary rocks.
215A. Recent sediments.
215B. Consolidated sedimentary rocks.

216A. Structural Analysis of Deformed Rocks. (2) I.
Mr. Weiss
Prerequisite: course 101 and consent of the instructor.
Analysis of structures and fabrics in hand specimens, in the field and on geologic maps.

216B. Petrofabric Analysis. (2) II.
Prerequisite: course 212, 216A and consent of the instructor.
Analysis of structures and fabrics on the microscopic scale.

220. Research. (1-5) I and II.
The Staff (Mr. Weiss in charge)

222. Geochronology. (2) II.
Mr. Evernden
Prerequisite: consent of instructor.
Radioactive decay schemes and their use in dating rocks and in geologic correlation; geologic rate problems.

* Not to be given, 1964-1965.
237A. Crystallography. (3) I. Mr. Pabst
Three lecture periods per week.
Prerequisite: consent of instructor.
Geometrical crystallography, including a discussion of space groups. Hermann-Mauguin symbols, the reciprocal lattice, the stereographic and gnomonic projections, crystal morphology and twinning.

237B. X-Ray Crystallography. (3) II. Mr. Pabst
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. Evernden in charge)
Selected readings in geology and geophysics.

Related Courses in Other Departments
Invertebrate Paleontology (Paleontology 111, 112, 116, 117, 136).
Micropaleontology (Paleontology 114A-114B, 139).
Mineral Exploration and Geological Engineering (see Engineering, Mineral Technology).
History of Science (History 105A-105B, 205).

GEOPHYSICS

Upper Division Courses

104A–104B. Mathematical Methods in Geophysics. (2–2) Yr. Mr. Bolt
Two lectures per week. Prerequisite: Mathematics 2A–2B, or equivalent. 104A is not prerequisite to 104B.
Algebraic methods; statistical methods; numerical analysis; special functions; the operational method; partial differential equations of geophysics.

120. Elementary Seismology. (2) I. Mr. Evernden
Two lectures per week.
Earthquakes, their origin and distribution; seismic waves; structure of the earth.

121. Seismology. (4) II. Mr. Evernden
Three lectures and one three-hour laboratory period per week. Prerequisite: Physics 4A–4B; Mathematics 2A–2B.
Paths of seismic waves and their relation to the structure of the earth; elementary theory of the seismograph; laboratory analysis of seismograms and their interpretation in terms of structure; seismic prospecting.

122A–122B. Geophysics. (2–2) Yr. Mr. Verhooogen
Two lectures per week. Prerequisite: Geology 5 or 15, Physics 4A–4B, Mathematics 124A–124B (may be taken concurrently).
Physics of the earth; its gravitational and magnetic fields; internal constitution; heat flow.

H196. Honors Course in Geophysics. (3) II. Mr. Evernden
One two-hour period per week. Prerequisite: senior and honors standing in the geophysics major.
A seminar dealing with the major topics in geophysics, including reports on original literature and a comprehensive examination.
Graduate Courses

(Concerning conditions for admission to graduate courses, see page 165)

204A-204B. Elastic Waves. (2-2) Yr.  
Mr. Bolt  
Prerequisite: Mathematics 124A or equivalent; Geophysics 121 (may be taken concurrently); Physics 105A.  
The theory of stress and strain; generation and propagation of wave motion in elastic material, with special reference to seismic waves.

208. Physics of Solids. (2) I.  
Mr. Verhoogen  
Physical and chemical properties of solids, with reference to rock-forming materials. Content will vary from year to year.

217. Advanced Seismometry. (2) II.  
Mathematical theory of the seismograph; discussion of the problems of modern seismometry and of recent results.

218A-218B. Seminar in Seismology. (2-2) Yr.  
Critical study of seismological problems including eigenvibrations of terrestrial planets, data analysis, and travel-time table construction. The content will vary from year to year.

219. Seminar in General Geophysics. (2) II.  
Mr. Evernden  
Theory of the figure of the earth, its gravitational field, earth tides, isostasy, and internal constitution. The content will vary from year to year.

290. Research. (1-5) I and II.  
The Staff (Mr. Verhoogen in charge)

Related Courses in Other Departments
Mineral Exploration and Geological Engineering (see Engineering, Mineral Technology).

University of California Seismographic Stations

The University of California now operates eighteen seismographic stations in northern California and Nevada. The stations at Berkeley and Mount Hamilton were established in 1887, the oldest stations in the Western Hemisphere. A number of stations are operated in cooperation with local agencies while some eight have their data telemetered directly to the Earth Sciences Building.

The function is to study the seismicity in northern California and adjacent parts of Nevada and Oregon and to conduct other research in seismology.

The director of the seismographic stations teaches courses in seismology leading to the master's and doctoral degrees.

Research work has involved the study of earthquake wave propagation, the nature of the waves, their relation to earth structure, the nature of earthquake sources, the energy in earthquakes, the theory of the seismograph. Currently Advanced Research Projects Agency contract research is underway.

The offices and laboratories are in the Earth Sciences Building; the seismographs are in Haviland Hall and in an underground vault in Strawberry Canyon.

The staff consists of the Director, graduate research assistants, assistant research seismologist, secretary, and technicians, as well as record changers at the outstations.
GERMAN

(Department Office, 5319 Dwinelle Hall)

Madison S. Beeler, Ph.D., Professor of German and Linguistics (Chairman of the Department).
Karl S. Guthke, Dr.phil., Professor of German.
Andrew O. Jászi, Ph.D., Professor of German.
Philip Motley Palmer, Ph.D., Professor of German.
Herbert Penzl, Dr.phil., Professor of Germanic Philology (Acting Chairman of the Department for the fall semester).
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.
Archер 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.
Marianне Bonwit, Ph.D., Associate Professor of German.
Joseph Mileck, Ph.D., Associate Professor of German.
Blake Lee Spahr, Ph.D., Associate Professor of German.
Frederic C. Tubach, Ph.D., Associate Professor of German.
Kathleen Harris, Dr.phil., Assistant Professor of German.
Philip F. Glander, Ph.D., Assistant Professor of German.
Bluma Goldstein, Ph.D., Assistant Professor of German.
Michael Mann, Ph.D., Assistant Professor of German.

David E. R. George, Ph.D., Acting Instructor in German.
Edith Lewy Hecht, M.A., Lecturer in German.
Richard M. Sheirich, M.A., Lecturer in German.
J. Peter Stern, Ph.D., Visiting Professor of German for the fall semester.
Jan Van Asselt, M.A., Acting Instructor 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 91.

Departmental Major Advisers: Miss Bonwit, Mr. Jaszi, Mr. Politzer.
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

1 In residence fall semester only, 1964–1965.
2 In residence spring semester only, 1964–1965.
in composition and at least 6 units made up from 118A, 118B, 119A, 119B, 124, 135A, and 140. Attention is also directed to the courses listed under “Foreign Literature in Translation,” pages 359–360.

**Honors Program.** Senior students who have a 3.0 overall grade-point average and a 3.5 grade-point average in at least 12 units of upper division German may enroll in the honors program. The honors program will include completion of two semesters of German H195 and a comprehensive examination.

**Higher Degrees.** See the Announcement of the Graduate Division, at Berkeley.

**GERMAN**

**Lower Division Courses**

**Duplication of Credit.** A student will not be allowed credit in German 1, 2, or 3 if they duplicate courses previously completed in high school or at another institution of collegiate grade. The first two years of work in a foreign language in high school is considered to be equivalent to one semester in college (4 units); each successive year in a foreign language in high school is equal to one additional semester in college (4 units).

1. Elementary German. Beginners’ Course. (4) I and II. Miss Harris in charge

12. Elementary German. Intensive Course. (8) I and II. Mrs. Hecht

Two hours daily, five times per week.

This course is equivalent to course 1 and 2.

2. Elementary German (continuation of 1). (4) I and II. Miss Harris in charge

Prerequisite: course 1 or two years of high school German.

3. Intermediate German. (4) I and II. Mr. George in charge

Prerequisite: course 2 or three years of high school German.

Certain sections, limited to fifteen students, are for those interested in conversational German.

3S. Scientific German. (4) I and II. Mr. Sheirich in charge

Prerequisite: course 2 or equivalent. Open only to students in the colleges of Chemistry and Engineering, premedical and predental students, and science majors in Letters and Science.

4. Intermediate German. (4) I and II. Mr. Mileck in charge

Prerequisite: course 3 or four years of high school German.

Conversational sections available. See course 3 above.

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. _____.
39B. Eighteenth Century. (2) I. Mr. Guthke.
39C. Nineteenth Century. (2) II. Mr. Glander.
39D. Twentieth Century. (2) II. Mr. George.*

* Not to be given, 1964–1965.
Upper Division Courses
Prerequisite: 16 units of lower division German courses.

101. Introduction to German Literature. (3) I and II.
Mr. Sheirich, Mr. Stern, Miss Goldstein, Mr. George
Designed primarily for juniors whose major subject is German. Introduction to basic structural elements of literary genres and literary terminology. Two sections, limited to twenty students each.

102. Twentieth-Century German Drama. (3) I and II.
(Formerly numbered 100A.)

103. Twentieth-Century German Prose. (3) I and II.
(Formerly numbered 100B.)
Mr. Politzer, Miss Goldstein

104. Nineteenth-Century German Drama. (3) I.
(Formerly numbered 104A.)
Mr. George

105. Nineteenth-Century German Prose. (3) II.
(Formerly numbered 104B.)

107. The Works of Friedrich Schiller. (3) I.
Miss Harris

108. Goethe to the Italian Journey. (3) I.
Miss Bonwit

109. Goethe after the Italian Journey. (3) II.
Mr. Glander

110. German Lyric Poetry. (3) II.
Mr. Politzer
Readings in German poetry from the Enlightenment to the present day.

112A-112B. Survey of German Culture and Institutions. (2–2) Yr.
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. Spahr
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 Eighteenth Century: Enlightenment, and Storm and Stress. (3) I.
Miss Bonwit
An analysis of the important German literary documents from 1700 to 1775.

119B. German Literature from the Romantic Movement to 1900. (3) II.
Miss Bonwit
Prerequisite: same as for course 118A. 119A is not prerequisite to 119B.

124. German Poetry of the Twentieth Century. (2) I.
Mr. Jászi
Prerequisite: same as for course 118A.

125. Introduction to Germanic Folklore. (3) II.
Prerequisite: open to all upper division students who have a reading knowledge of German or another European language.
A survey of the theory, methods and results of folkloristic research in the Germanic area; the relationship of materials in the popular tradition to the studies of literature, linguistics, and cultural history.

* Not to be given, 1964–1965.
**130A–130B. Advanced Grammar and Composition.** (3–3) Yr.
Mrs. Hecht, Mr. Palmer, ———

Not open to native Germans except with consent of the instructor.

* **131A–131B. Composition and Style.** (2–2) Yr.
Prerequisite: grade B or higher in course 130A–130B, or consent of the instructor.
131A is not prerequisite to 131B.

**135A. Middle High German.** (3) I.
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.
Prerequisite: course 135A.
Readings in Middle High German literature.

**140. Introduction to Descriptive German Grammar.** (3) I and II.
Prerequisite: same as for course 118A.
The structure of German: sounds, forms, syntax. Recommended for prospective teachers.

**H195. Special Study for Honors Candidates.** (3) I and II.
The Staff
Prerequisite: upper division standing.

**199. Special Study for Advanced Undergraduates.** (1–3) I and II.
——— in charge

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**Graduate Courses**

(Concerning conditions for admission to graduate courses, see page 165)
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) I.
Prerequisite: course 135A.

**205. German Literature during the Renaissance and Reformation.** (2) II.

**206. German Literature during the Seventeenth Century.** (2) I.

**214. Lessing and His Time.** (2) II.
Mr. Guthke

**200. Proseminar in Bibliography and Textual Analysis.** (2) I.
Miss Harris
Training in the use of bibliographical aids to the study of German philology and literature; analysis and interpretation of selected texts.

**220. Goethe to the Period of the Italian Journey.** (2) I.
Mr. Jászi

**221. Goethe from the Period of the Italian Journey to His Death.** (2) II.
Mr. Jászi

**222. Schiller’s Dramas.** (2) I.
Mr. Guthke
The purpose of this course is to study the dramatic work (including some of the fragments) of Friedrich Schiller, leading dramatist of German Classicism. Special reference will be made to the broader context of German idealism.

* **228. Early German Romanticism: 1795–1810.** (2) I.
Mr. Politzer

* Not to be given, 1964–1965.
229. Kleist, Büchner, Grabbe. (2) I. Mr. Politzer

231. Grillparzer and Austrian Drama. (2) I. Mr. Politzer

238. German Realism, 1850–1900. (2) II. Miss Bonwit

239. Interpretation and Criticism of German Poetry. (2) II. Mr. Jászi

240. Twentieth-Century German Prose. I and II. Mr. Mileck, ———

240A. Hermann Hesse. (2) I. Mr. Mileck
240B. Thomas Mann. (2) II. Mr. Mileck
240C. Franz Kafka. (2) I. ———

241. German Naturalism. (2) I. Mr. Guthke

249. Seminar in German Literature. (2 or 3) II. The Staff (Mr. Spahr in charge)

298. Special Study for Graduate Students. (1–4) I and II. ——— in charge

1G. German for Graduate Students. Beginning. (No credit) I and II.
(Formerly numbered A.) Preparation for graduate reading examination.

2G. German for Graduate Students, Advanced. (No credit) I and II.
(Formerly numbered B.) Preparation for graduate reading examination.

German Linguistics

For the courses in English philology, see the Department of English, page 338.

260. Germanic Linguistics. (3) II. Mr. Beeler

Prerequisite: at least one 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) II. Mr. Palmer

Prerequisite: grade B or higher in course 135A.

265. Gothic. (3) II. Mr. Penzl

275. Old High German. (3) II. Mr. Penzl

290. Seminar in Germanic Linguistics. (2 or 3) II. Mr. Palmer

Topic: Old Saxon (2).

DUTCH

101. Elementary Dutch. (4) I. Mr. Van Asselt

The elements of grammar; intensive practice in spoken Dutch; rapid reading of simple texts.

* Not to be given, 1964–1965.
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102. Advanced Dutch (Continuation of 101). (4) II. Mr. Van Asselt
Prerequisite: Dutch 101.
Continuation of 101 with special attention given to the reading of scientific, technical and literary texts.

YIDDISH

1. Elementary Yiddish (4) I.
The elements of grammar; introduction to spoken Yiddish; rapid reading of simple texts.
2. Elementary Yiddish. (4) II.
Prerequisite: Yiddish 1 or consent of instructor.
Continuation of Yiddish 1; introduction to the reading of literary prose and poetry.

Related Courses in Another Department
The Symbolist Movement in European Literature (Comparative Literature 201A–201B).
Arthurian Literature. Theme: The Grail (Comparative Literature 205).
Romanticism in Western Europe (Comparative Literature 221).

GREEK

For courses in the Greek language and literature, see under Department of Classics.

HISTORY

(Department Office, 3229 Dwinelle Hall)
Walton E. Bean, Ph.D., Professor of History.
Woodbridge Bingham, Ph.D., Professor of History.
Woodrow Borah, Ph.D., Professor of History.
William J. Bouwsma, Ph.D., Professor of History.
Delmer M. Brown, Ph.D., Professor of History.
*Gene A. Brucker, Ph.D., Professor of History.
A. Hunter Dupree, Ph.D., Professor of History.
George H. Guttridge, M.A., Sather Professor of History.
Lawrence A. Harper, J.D., Ph.D., Professor of American History.
Richard Herr, Ph.D., Professor of History.
James F. King, Ph.D., Professor of History.
Adrienne Koch, Ph.D., Professor of History.
Joseph R. Levenson, Ph.D., Professor of History.
Bryce Lyon, Ph.D., Professor of History.
Martin E. Malia, Ph.D., Professor of History.
Henry F. May, Ph.D., Margaret Byrne Professor of History.
*Armin Rappaport, Ph.D., Professor of History.
*Nicholas V. Riasanovsky, D.Phil., Professor of History.
Hans W. Rosenberg, Ph.D., Shepard Professor of History.

Henry Rosovsky, Ph.D., Professor of Economics and of History.
Carl E. Schorske, Ph.D., Professor of History.
Charles G. Sellers, Jr., 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.
George P. Hammond, Ph.D., LL.D., Professor of History and Director of the Bancroft Library, Emeritus.
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.
P. B. Schaefler, Ph.D., Associate Professor of History, Emeritus.
John J. Van Nostrand, Ph.D., Professor of Ancient History, Emeritus.
Klaus Baer, Ph.D., Associate Professor of History and of Near Eastern Languages.
† Thomas G. Barnes, D.Phil., Associate Professor of History.
Robert J. Brentano, D.Phil., Associate Professor of History.
H. Franz Schurmann, Ph.D., Associate Professor of History and of Sociology.
* Richard M. Abrams, Ph.D., Assistant Professor of History.
Gunther Barth, Ph.D., Assistant Professor of History.
L. Perry Curtis, Ph.D., Assistant Professor of History.
Gerald D. Feldman, Ph.D., Assistant Professor of History.
* Roger Hahn, Ph.D., Assistant Professor of History.
Winthrop D. Jordan, Ph.D., Assistant Professor of History.
Lawrence W. Levine, Ph.D., Assistant Professor of History.
* Thomas R. Metcalf, Ph.D., Assistant Professor of History.
Robert L. Middlekauff, Ph.D., Assistant Professor of History.
Robert O. Paxton, Ph.D., Assistant Professor of History.
William B. Slottman, Ph.D., Assistant Professor of History.
John M. Smith, Jr., Ph.D., Assistant Professor of History.
George W. Stocking, Jr., Ph.D., Assistant Professor of History.
Richard A. Webster, Ph.D., Assistant Professor of History.

Walter Beringer, Ph.D., Visiting Assistant Professor of History.
Carlo M. Cipolla, Laurea, Professor of Economics.
Albert Fishlow, Ph.D., Associate Professor of Economics.
Leon F. Litwack, Ph.D., Visiting Associate Professor of History.
Sheldon Rothblatt, M.A., Acting Instructor in History.
Wolfgang Sauer, Dr.Phil., Visiting Associate Professor of History.
Irwin Scheiner, M.A., Acting Instructor in History.
Gerald E. Wheeler, Ph.D., Visiting Professor of History.
Reginald E. Zelnik, M.A., Acting Assistant Professor of 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 91.

Departmental Major Advisers: Consult Departmental Office.

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 and 17C-17D; 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 (History 103); (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).

Lower Division Honors Courses. 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. Students with an overall grade-point average of 3.0 may apply to the departmental honors committee for admission as juniors to the honors program. Application should be made at the departmental office. Applications will be accepted during registration week.

The major honors program 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 and 17C-17D, H17A-H17B, 19A-19B, or 33A-33B.

(b) In the junior year, 12 units of upper division history courses including (1) History H102 and (2) a proseminar (History 103; see under course listings, Group II, B, "Proseminars in History"); History 101 will not be taken.

(c) In the senior year, History H198A-H198B (6 units per semester), devoted to preparation of 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.

Higher Degrees. Students planning to work toward the degrees of M.A. and Ph.D., should consult the ANNOUNCEMENT OF THE GRADUATE DIVISION,
BERKELEY, and the History Department bulletin entitled HIGHER DEGREES IN HISTORY, 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. Western Civilization. (3–3) Yr.** Mr. Brenzano, Mr. Slottman

**H4B. Western Civilization from 1648. (3) II.** Mr. Rothblatt

Prerequisite: consent of instructor. Limited to ten students per section.

An honors course including reading, discussion, and reports, focusing on selected movements and epochs.

**8A–8B. The Americas since 1492. (3–3) Yr.**

**17A–17B. The United States. (2–2) Yr.** Mr. Litwack

Prerequisite: sophomore standing.

History majors should take course 17C–17D in conjunction with this course.

**17C–17D. The United States. (1–1) Yr.** Mr. Litwack

Prerequisite: sophomore standing.

An extra hour of discussion to be taken concurrently with 17A–17B. Intended especially for sophomores and history majors.

**H17A–H17B. The United States. (3–3) Yr.** Mr. Jordan, Mr. Middlekauff

Prerequisite: sophomore standing and consent of instructor. Limited to ten students per section.

An honors course including reading, discussion, and reports, focusing on selected movements and epochs.

**19A–19B. Asia. (3–3) Yr.** Mr. Bingham

Political and cultural survey from ancient to modern times, covering China, Japan, India and the Middle East including relations with the West.

**33A–33B. American Studies. (3–3) Yr.** Miss Koch

Open to sophomores with consent of 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.)

**109A–109B. Ancient Egypt. (3–3) Yr.** Mr. Baer

**110A–110B. Ancient Greece. (3–3) Yr.** Mr. Beringer

*111A–111B. Ancient Rome. (3–3) Yr.

*115A–115B. Byzantium. (3–3) Yr.

**121A–121B. Medieval Europe. (3–3) Yr.** Mr. Lyon

* Not to be given, 1964–1965.
122. European Culture in the Middle Ages. (3) II.

123. Medieval France. (3) II.

125A-125B. Medieval Institutions. (3-3) Yr.

131. The Age of Renaissance. (3) II.

132. The Age of Reformation. (3) II.

133. The Age of Absolutism and Enlightenment. (3) I.

134A-134B. European Intellectual History. (3-3) Yr.

135A. Russia to 1689: Kievan and Moscovite Russia. (3) I.

135B. Russia, 1689-1890: Peter the Great through the Great Reforms. (3) II.

136A. Russia since 1890: The Russian Revolution and the Soviet Regime. (3) II.

136B-136C. Russian Intellectual History. (3-3) Yr.

140A-140B. The Habsburg Monarchy and the Succession States. (3-3) Yr.

141A-141B. Modern France. (3-3) Yr.

143A-143B. Germany from 1815 to the Present. (3-3) Yr.

144A-144B. European Diplomacy since 1815. (3-3) Yr.

145. Modern Europe. I and II. The Staff in Modern European History

145A. 1789 to 1870. (3) 145B. 1870 to 1914. (3) I. Mr. Webster 145C. 1914 to the present. (3) II. Mr. Paxton

147A-147B. Social History of Western Europe. (3-3) Yr.

149. Rise of the Dutch Republic and Empire. (3) II. Mr. Sluiter

(Formerly numbered 133C.)

150A-150B. Medieval England. (3-3) Yr. Mr. Brentano

Emphasis will be placed on constitutional and intellectual developments.

151A-151B. England since 1500. (3-3) Yr. Mr. Barnes, Mr. Curtis

Prerequisite: an elementary knowledge of the history of Western Europe.

* Not to be given, 1964-1965.
152A-152B. Constitutional History of England. (3-3) Yr.  
Mr. Lyon

155A-155B. The British Commonwealth and Empire. (3-3) Yr.  
Prerequisite: course 151B or equivalent.

159. Great Britain since 1900. (3) I.

160A°-160B. Spain and Portugal. (3-3) Yr.  
Mr. Herr

161A-161B. Hispanic-American History. (3-3) Yr.  
Mr. King

162. The Caribbean Area since 1700. (3) I.  
Mr. King

163. Brazil. (3) I.  
Mr. Sluiter

164. Argentina since 1800. (3) II.  
Emphasis on post-1800 developments. Designed for majors in the social sciences.

165A-165B. Modern Social History of Latin America. (3-3) Yr.  
Mr. Borah

166A-166B. Mexico. (3-3) Yr.  
Mr. Rappaport

167A-167B. The Diplomatic History of the United States. (3-3) Yr.  
Mr. Rappaport

170A-170B. American History to 1789. (3-3) Yr.  
170A. The Colonial Period.  
Mr. Middlekauff, Mr. Jordan  

172A-172B. Constitutional History of the United States. (2-2) Yr.  
Prerequisite: course 171A-171B or consent of 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 course 172A-172B.

173A. The Era of Sectional Conflict, 1820-1865. (3) I.  
Mr. Stampp

173B. Reconstruction and the New Nation, 1865 to 1900. (3) II.  
Mr. Stampp

174A-174B. Recent History of the United States. (3-3) Yr.  
174A. 1900 to 1928.  
Mr. Levine  
174B. 1928 to the present.

175A-175B. Intellectual History of the United States. (3-3) Yr.  
Mr. May

176A°-176B. Social History of the United States: 1763 to the Present.  
(3-3) Yr.  
Mr. Stocking

177A-177B. The United States, 1787 to 1845. (3-3) Yr.  
Mr. Sellers

180A-180B. The American Political Tradition. (3-3) Yr.  
Miss Koch

Among the major figures 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. (3-3) Yr.  
Mr. Barth

189A-189B. California. (2-2) Yr.  
Mr. Bean

* Not to be given, 1964-1965.
191A–191B. Social History of China and Japan. (3–3) Yr. Mr. Schurmann
Prerequisite: consent of instructor.
191A. China.
191B. Japan.

193A–193B. The Middle East Since 1258. (3–3) Yr. Mr. Smith
193A. The background, origins and rise of the Ottomans; the Ottoman Empire, its
Arab provinces, and Persia to 1798.
193B. The modern Middle East, from 1798 to the present.

194A–194B. China. (3–3) Yr. Mr. Levenson
195A–195B. Japan. (3–3) Yr. Mr. Brown, Mr. Scheiner

*196. Southeast Asia. (3) II.

*197A–197B. India. (3–3) Yr.

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

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) II. Mr. Charlson

B. Proseminars in History

103. Proseminar: Problems in Interpretation and Research in the
Several Fields of History. (3) I and II. The Staff
Prerequisite: a one-year upper division course in the same area of history; and consent
of instructor. Enrollment is limited to 15 students.

Emphasis will be placed on writing and discussion. With consent of instructor may be
repeated without duplication of credit.

*A. Ancient Egypt, Greece and Rome.
B. Europe. I. Mr. Feldman, Mr. Paxton, Mr. Webster, Mr. Zelnik. II. Mr. Bouwsma,
Mr. Feldman, Mr. Paxton, Mr. Sauer, Mr. Webster, Mr. Zelnik.
C. England. I. Mr. Curtis, Mr. Rothblatt. I. Mr. Curtis, Mr. Guttridge, Mr. Rothblatt.
D. United States. I. Mr. Bean, Mr. Jordan, Mr. Litwack. II. Mr. Barth,
Mr. Levine, Mr. May, Mr. Middlekauff, Mr. Sellers, Mr. Stampp.
E. Latin America. *I. II. Mr. Borah, Mr. Sluiter.
F. Asia. I. Mr. Bingham, Mr. Scheiner, Mr. Schurmann. II. Mr. Brown, Mr. Smith.
(See also History of Science, page 398.)

C. Teaching Colloquium

171L. Proseminar in United States History. (3) I. Mr. Harper
An analysis of concepts and theories concerning factors underlying United States
history. Admission only with consent of instructor. Recommended for teachers or prospec­
tive teachers.

D. Honors Courses

H102. Colloquium on Historical Thought. (3) I and II.
Mr. Bouwsma, Mr. Rothblatt, Mr. Levenson

Limited to junior honors candidates.
Consideration of the nature and function of historical thought as manifested in major
historical classics, ancient and modern.

* Not to be given, 1964–1965.
HISTORY

HI98A–HI98B. Senior Honors. (6–6) Yr.
The Staff
Limited to senior honors candidates.
Directed study centering upon the preparation of an honors thesis. Supervisors will be assigned to each student after consultation with the honors committee.

E. Special Individual Study

199. Special Study for Advanced Students. (1–4) I and II.
The Staff
Restricted to senior honor students.

Graduate Courses
(Concerning conditions for admission to graduate courses, see page 165)

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
A. Ancient Egypt, Greece and Rome. I. (not to be given) II. Mr. Beringer.
B. Europe. I. Mr. Feldman, Mr. Lyon, Mr. Paxton, Mr. Rosenberg, Mr. Sauer, Mr. Slottman, Mr. Zelnik. II. Mr. Herr, Mr. Malia.
C. England. I. Mr. Curtis, Mr. Gugttridge. II. Mr. Guttridge.
D. United States. I. Miss Koch, Mr. Middlekauff, Mr. Stampp, Mr. Wheeler. II. Mr. Barth, Mr. Dupree, Mr. Jordan, Mr. Levine, Mr. Litwack.
E. Latin America. I. II. Mr. Borah.
F. Asia. I. Mr. Scheiner, Mr. Smith. II. Mr. Brown.
G. The Matters and Methods of Economic History. *I. II. Mr. Rosenberg.

202. Historical Method and Bibliography. (3) I and II.
Mr. Borah, Mr. Sontag, Mr. Rosenberg, Mr. Schorske
I: Mr. Borah, Mr. Sontag; II: Mr. Rosenberg, Mr. Schorske.
Designed especially for candidates for higher degrees in history. Stress is laid on practical exercises.

*207. Studies in Comparative History. (3) I.
Mr. Borah
Prerequisite: graduate standing.

Group II—Research Seminars

211. Ancient Greece and Rome. (3) I.
Mr. Beringer
A reading knowledge of French or German, and Latin or Greek is required.

*215. Byzantium. (3) II.

220. Paleography and Other Auxiliary Studies. (3) I.
Mr. Barnes

221. Medieval Europe. (3) II.
Mr. Lyon

*231. The Renaissance. (3) II.
Mr. Brucker

232. Early Modern Europe. (3) I.
Mr. Bouwsma

233. Western Europe. (3) I.
Mr. Herr

234. European Intellectual History. (3) I.
Mr. Schorske

*235. Russian Thought and Politics in the Nineteenth Century. (3) II.
Mr. Riasanovsky

236. Modern Russia. (3) I.
Mr. Malia

* Not to be given, 1964–1965.
239. Central and Southeastern Europe. (3) II. Mr. Slottman
241. Modern France. (3) II. Mr. Paxton
243. Modern Germany. (3) I and II. Mr. Feldman, Mr. Sauer
244. European Diplomatic History. (3) II. Mr. Sontag
246. European Social and Institutional History of the Nineteenth Century. (3) I. Mr. Rosenberg
248. Modern Italy. (3) II. Mr. Webster
250. Medieval England. (3) II. (Formerly numbered 225.) Mr. Brentano
251. England, 1660 to 1837. (3) I. Mr. Guttridge
252. Tudor-Stuart England. (3) II. Mr. Barnes
255. The British Commonwealth and Empire. (3) II. Mr. Curtis
259. Modern Britain. (3) II. Mr. Curtis
*260. Spain. (3) Mr. Herr
  Prerequisite: course 160A–160B, a reading knowledge of Spanish, and German or French.
261. Hispanic-America. (3) II. Mr. King
263. Hispanic-America: Colonial Period and Brazil. (3) I. Mr. Sluiter
*265. Modern Social History of Latin America. (3) I. —
*266. Mexico. (3) II. —
267. Diplomatic History of the United States. (3) II. Mr. Wheeler
  Prerequisite: course 167A–167B.
270. The American Colonies. (3) II. Mr. Jordan
272. Economic and Legal History of the United States. (3) II. Mr. Harper
273. The Old South, the Civil War, the Reconstruction. (3) II. Mr. Stampp
274. Recent History of the United States. (3) I. Mr. Levine
275. Intellectual History of the United States. (3) I.
  Recommended: course 175A–175B or equivalent.
276. American Social History, 1700 to 1900. (3) II. Mr. Stocking
277. Early National Period of United States History. (3) I. Mr. Sellers
278. History of Science and Technology in America. (3) I. Mr. Dupree
281. North America. (3) I and II. Mr. Hammond
*282. Spanish Borderlands. (3) Mr. Hammond

* Not to be given, 1964–1965.
287. The West in United States History. (3) I.
   (Formerly numbered 271.) Mr. Barth

289. California and the West. (3) II.

290. Asia. (3) II.
   Mr. Bingham

291. Social History of Asia. (3) II.
   Mr. Schurmann

293. The Middle East. (3) II.
   Mr. Smith

294. Modern China. (3) II.
   Mr. Levenson

295. Japan. (3) I and II.
   Mr. Brown, Mr. Scheiner

296. Southeast Asia. (3) II.
   Mr. Wheatley

297. India. (3) I.
   Mr. Metcalf

Group III—Individual Research and Study

298. Directed Research. (1-6) I and II. The Staff

299. Independent Study. (3-6) I and II.
   The 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 examinations.

299C. Independent Study. (1-5) I and II.
   The Staff
   Individual study for graduate students majoring in fields other than history.

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 de­
tails see the cross-listings in the philosophy section of this bulletin.) Students
interested in graduate programs in the history of science should consult the
department.

Upper Division Courses

*103S. Proseminar: Problems in Interpretation and Research in History
   of Science. (3) II. Mr. Hahn

   (3–3) Yr.
   105A. Antiquity to Newton.
   105B. Newton to the present.

*127A–127B. Topics in the History of Physical Science. (3–3) Yr.
   (Formerly Philosophy 127A–127B.)
   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.

*128A–128B. Topics in the History of Biological Science. (3–3) Yr.

* Not to be given, 1964–1965.
178A–178B. History of Science and Technology in American Society. (3–3) Yr.
178A. Science.
178B. Technology. I.

Graduate Courses

201S. Advanced Studies in the Sources and General Literature of the History of Science. (3) I.

205. Seminar in the History of Science. (3) II.
(Formerly numbered 204.)

278. History of Science and Technology in America. (3) I. Mr. Dupree

ECONOMIC HISTORY

All of the courses in this section are acceptable for major credit in history.

Upper Division Courses

112A–112B. Economic History of Europe. (3–3) Yr. Mr. Cipolla
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) II. Mr. Fishlow
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.

Graduate Courses

210A–210B. Advanced Study in Economic History. (3–3) Yr.
Prerequisite: consent of instructor. Mr. Fishlow, Mr. Landes, Mr. Rosovsky
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. Problems and methods in economic history; economic change in history; the nature of historical evidence and argument; collation, criticism, and evaluation of source material; techniques of organization and composition. (3) I. Mr. Landes.
Sec. 2. Selected problems in the comparative study of industrialization. (3) I. Mr. Rosovsky.

210B.* Sec. I. Problems and methods in economic history: quantitative techniques and economic theory. (3) Mr. Fishlow.
Sec. 2. Seminar in the economic history of Europe. (3) II. Mr. Landes.

212. Topics in Economic History. (3) I and II.
Mr. Cipolla, Mr. Landes, Mr. Fishlow, Mr. Rosovsky

212A. The Rise of Capitalism. I. (3) Mr. Cipolla.
212B. The Industrial Revolution in Europe. I. (3) Mr. Landes.
212C. Economic Growth of the United States. II. (3) Mr. Fishlow.
212D. Economic Growth in Follower Countries: Cases of Japan and Russia. II. (3) Mr. Rosovsky.

Doctoral candidates in history whose major field is economic history are expected to take Economic History 210B, Section I.

* Not to be given, 1964–1965.
§ Approved for one offering only, 1964–1965.
HUMANITIES

Daniel Heartz, Ph.D., Associate Professor of Music.
Jackson V. Burgess, M.A., Assistant Professor of English.
Donald M. Friedman, Ph.D., Assistant Professor of English.
Svetlana Alpers, M.A., Instructor in Art.

Committee in Charge:
Jonas A. Barish, Ph.D., Associate Professor of English.
Frederick C. Crews, Ph.D., Associate Professor of English.
Robert W. Goldsby, M.F.A., Professor of Dramatic Art.
Henrietta G. Harris, M.A., Assistant Professor of Dramatic Art.
Juergen Schulz, Ph.D., Associate Professor of Art.
Joseph Tussman, Ph.D., Professor of Philosophy.

Letters and Science List. All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 91.

The Field Major. See the ANNOUNCEMENT OF THE COLLEGE OF LETTERS AND SCIENCE.

Upper Division Courses

101A. Art. (3) I and II.
Prerequisite: restricted to seniors in the Humanities Field Major.
Analytical and critical methods in the visual arts exemplified through careful study of selected masterpieces. Problems in the comparison of the arts; the roles of form and content in different media.

101B. Music. (3) II.
Prerequisite: restricted to seniors in the Humanities Field Major.
Analytical and critical methods in music exemplified through careful study of selected masterpieces. Problems in the comparison of the arts; the roles of form and content in different media.

102. Literature. (3) I and II.
Mr. Burgess, Mr. Friedman
Restricted to seniors in the Humanities Field Major.
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.

104. Topics in the History of Culture. (3) II.
Restrict to seniors in the Humanities Field Major, except by permission of the instructor. Enrollment limited to twenty students.
An analysis of the historical contexts in which were produced some of the works of art, literature, and philosophy which form the subject of the other senior humanities courses.

HUNGARIAN

(For courses in the Hungarian language and literature, see under Department of Slavic Languages and Literatures.)
ITALIAN

(Department Office, 4226 Dwinelle Hall)

§ Enrico De Negri, Dottore in Lettere, Professor of Italian.
Arnofo B. Ferruolo, Dottore in Lettere, Professor of Italian.
Aldo D. Scaglione, Dottore in Lettere, Professor of Italian and of Comparative Literature (Chairman of the Department of Italian).
Michele De Filippis, Ph.D., Professor of Italian, Emeritus.
Nicolas J. Perella, Ph.D., Associate Professor of Italian.
Gustavo Costa, Dottore in Lettere, Assistant Professor of Italian.
Arshi Pipa, Dottore in Lettere, Assistant Professor of Italian.
Ruggiero Stefanini, Dottore in Lettere, Assistant Professor of Italian.

Louise G. Clubb, Ph.D., Visiting Assistant Professor of Italian.
Catherine Feucht, B.A., Lecturer in Italian.
Elio Gianturco, Ph.D., Visiting Professor of Italian for the spring semester.
Cecilia Ross, Ph.D., Lecturer 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 91.

Departmental Major Adviser: Mr. Perella.

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.

Lower Division Courses

Duplication of Credit. A student will not be allowed unit credit for that part of Italian 1, 2, or 3 which duplicates courses previously completed in high school or at another institution of collegiate grade. The first two years of work in foreign language in high school is considered to be equivalent to one semester in college (4 units); each successive year in a foreign language in high school is equal to one additional semester in college (4 units).

1 In residence fall semester only, 1964–1965.
2 In residence spring semester only, 1964–1965.
1. Elementary Italian. (4) I and II. 
   Five meetings per week. 
   Mr. Scaglione (in charge)

2. Elementary Italian. (4) I and II. 
   Five meetings per week. Prerequisite: course 1 or the equivalent. 
   Mr. Scaglione (in charge)

3. Intermediate Italian. (4) I and II. 
   Mr. Perella, Mr. Stefanini (in charge) 
   Five meetings per week. Some sections emphasize reading, others conversation. Prerequisite: course 2 or the equivalent. 

4. Intermediate Italian. (4) I and II. 
   Five meetings per week. Prerequisite: course 3 or the equivalent. 
   Mrs. Ross

39. Italian Literature in English Translation. 
   The most important authors 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. Costa, Mrs. Clubb, Mr. Ferruolo, Mr. Perella. 
   39B. From the End of the Renaissance to the Present. (3) I and II. Mr. Pipa.

Upper Division Courses

   (3-3) Yr. 
   Mr. Pipa, Mr. Stefanini

103A-103B. A Survey of Italian Literature. (3-3) Yr. Mr. Costa, Mr. Perella 
   Representative authors and works, with a consideration of the more important aspects of Italian literary history in their philosophical and historical background.

109A-109B. Dante’s Divina Commedia. (3-3) Yr. 
   Mr. De Negri

110A-110B. Italian Literature of the Thirteenth and Fourteenth Centuries. 
   (3-3) Yr. 
   Mrs. Clubb 
   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 
   The main trends in the literature of the fifteenth and sixteenth centuries. Emphasis on the works of Lorenzo De’ Medici, Poliziano, Castiglione, Leonardo, Machiavelli, Ariosto, and Tasso.

114. Italian Literature of the Eighteenth Century. (3) I. 
   Mr. Costa 
   Emphasis on the works of Vico, Goldoni, Parini, and Alfieri.

115A-115B. Italian Literature of the Nineteenth Century. (3-3) Yr. 
   Mr. Perella 
   Emphasis on the works of Foscolo, Leopardi, Manzoni, Carducci, Pascoli, and Verga.

116. Italian Literature of the Twentieth Century. (3) II. 
   Mr. Pipa 
   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 (in charge)

Specifically designed for students who wish individually to pursue a program of reading and study not covered by any other course. Units of credit to be determined by the instructor.

Literature Courses in English

*130. Dante’s Divine Comedy. (3) II. 
   Mr. Scaglione
   Prerequisite: consent of instructor.
   A historical and critical reading of the poem.

* Not to be given, 1964-1965.

** Special topics courses. 

Course content and staff are subject to change. 

Grades in Italian are given on the honor system.

* Notes on individual courses will be available in The Course Guide for the 1964-1965 academic year.
140. Dante, Petrarch, and Boccaccio. (3) II.
Prerequisite: consent of instructor.
The works of Dante, Petrarch, and Boccaccio and their relation to the Middle Ages and to the Renaissance.

Graduate Courses
(Concerning conditions for admission to graduate courses, see page 165)

201. Historical Grammar. (2) I. Mr. Sarolli

202. Early Italian Texts. (2) II. Mr. Stefanini

203. Methods of Literary Study and Stylistic Analysis. (2) II. Mr. Sarolli

204. Italian Literary Criticism. (2) I. Mr. Pipa

209. Studies in the Divina Commedia. (2) I. Mr. Sarolli

211. Seminar on Petrarch. (2) II. Mr. Ferruolo
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
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) I. 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) I. Mr. Gianturco

*218. Seminar on the Baroque. (2) I. Mr. Perella
Especially: the pastoral drama, Marino, and the Marinisti.

221. Romanticism in Italy. (2) II. Mr. De Negri
The Romantic movement in Italy in its relationship to European Romanticism, with emphasis on Foscolo, Leopardi, and Manzoni.

225. The Italian Lyric. (2) II. Mr. Gianturco
A proseminar on the dominant forms and themes of the Italian lyric with the aim of determining the nature and historical relationships of the principal schools and movements. Emphasis will be upon the period from the Renaissance to the present.

299. Special Study for Graduate Students. (1-4) I and II.
Mr. De Negri (in charge)
Specifically designed for students who wish individually to pursue a special program of study and research not covered by any other course or seminar. Units of credit to be determined by the instructor.

1G. Beginning Italian for Graduate Students. (No credit) I. Mrs. Ross

2G. Advanced Italian for Graduate Students. (No credit) II.

Related Courses
The Literature of the Renaissance in Western Europe (Comparative Literature 151A–151B).
Studies in Renaissance Literature (Comparative Literature 215A–215B).

* Not to be given, 1964–1965.
Letters and Science List. All courses except 131A, 131B, 152, and 181 series. For regulations governing this list, see page 91.

Departmental Major Advisers: Mr. Desmond, Mr. Griffin, Mr. Steffens, Mr. Stewart, Mr. Jacobs.

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 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. In course descriptions, where the words “press” or “journalism” are used, they include newspapers, magazines, radio, television and other mass media of communication, as these media relate to public affairs.

Honors Program. A student accepted in the honors program will elect, in the fall 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 student will present an acceptable term paper.

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.
Lower Division Courses

21. Elementary News Writing. (3) I and II. 
Prerequisite: English 1A–1B or Speech 1A–1B. 
Mr. Jacobs in charge 
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. 
The reporter's functions and responsibilities; interrogation and evaluation of data.

Mr. Griffin, Mr. Steffens 
Lecture and laboratory. Prerequisite: course 21 or the equivalent. Prescribed in the junior year for journalism majors.
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 outlets is required.

140. History of Journalism. (3) I. 
Mr. Stewart 
Development of journalism, particularly in the United States, with an introduction to the important media and personalities.

141. The Press and Society. (3) II. 
Mr. Hulten 

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 and II. 
Mr. Fuchs 
Prerequisite: consent of the instructor. 
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. Steffens 
A survey of significant reporting and comment in the American press.

152. Magazine Article Writing. (3) I and II. 
Mr. Steffens, ——— 
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. Pickerell 
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 information, and the doctrine of privacy.

181. Senior Course in Journalistic Problems.
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. Mr. Steffens. 
(Formerly numbered 180) 
Two hours of lecture and one two-hour laboratory per week.

181J. Newspaper Advertising. (3) I. Mr. Fuchs. 
(Formerly numbered 171.) 
Two hours of lecture and one two-hour laboratory per week.

* Not to be given, 1964–1965.
181K. Problems of Publishing. (3) II. Mr. Jacobs.
(Formerly numbered 170.)
Two hours of lecture and one two-hour laboratory per week.

181L. Reporting of Public Affairs. (3) II. Mr. Jacobs.
(Formerly numbered 184.)
Two hours of lecture and one two-hour laboratory per week.

(3-3) Yr.
190A is not prerequisite to 190B.

190A. Press and World Affairs.
Examination of sources and flow of news throughout the world; influences that affect information reaching people.

190B. Comparative World Journalism.

195. Critical Reviewing for the Press. (3) I.
Mr. Jacobs
Prerequisite: senior standing and consent of the instructor.
Theory and technique of reviewing current literature, drama, film, and the arts. Practice in writing reviews.

196. Theories and Problems in the Conduct of International Information Programs. (3) I.
Mr. Hulten
Prerequisite: senior or graduate standing and consent of the instructor. Governmental efforts at international persuasion.

H198. Senior Honors Program. (2-4) I and II.
Mr. Griffin in charge
Prerequisite: senior standing, a grade-point average of not less than 3, and consent of committee in charge.
Intensive individual or group examination of a topic, 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.

199. Special Study for Advanced Students. (1-4) I and II.
Mr. Griffin
Restricted to senior students majoring in journalism whose total grade-point average is not less than 3 and whose grade-point average in journalism is not less than 3.

Graduate Courses
Prerequisite: courses 21 or 131 and 140. Admission to all graduate courses is at the discretion of the instructor. See also page 165.

201. Research Methods in Journalism. (2) I.
Mr. Fuchs
Required of all candidates for the Master of Journalism degree.

220. The Newspaper and Public Affairs. (2) I and II.
Mr. Jacobs

231. The Press and Its Audience. (2) II.
Mr. Fuchs

240. Seminar in History of Journalism. (2) I.
Mr. Griffin

251. Literature of the Press. (2) II.
Study of journalistic writings, principally contemporary.

263. Public Opinion, Propaganda, and the Mass Media. (2) II.
Mr. Stewart

265. The Law of Communications. (2) II.
Mr. Pickerell
A seminar inquiring into legal controls affecting the press. Case studies.

270. Economic Organization of the Press. (2) I.
A seminar analyzing the business practices and financial structure of the press and its relationship to the community in which it operates. Case studies.

*270. Economic Organization of the Press. (2) I.
A seminar analyzing the business practices and financial structure of the press and its relationship to the community in which it operates. Case studies.

* Not to be given, 1964-1965.
290. Seminar in Comparative World Journalism. (2) I. Mr. Desmond
296. Seminar in International Persuasion. (2) II. Mr. Hulten
Prerequisite: course 196 or consent of instructor.
Use of communication in international relations; examination of propaganda campaigns and techniques.
298. Group Study in Journalism. (2) 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
Marketing (Business Administration 160).
Advertising (Business Administration 163).
The Conduct of American Foreign Relations (Political Science 106).
Concepts in American Foreign Policy (Political Science 128A).
Pressure Groups and Political Power (Political Science 160).
Public Opinion (Political Science 162).
Soviet Propaganda (Political Science 165).
Field Work in Legislative Process (Political Science 400A-400B).
Social Psychology (Psychology 140).
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.
Francis Violich, B.S., Professor of City Planning and of Landscape Architecture (Chairman of the Department).
John W. Gregg, B.S., D.L.A., Professor of Landscape Architecture, Emeritus
Robert D. Raabe, Ph.D., Associate Professor of Landscape Architecture and of Plant Pathology.
R. Burton Litton, M.L.A., Associate Professor of Landscape Architecture.
Robert J. Tetlow, M.S., Associate Professor of Landscape Architecture.
Michael M. Laurie, M.L.A., Assistant Professor of Landscape Architecture.

May K. Arbegast, M.S., Lecturer in Landscape Architecture.
John B. Jackson, A.B., Lecturer in Landscape Architecture.
Tito Patri, B.S., Lecturer in Landscape Architecture.
Robert Royston, B.S., Lecturer in Landscape Architecture.
Geraldine K. Scott, B.S., Lecturer in Landscape Architecture.

Departmental Major Advisers: Mr. Litton, Undergraduate; Mr. Vaughan, Graduate.

1In residence fall semester only, 1964–1965.
Preparation for the Major. For courses required in preparation for the major, see page 85. For further information, consult the Announcement of the College of Environmental Design.

The Major. Required: Landscape Architecture 49 and a minimum of 40 units in landscape architecture, selected with the approval of the major adviser, including courses 1A, 1B, 2, 20, 111A, 111B, 111C, 120, 121, 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
1A–1B. Introduction to Theory and Design. (3–3) Yr.
   (Formerly numbered 1.) Mr. Laurie, Mr. Tetlow
   Lecture and laboratory. Prerequisite: Architecture 1 or equivalent.

2. History and Literature of Landscape Architecture. (2) I.
   Limited to major students in landscape architecture.
   Landscape design through the ages, with emphasis on its relation to climate, topography and society.

11. Delineation. (1) I and II.
   Laboratory. Limited to major students in landscape architecture or in city and regional planning.
   Methods of graphic communication in landscape architecture. May be repeated once for credit.

20. Introduction to Plant Materials and Planting Design. (3) II.
   Lecture, laboratory, and field trips. Prerequisite: general botany. Mrs. Arbegast
   Identification of common trees and shrubs; classification for use in landscape design.

49. Summer Travel and Observation Course. (No credit.) The Staff
   Limited to major students in landscape architecture.
   Six weeks of field trips, study, and analysis of outstanding works in site planning and landscape design.

Upper Division Courses
Architecture 1 and 2, Art 2A, Botany 1, Engineering 21, Landscape Architecture 1A–1B, 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. Laurie and the Staff
   Lecture and laboratory. Prerequisite: advanced standing in architecture, or city and regional planning. Not open to majors in landscape architecture.
   An introduction to the history, theory, and materials of landscape architecture.

111A–111B–111C. Landscape Construction. (3–3–3) 111A: I; 111B: II; 111C: II.
   Mr. Tetlow, Mr. Litton
   Lecture and laboratory.
   Prerequisite: 111A, plane surveying; 111C, course 111B.
   Design, calculations, and graphic solutions to problems involving grading and surfacing; simple structures and materials; irrigation and drainage; specifications and estimates.
120. *Plant Materials and Elementary Planting Design.* (3) I. Mrs. Arbegast
Lecture, laboratory, and field trips. Prerequisite: course 20 or the equivalent.
Reading assignments on ecology and plant geography; identification, graphics of presentation.

121. *Plant Materials and Planting Design.* (3) II. Mrs. Scott
Lecture, laboratory, and field trips. Prerequisite: courses 20 and 120, or equivalent.
Identification, problems in planting design, plans and specifications.

122. *Advanced Planting Design and Plant Materials.* (3) I. Mrs. Scott
Lecture, laboratory, and field trips. Prerequisite: courses 20 and 120, 121, or equivalents.
Planting design problems of complex nature.

130. *Theory and Design.* (3) I. Mr. Litton
Lecture and laboratory.
Problems of limited scope.

131. *Theory and Intermediate Design.* (3) II. Mr. Tetlow, Mr. Laurie
Lecture and laboratory. Prerequisite: course 130, or enrollment in the Department of City and Regional Planning.
Analysis and design with special reference to problems of residential sites and related public use areas.

132A–132B. *Advanced Design and Construction.* (4–4) Yr. Mr. Tetlow, Mr. Patri
Lecture and laboratory. Prerequisite: courses 111A and 131.
Analysis and design of complex site projects; practice in the preparation of working drawings and documents as integral parts of the design process.

134. *Park and Recreation Area Planning.* (4) I. Mr. Vaughan
Lecture, laboratory, seminars, and field trips. Prerequisite: City and Regional Planning 100 or 110.
Principles, standards and procedures in planning and design of areas for park recreation use; laboratory problems.

135. *Site Planning.* (4) II. Mr. Vaughan
Lecture, laboratory, seminars, and field trips. Prerequisite: City and Regional Planning 100 or 110 and advanced standing in architecture or landscape architecture.
Planning and design of large-scale site developments with special reference to the landscape architect's role.

198. *Directed Group Study.* (1–5) I and II. The Staff (Mrs. Scott in charge)
Prerequisite: consent of the instructor.

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 165)

201A–201B. *Graduate Design and Theory.* (1–6; 1–6) Yr. Mr. Vaughan, Mr. Jackson and Staff
Advanced problems and research.

203. *Urban Design and Landscape Architecture.* (3) II. Mr. Royston
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
Prerequisite: graduate standing in landscape architecture or city and regional planning.
LATIN

For courses in the Latin language and literature, see under Department of Classics.

LAW

(Department Office, 225 Law Building)

Richard M. Buxbaum, A.B., LL.B., LL.M., Professor of Law.
*Jerome A. Cohen, A.B., LL.B., Professor of Law.
Rex A. Collings, Jr., M.A., LL.B., Professor of Law.
Ronan E. Degnan, B.S.L., LL.B., Professor of Law.
Bernard L. Diamond, A.B., M.D., Professor of Criminology and of Law.
Albert A. Ehrenzweig, Dr. Jur., J.D., LL.M., J.S.D., Walter Perry Johnson
Professor of Law.
Edward G. Halbach, Jr., A.B., J.D., LL.M., Professor of Law.
John R. Hetland, B.S.L., LL.B., Professor of Law.
Ira M. Heyman, A.B., LL.B., Professor of Law.
John H. Jackson, A.B., J.D., 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.
Herma H. Kay, A.B., J.D., Professor of Law.
Adrian A. Krag, 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, B.S.L., LL.B., Elizabeth Josselyn Boalt Professor of Law.
Frank C. Newman, A.B., LL.B., LL.M., J.S.D., 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 of Criminology.
Preble Stolz, A.B., J.D., Professor of Law.
Justin Sweet, A.B., LL.B., Professor of Law.
Paul W. Tappan, Ph.D., LL.D., J.S.D., Professor of Law and of 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.
William Lloyd Prosser, A.B., LL.B., LL.D., Dr. Jur.h.c., Elizabeth Josselyn
Boalt Professor of Law, Emeritus.

† Called to active service, 1964–1965.
John P. Austin, A.B., LL.B., Lecturer in Law.
Spurgeon Avakian, A.B., LL.B., Lecturer in Law.
Babette B. Barton, B.S., LL.B., Lecturer in Law.
Newell C. Barnett, A.B., LL.B., Lecturer in Law.
Bryant M. Bennett, A.B., LL.B., Lecturer in Law.
Raoul Berger, B.A., LL.M., Visiting Professor of Law.
William H. Brailsford, A.B., LL.B., Lecturer in Law.
Robert L. Bridges, A.B., LL.B., Lecturer in Law.
Valentine Brookes, A.B., LL.B., Lecturer in Law.
Robert H. Cole, A.B., LL.B., Acting Associate Professor of Law.
John W. Cowee, M.B.A., Ph.D., LL.B., Professor of Business Administration.
Rupert G. Crittenden, LL.B., Visiting Lecturer in Law.
William I. Edlund, A.B., LL.B., Lecturer in Law.
A. Barlow Ferguson, A.B., LL.B., Lecturer in Law.
James B. Frankel, B.S., LL.B., Visiting Lecturer in Law.
Charles W. Froelich, Jr., A.B., LL.B., Acting Professor of Law.
Kathryn A. Gehrels, A.B., LL.B., Lecturer in Law.
Dan F. Henke, B.S., M.L., Law Librarian and Lecturer in Law.
Harry R. Horrow, B.A., J.D., Lecturer in Law.
Tevis Jacobs, A.B., J.D., Lecturer in Law.
John Kaplan, A.B., LL.B., Visiting Associate Professor of Law.
George C. Keeler, A.B., LL.B., Visiting Lecturer in Law.
Frank M. Keesling, A.B., LL.B., Lecturer in Law.
Joseph Chanslor Kimble, A.B., LL.B., Lecturer in Law.
Samuel A. Ladar, A.B., J.D., Lecturer in Law.
Dana Latham, A.B., LL.B., Lecturer in Law.
Hans A. Linde, B.A., LL.B., Visiting Associate Professor of Law.
George S. Loquvam, B.S., M.D., Visiting Lecturer in Law.
William D. McKee, B.S., LL.B., Lecturer in Law.
T. Neal McNamara, B.A., J.D., Visiting Lecturer in Law.
John K. McNulty, A.B., LL.B., Acting Associate Professor of Law.
Marc H. Monheimer, A.B., LL.B., Lecturer in Law.
Edward L. Mulliner, B.S., LL.B., Visiting Lecturer in Law.
Robert M. O'Neil, A.M., LL.B., Acting Associate Professor of Law.
David E. Nelson, A.B., LL.B., Visiting Lecturer in Law.
John A. Pettis, Jr., A.B., LL.B., Lecturer in Law.
Martin N. Pulich, A.B., LL.B., Lecturer in Law.
Frank H. Roberts, A.B., J.D., Visiting Lecturer in Law.
James E. Sabine, A.B., LL.B., Lecturer in Law.
Walter G. Schwartz, A.B., LL.B., Lecturer in Law.
Marvin Tepperman, J.D., Lecturer in Law.
David D. Walkley, 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 $390 each semester, which includes the incidental fee of $90 charged all students.

Professional Curriculum

First Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Semester</th>
<th>Instructor(s)</th>
</tr>
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<tbody>
<tr>
<td>200A-200B</td>
<td>Contracts</td>
<td>4-2</td>
<td>Yr.</td>
<td>Mr. Laube, Mr. Sweet</td>
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<tr>
<td>202</td>
<td>Criminal Law and Procedure</td>
<td>3</td>
<td>II.</td>
<td>Mr. Collings, Mr. Sherry, Mr. Tappan</td>
</tr>
<tr>
<td>206A-206B</td>
<td>Pleading and Procedure in Civil Cases</td>
<td>3-3</td>
<td>Yr.</td>
<td>Mr. Degnan, Mr. Louisell, Mr. Stolz</td>
</tr>
<tr>
<td>208A-208B</td>
<td>Property</td>
<td>4-2</td>
<td>Yr.</td>
<td>Mr. Hetland, Mr. Heyman, Mr. Kaplan, Mr. Wilkins</td>
</tr>
<tr>
<td>209</td>
<td>Legislation and Administrative Law</td>
<td>3</td>
<td>II.</td>
<td>Mr. Linde, Mr. Newman, Mr. O'Neil</td>
</tr>
<tr>
<td>212A-212B</td>
<td>Torts</td>
<td>4-2</td>
<td>Yr.</td>
<td>Mr. Cole, Mr. Fleming, Mr. Kaplan</td>
</tr>
<tr>
<td>214A-214B</td>
<td>Introduction to Law</td>
<td>½-½</td>
<td>Yr.</td>
<td>Mr. Stolz and Law Associates</td>
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Second Year

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<tr>
<th>Course Code</th>
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<th>Instructor(s)</th>
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<td>220</td>
<td>Administrative Law</td>
<td>3</td>
<td>II.</td>
<td>Mr. Berger, Mr. O'Neil</td>
</tr>
<tr>
<td>222</td>
<td>Business Associations; Corporations</td>
<td>4</td>
<td>I.</td>
<td>Mr. Buxbaum</td>
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<tr>
<td>222A-222B</td>
<td>Business Associations; Corporations</td>
<td>4-2</td>
<td>Yr.</td>
<td>Mr. Jennings</td>
</tr>
<tr>
<td>224A-224B</td>
<td>Constitutional Law</td>
<td>2-2</td>
<td>Yr.</td>
<td>Mr. Cole, Mr. Linde, Mr. O'Neil</td>
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<tr>
<td>228</td>
<td>Legal Accounting</td>
<td>2</td>
<td>I.</td>
<td></td>
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<tr>
<td>230</td>
<td>Marital Property</td>
<td>2</td>
<td>I and II</td>
<td>Mrs. Armstrong, Mr. Collings, Mrs. Kay</td>
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<tr>
<td>232</td>
<td>Security Transactions</td>
<td>2</td>
<td>I.</td>
<td>Mr. Hetland, Mr. Riesenfeld</td>
</tr>
<tr>
<td>234A-234B</td>
<td>Estates and Trusts</td>
<td>2-2</td>
<td>Yr.</td>
<td>Mrs. Barton, Mr. Froehlich, Mr. Halbach</td>
</tr>
<tr>
<td>237A</td>
<td>Income Taxation I</td>
<td>3</td>
<td>I.</td>
<td>Mr. Froehlich, Mr. Kragen</td>
</tr>
<tr>
<td>237B</td>
<td>Income Taxation II</td>
<td>2</td>
<td>II.</td>
<td>Mr. Froehlich, Mr. Kragen</td>
</tr>
<tr>
<td>238</td>
<td>Justice and Correctional Administration</td>
<td></td>
<td>I.</td>
<td>Mr. Tappan</td>
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</table>
### Third Year

<table>
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<th>Course Number</th>
<th>Course Title</th>
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<th>Instructor(s)</th>
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</thead>
<tbody>
<tr>
<td>240</td>
<td>Advanced Administrative Law</td>
<td>(2) II</td>
<td>Mr. Buxbaum</td>
</tr>
<tr>
<td>241</td>
<td>International Business Transactions</td>
<td>(2) II</td>
<td>Mr. Riesenfeld</td>
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<tr>
<td>242</td>
<td>International and Maritime Law</td>
<td>(2) I</td>
<td>Mr. Riesenfeld</td>
</tr>
<tr>
<td>243</td>
<td>Bills and Notes</td>
<td>(2) I</td>
<td></td>
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<tr>
<td>244</td>
<td>Creditors’ Remedies</td>
<td>(3) II</td>
<td>Mr. Riesenfeld</td>
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<tr>
<td>245</td>
<td>Comparative Jurisprudence</td>
<td>(2) I</td>
<td>Mr. Ehrenzweig</td>
</tr>
<tr>
<td>246</td>
<td>Conflict of Laws</td>
<td>(3) I and II</td>
<td>Mr. Ehrenzweig, Mrs. Kay</td>
</tr>
<tr>
<td>247</td>
<td>Securities Regulation</td>
<td>(2) I</td>
<td>Mr. Jennings</td>
</tr>
<tr>
<td>248</td>
<td>Selected Problems in Business Planning</td>
<td>(2) II</td>
<td>Mr. Jennings</td>
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<tr>
<td>249A</td>
<td>Sales</td>
<td>(2) I</td>
<td>Mr. Laube</td>
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<tr>
<td>249B</td>
<td>Sales</td>
<td>(3) II</td>
<td>Mr. Laube</td>
</tr>
<tr>
<td>250</td>
<td>Evidence</td>
<td>(2) I</td>
<td>Mr. Degnan</td>
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<tr>
<td>250A-250B</td>
<td>Evidence</td>
<td>(2–2) Yr</td>
<td>Mr. Louisell, Mr. Sherry</td>
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<tr>
<td>251</td>
<td>Jurisprudence</td>
<td>(2) II</td>
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<tr>
<td>252</td>
<td>Selected Problems in Constitutional Law</td>
<td>(2) I</td>
<td></td>
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<tr>
<td>253</td>
<td>Family Law</td>
<td>(2) I</td>
<td>Mrs. Kay</td>
</tr>
<tr>
<td>254</td>
<td>Federal Jurisdiction</td>
<td>(2) II</td>
<td></td>
</tr>
<tr>
<td>255</td>
<td>Political Institutions and Law in the Communist World</td>
<td>(2) II</td>
<td>Mr. Ehrenzweig, Mr. Cowee</td>
</tr>
<tr>
<td>256</td>
<td>Land Development and Security</td>
<td>(2) II</td>
<td>Mr. Hetland</td>
</tr>
<tr>
<td>257</td>
<td>Insurance</td>
<td>(2) II</td>
<td>Mr. Ehrenzweig, Mr. Cowee</td>
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<tr>
<td>258</td>
<td>Law and International Organization</td>
<td>(2) I</td>
<td>Mr. Linde</td>
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<tr>
<td>259</td>
<td>International Conflict of Law</td>
<td>(2) II</td>
<td>Mr. Ehrenzweig</td>
</tr>
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<td>260</td>
<td>Land Use Planning</td>
<td>(2) II</td>
<td>Mr. Heyman</td>
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<td>261</td>
<td>Selected Problems in Marital Property and Family Law</td>
<td>(2) II</td>
<td>Mrs. Kay</td>
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<td>262</td>
<td>Labor Law</td>
<td>(3) I</td>
<td>Mr. Kagel</td>
</tr>
<tr>
<td>263</td>
<td>Negotiation, Conciliation, Arbitration</td>
<td>(2) II</td>
<td>Mr. Kagel</td>
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<td>264</td>
<td>Modern Social Legislation</td>
<td>(2) II</td>
<td>Mrs. Armstrong</td>
</tr>
<tr>
<td>265</td>
<td>Court Administration</td>
<td>(2) I</td>
<td>Mr. Stolz</td>
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<td>266</td>
<td>Legislation</td>
<td>(2) I</td>
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<td>267</td>
<td>Law and Anthropology</td>
<td>(2) II</td>
<td>Mrs. Schreter</td>
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</tbody>
</table>

*Not to be given, 1964–1965.*
268. State and Local Government Law. (2) I. Mr. Sato
269. State and Local Taxation. (2) II. Mr. Sato
270. Government Control of Business. (2) I. Mr. Riesenfeld
271. Trial Practice. (2) I. Mr. Hetland
272. Antitrust Law. (2) II. Mr. Buxbaum
273. Criminal Procedure and Practice. (2) II. Mr. Sherry
274. Restitution. (2) II.
275. Selected Problems in Contracts. (2) II. Mr. Sweet
276. Copyright and Unfair Competition. (2) II. Mr. Fleming
277. Advanced Study in Criminal Law. (2) I. Mr. Collings
278. Selected Problems in Criminal Law and Administration. (2) I.

279. Natural Resources Law. (2) II. Mr. Sato
280. Oil and Gas Law. (2) I. Mr. Sato
281. Estate Planning and Taxation. (3) I. Mr. Halbach
282. Estate and Gift Taxation. (2) II.
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**

Mr. Newman, Mr. Riesenfeld

286A–286B. Seminar in Business Associations. (2–2) Yr.
Mr. Buxbaum, Mr. Jennings

287A–287B. Seminar in Commercial Transactions. (2–2) Yr.
Mr. Fleming, Mr. Laube, Mr. Riesenfeld, Mr. Sweet

288A–288B. Seminar in Constitutional Law. (2–2) Yr.
Mr. Cole, Mr. Heyman

289A–289B. Seminar in Criminal Law and Procedure. (2–2) Yr.
Mr. Collings, Mr. Sherry

290A–290B. Seminar in International and Maritime Law. (2–2) Yr.
Mr. Buxbaum, 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. Newman

295A–295B. Seminar in Practice and Procedure. (2–2) Yr.        Mr. Louisell

296A–296B. Seminar in Property and Trust Administration. (2–2) Yr.
   Mr. Halbach, Mr. Hetland, Mr. Heyman, Mrs. Kay

297A–297B. Seminar in Public Finance and Taxation. (2–2) Yr.
   Mrs. Barton, Mr. Kragen, 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. Degnan 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.

Raynard C. Swank, Ph.D., Professor of Librarianship (Chairman of the Department).

Edward A. Wight, Ph.D., Professor of Librarianship.

Ray E. Held, Ph.D., Associate Professor of Librarianship.

* Anne E. Markley, M.A., Associate Professor of Librarianship.

Fredric J. Mosher, Ph.D., Associate Professor of Librarianship.

Robert D. Harlan, Ph.D., Assistant Professor of Librarianship.

Charles P. Bourne, B.S.E.E., Lecturer in Librarianship.

Mae J. Durham, B.L.S., Lecturer in Librarianship.

Grete W. Fruge, Certificate in Librarianship, Lecturer in Librarianship.

Russell Shank, M.B.A., 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.

**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 are required for admission. German and French are particularly recommended. 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 must do so not later than the semester prior to entrance.

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.

**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. 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.

The Master of Library Science degree (M.L.S.) is conferred upon students who complete a 28-unit program with an average grade of B. Twenty-two units must be taken in librarianship in required courses; 6 additional units may be elected in librarianship, or in upper division or graduate courses in other departments, provided they are approved by the Dean as being acceptable to the individual's complete program of instruction.

**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.

201. Introduction to Cataloguing and Classification. (4) I and II.

Miss Markley, Mrs. Fruge

Four hours of lecture and eight hours laboratory per week.

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.
Mr. Mosher, Mr. Held, Mr. Harlan  
Basic reference materials including national and trade bibliography.  
Lectures, discussions, and reports on assigned problems.

203. Introduction to Librarianship. (2) I and II.  
Mr. Swank  
Introductory survey of the evolution of libraries and basic information about the principal fields of library service, with emphasis on major trends and problems. Readings and written reports.

204. Selection and Acquisition of Library Materials. (2) I and II. 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) I and 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) I and 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, University, and Special Library Administration. (2) I and II.  
Mr. Swank  
A general introduction to the organization and administration of college, university, and special libraries and their place in the institutions of which they are a part. Problems and practices of library's government, functions, staff, collections, finances, and buildings.

209. Library Work with Children. (2) I and II.  
Mrs. Durham  
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.

210. Analysis of Imaginative Literature for Children. (2) I and II.  
Prerequisite: Anthropology 121, or Classics 178, or equivalent.  
Mrs. Durham  
Historical development and critical analysis of folklore, legends, myths, and modern imaginative literature; their role in the library program for children and young adults.

211. Development of the Book. (2) I and II.  
Mr. Mosher  
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) I and II.  
Mr. Held, Mr. Mosher, Mr. Harlan  
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 Cataloging and Classification. (2) I and II.  
Miss Markley, Mrs. Frugé

Two hours of lecture and four hours of laboratory per week. 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) I.  
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. Shank

Scientific and technical literature with emphasis on reference and bibliographical aids. Periodical and serial literature and its use and control through abstracts and indexes.

218. Advanced Cataloging. (2) I or II.  
Miss Markley

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.  
Miss Markley

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.  
Miss Markley

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 Markley

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. Danton

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. II. Mr. Held.

226. History of Printing. (2)  
Mr. Mosher

Prerequisite: course 211 or the equivalent.

226A. Origins of Printing and Publishing in Europe. II.

226B. History of Books and Printing from the Sixteenth Century. II.

226C. History of Printing and Publishing in the United States. II.

Note: Either 226A or 226B or 226C will be given during the spring semester.
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.

230. Library Administration. (2) I.  
Mr. Wight  
Prerequisite: course 203, and 206, 207 or 208.  
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) I.  
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) II.  
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.

239. Library in the Community. (2) II.  
Mr. Wight  
Principles of library organization, administration, collection building, and evaluation of the public junior college library. Theory and examination of current practice through intensive survey of actual operation.

240. Content Analysis. (2) I.  
Mr. Merritt  
Problems in methods of determining maturity level, social and moral attitudes, and other educational and propagandistic assumptions in materials of communication.

245. Introduction to Documentation. (2) I and II.  
Mr. Bourne  
Prerequisite: courses 201, 202, 203.  
Survey of activities performed by documentation centers in the production, acquisition, organization, servicing, and dissemination of technical reports. Introduction to various systems and devices for the storage and retrieval of information.

251. Methods of Research in Librarianship. (2) I and II.  
Mr. Wight in charge  
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 development and investigation of library problems. Required of all candidates for the doctor's degree.

260. Seminar in Comparative Librarianship. (2) I.  
Mr. Danton  
Library development in the Western World—underlying social and political causes.

265. Seminar in Library Education. (2) II.  
Mr. Danton  
Origins, development and effects of education for librarianship in Europe and the United States.

* Not to be given, 1964-1965.

* Either 228 or 233 or 240 will be given during the fall semester.
299. Special Study. (1–8) I and II.
   The Staff (Mr. Swank in charge)
   Individual direction of student’s selection, planning and writing of a dissertation. This course must be taken for a total, in all semesters, of 4 units or more.

**LINGUISTICS**

(Departmental 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.*
David W. Reed, Ph.D., *Professor of Linguistics and of English.*
Wallace L. Chafe, Ph.D., *Associate Professor of Linguistics.*
John J. Gumperz, Ph.D., *Associate Professor of Linguistics and South Asian Languages.*
William F. Shipley, Ph.D., *Associate Professor of Linguistics.*
Harvey Pitkin, Ph.D., *Assistant Professor of Linguistics.*
Jesse O. Sawyer, Ph.D., *Assistant Professor of Linguistics and Director, Language Laboratory.*

*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 91.

*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; 29 units of upper division courses in linguistics and allied fields. Twenty-three units of this last requirement are to consist of the following courses without substitution: Linguistics 100, 120, 130, 140, 145, 150; Sanskrit 190A–190B. The remaining 6 units (two courses) must be selected from among the following: Linguistics 170; Anthropology 120; English 110, 131; German 140. Recommended: Anthropology 2A–2B, Linguistics 35.

**Honors Program.** A candidate for honors with the bachelor’s degree will elect, in each semester of the senior year, Linguistics H195 for 2 or more 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.

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* In residence spring semester only, 1964–1965.
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, Tamil, Telugu, Turkish, Urdu), Oriental Languages (Cantonese, Classical Chinese, Indonesian/Malay, Japanese, Korean, Mandarin, Mongolian, Old Turkish, 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, Hungarian), Spanish and Portuguese (Spanish, Portuguese, Old Spanish). See also list of Related Courses in Other Departments, page 422.

**Lower Division Course**

35. Language and Linguistics. (3) I and II. Mr. Shipley

Three lectures and one section meeting per week.
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. The languages of the world and their relationships.

**Upper Division Courses**

100. Elementary Phonology and Grammar. (3) I and II. Mr. Chafe

Three lectures and one section meeting per week.
Prerequisite: upper division status or with consent of the instructor.

120. Principles of Historical and Comparative Linguistics. (2) I. Mr. Chrétien

Prerequisite: upper division status or consent of the instructor.

130. Phonetics and Phonemics. (3) I and II. Mr. Shipley

Three lectures and one section meeting per week.
Prerequisite: course 100 or equivalent.

140. Grammatical Analysis. (3) I and II. Mr. Pitkin

Prerequisite: course 100 or equivalent.

145. Types of Linguistic Structure; a Survey of Selected Languages. (3) I. Mr. Chafe

Prerequisite: course 100 or equivalent.

150. Introduction to Indo-European Comparative Grammar. (3) I. Mr. Emeneau

Prerequisite: course 100 and 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.

170. American Indian Languages. (3) II.

Prerequisite: course 100 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. The Staff

Restricted to senior honor students.
Graduate Courses

(Concerning conditions for admission to graduate courses, see page 165)

205. Advanced Phonology. (2) I. Mr. Chafe
Prerequisite: course 130.
Phonological theory and practice, with reference to examples from selected languages.

210. Advanced Grammar. (2) II. Mr. Chafe
Prerequisite: course 140.
Problems and applications of grammatical theory with examples from selected languages.

215. Computational Linguistics. (2) II. Mr. Chafe
Prerequisite: consent of instructor.
The use of electronic computers in linguistics.

216. Dialectology. (2) I. Mr. Gumperz
Prerequisite: course 100, 130, and a reading knowledge of French or German or one other Modern European language.

218. History of Linguistics. (2) II.
Prerequisite: consent of instructor.

220A-220B. Linguistic Field Methods. (3–3) Yr. Mr. Pitkin
Open to qualified language students and students of anthropology who have had course 130 and 140. (Course 140 may be taken concurrently with 220A.) May be repeated without duplication of credit with consent of instructor.

225. Modern Linguistic Theory. (2) I. Mr. Shipley
Prerequisite: consent of instructor.
Topics will be chosen each semester from among the following: Sapir and anthropological linguistics, Bloomfield and his followers, British theoreticians, European theoreticians, American developments of the last decade.

230A-230B. Advanced Historical and Comparative Linguistics. (2–2) Yr.
Prerequisites: courses 130, 140, and 150, or equivalents.
Theory and method in the study of language change, reconstruction, and related topics.

271. Acoustic Phonetics. (2) II. Mr. Sawyer
Prerequisite: course 130 or its equivalent.

290. Seminar. (2) I and II.
Prerequisite: consent of instructor.
Students may receive credit for more than one seminar. May be repeated without duplication of credit with consent of instructor.
(a) Descriptive Linguistics, ——; (b) Historical Linguistics, ——; (c) Applications of Linguistics, ——; (d) Statistical Linguistics, Mr. Chrétien; (e) Ethno-Linguistics, ——; (g) Problems in Field Linguistics, Mr. Pitkin; (h) Linguistics of India, Mr. Emeau; (i) Pacific Linguistics, Mr. Chrétien; (j) Communication Science, ——.

298. Special Study. (1–6) I and II.

299. Directed Research. (1–6) I and II.

Related Courses in Other Departments
Language and Culture (Anthropology 120).
Language (English 25).
The English Language (English 110).
Introduction to Descriptive German Grammar (German 140).
Germanic Linguistics (German 260).
Linguistic Structures of South Asian Languages (Near Eastern Languages 193).
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).
Romance Dialect Geography (Romance Philology 205).
Comparative Slavic Linguistics (Slavic Languages and Literatures 220).

Logic and the Methodology of Science

(Official Office, 247 Campbell Hall)

Ernest W. Adams, Ph.D., Associate Professor of Philosophy.
John W. Addison Jr., Ph.D., Associate Professor of Mathematics (Chairman of the Group).
David Blackwell, Ph.D., Professor of Statistics.
Yuen Ren Chao, Ph.D., Litt.D., Agassiz Professor of Oriental Languages and Literature, Emeritus.
William Craig, Ph.D., Professor of Philosophy.
Leon A. Henkin, Ph.D., Professor of Mathematics.
Benson Mates, Ph.D., Professor of Philosophy.
Raphael M. Robinson, Ph.D., Professor of Mathematics.
Alfred Tarski, Ph.D., Professor of Mathematics.
Robert L. Vaught, Ph.D., Professor of Mathematics.

The Group in Logic and the Methodology of Science administers a graduate program in this field leading to the Ph.D. degree.

Graduate Adviser: Mr. Adams.

Preparation. For admission to the graduate program the student shall have completed an undergraduate major in philosophy or in mathematics or a joint major in both, including at least one full year upper division (that is junior-senior level) course in logic. In addition, he shall have completed (a) at least one upper division course in some science, and (b) at least one full year upper division course in mathematics (other than logic) if his undergraduate major was philosophy, or in philosophy (other than logic) if his undergraduate major was mathematics. Exceptions to these requirements are permitted only at the discretion of the graduate adviser.

Further Information. Further information about the program, including a statement of the requirements for advancement to candidacy, is given in the Announcement of the Group in Logic and the Methodology of Science, which is available upon request from the Group Office.
Courses

Courses are chosen with the advice of the graduate adviser from among the offerings of the various departments of the University. In addition to the Departments of Mathematics and Philosophy, attention is especially directed to courses in the various science departments, in statistics, and in linguistics.

Logic Colloquium. (No Credit) I and II.

The Staff

Reports on current research and scholarly work by members of the staff, visitors, and graduate students.

MATHEMATICS

(Department Office, 301 Campbell Hall)

William G. Bade, Ph.D., Professor of Mathematics (Vice-Chairman of the Department).

†Errett A. Bishop, Ph.D., Professor of Mathematics.

Paul L. Chambré, Ph.D., Professor of Mathematics and of Nuclear Engineering.

Shing-Shen Chern, D.Sc., Professor of Mathematics.

Heins O. Cordes, Ph.D., Professor of Mathematics.

René J. De Vogelaere, Ph.D., Professor of Mathematics.

Stephen P. Diliberto, Ph.D., Professor of Mathematics.

István Fáry, Ph.D., Professor of Mathematics.

Jacob Feldman, Ph.D., Professor of Mathematics.

Alfred L. Foster, Ph.D., Professor of Mathematics.

Bernard Friedman, Ph.D., Professor of Mathematics.

†Henry Helson, Ph.D., Professor of Mathematics.

Leon A. Henkin, Ph.D., Professor of Mathematics.

Morris W. Hirsch, Ph.D., Professor of Mathematics.

Gerhard P. Hochschild, Ph.D., Professor of Mathematics.

Harry D. Huskey, Ph.D., Professor of Mathematics and of 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 of Statistics.

Charles B. Morrey, Jr., Ph.D., Professor of Mathematics (Vice-Chairman of the Department).

Anthony P. Morse, Ph.D., Professor of Mathematics.

Edmund Pinney, Ph.D., Professor of Mathematics.

Murray H. Protter, Ph.D., Professor of Mathematics (Chairman of the Department).

1 In residence fall semester only, 1964–1965.
2 In residence spring semester only, 1964–1965.
Raphael M. Robinson, Ph.D., Professor of Mathematics.
Maxwell A. Rosenlicht, Ph.D., Professor of Mathematics.
Abraham Seidenberg, Ph.D., Professor of Mathematics.
Stephen Smale, Ph.D., Professor of Mathematics.
Edwin H. Spanier, Ph.D., Professor of Mathematics.
Alfred Tarski, Ph.D., Professor of Mathematics.
Abraham H. Taub, Ph.D., Professor of Mathematics and Director of the Computer Center.

P. Emery Thomas, Ph.D., Professor of Mathematics (Vice-Chairman of the Department).
Robert L. Vaught, Ph.D., Professor of Mathematics.
František 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.
Raymond H. Sciobereti, Ph.D., Associate Professor of Mathematics, Emeritus.
Pauline Sperry, Ph.D., Associate Professor of Mathematics, Emeritus.
John W. Addison, Jr., Ph.D., Associate Professor of Mathematics.
Hans J. Bremermann, Ph.D., Associate Professor of Mathematics.
Lester E. Dubins, Ph.D., Associate Professor of Mathematics and of Statistics.

Shoshichi Kobayashi, Ph.D., Associate Professor of Mathematics.
Antoni A. Kosinski, Ph.D., Associate Professor of Mathematics.
*R. Sherman Lehman, Ph.D., Associate Professor of Mathematics.
Joseph Q. Wolf, Ph.D., Associate Professor of Mathematics.
Glen E. Bredon, Ph.D., Assistant Professor of Mathematics.
Robert B. Brown, Ph.D., Assistant Professor of Mathematics.

P. Nicholas Burgoyne, Ph.D., Assistant Professor of Mathematics.
Richard M. Dudley, Ph.D., Assistant Professor of Mathematics.
Herbert B. Enderton, Ph.D., Assistant Professor of Mathematics.
Paul Fong, Ph.D., Assistant Professor of Mathematics.
Phillip A. Griffiths, Ph.D., Assistant Professor of Mathematics.
Antoni A. Kosinski, Ph.D., Assistant Professor of Mathematics.
Bernard R. Kripke, Ph.D., Assistant Professor of Mathematics.
Jerome P. Levine, Ph.D., Assistant Professor of Mathematics.
*Calvin C. Moore, Ph.D., Assistant Professor of Mathematics.
Andrew P. Ogg, Ph.D., Assistant Professor of Mathematics.
John L. Rhodes, Ph.D., Assistant Professor of Mathematics.
Donald E. Sarason, Ph.D., Assistant Professor of Mathematics.
Eliahu Shamir, Ph.D., Assistant Professor of Mathematics.
Marvin Shinbrot, Ph.D., Assistant Professor of Mathematics.
Joseph A. Wolf, Ph.D., Assistant Professor of Mathematics.
William W. Adams, A.B., Instructor in Mathematics.
Dan Amir, Ph.D., Instructor in Mathematics.

1 In residence fall semester only, 1964–1965.
2 In residence spring semester only, 1964–1965.
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 91.

Departmental Major Advisers: See departmental office.

The Major in Mathematics. The major in mathematics consists of Mathematics 1A–1B, 2A–2B, 104, 113A, 135A or 185, 130A or 140, and 12 additional units of upper division mathematics. Courses 111, 120A–120B, 190A–190B are not acceptable for the major in mathematics.

Mathematics 105 is a desirable part of the major program. 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 12 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 not more than 6 units of theoretical courses in astronomy, physics, statistics, or other sciences as part of his major in mathematics.

Mathematics majors who expect to work in digital computing or to undertake further study in computer sciences are advised to take Mathematics 113B, 128A, 128B, 128C, 128D, and both 135A and 185. Statistics 112 and 113 are especially recommended, as are Electrical Engineering 151A and 151B.

**The Major in Mathematics for teachers.** 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 required for the secondary teaching credential. No education courses are required for graduation.

The major in mathematics for teachers consists of Mathematics 1A–1B, 2A–2B, Philosophy 12, 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 Program.** In addition to completing the established requirements for the major, 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.

**1A–1B. Calculus with Analytic Geometry, First Course.** (4–4) Yr. 
Beginning each semester. Mr. Diliberto, Mr. Dubins, Mr. Robinson, Mr. Rosenlicht, Mr. Spanier

Prerequisite: two years of high school algebra, plane geometry, plane trigonometry. Beginning calculus for mathematics majors, most physical science students, and others who wish to continue with mathematics.

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.)

**H1A–H1B. Calculus with Analytic Geometry, First Course.** (4–4) Yr. (Formerly numbered 1C–1D.) Mr. Henkin

Prerequisite: two years of high school algebra, plane geometry, plane trigonometry. 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 honors candidates.

**2A–2B. Calculus with Analytic Geometry, Second Course.** (4–4) Yr.
Beginning each semester. Mr. Kosinski, Mr. Morse, Mr. Ogg, Mr. Shinbrot, Mr. F. Wolf
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, all of 4B and two-thirds of 119 and 122.)

H2A-H2B. Calculus with Analytic Geometry, Second Course. (4-4) Yr.

Prerequisite: course H1A-H1B or 1A-1B and permission of instructor. Mr. Morrey Honors course, corresponding to 2A-2B, for able students with strong mathematical background and interest. Emphasis on theory, rigor, and hard problems. Recommended as preparation for the major, particularly for honors candidates.

3A-3B. Calculus with Analytic Geometry, First Course. (3-3) Yr.

Beginning each semester.

Prerequisite: two years of high school algebra, plane geometry, plane trigonometry. Students may not receive credit for 3A after having completed 3B or 16A-16B. 3A-3B covers the first 6 units of 1A-1B.

Elements of analytic geometry, introduction to differential and integral calculus, with applications.

4. Calculus with Analytic Geometry, Second Course. (3) I and II. Mr. Pugh

(Formerly numbered 4A.)

Prerequisite: course 3B. Course 4 can be followed by 2A for 3 units credit.

Continuation of differential and integral calculus with application to hyperbolic functions, polar coordinates, solid analytic geometry and vectors.

5. Mathematics for Liberal Arts Students. (3) I and II. Mr. Kripke, Mr. Lund

Not open to students who have had 1A, 3A or 16A.

Conceptions of modern mathematics for students who have no technical background. The content varies among the following topics: algebra, geometry, set theory, logic, number theory, statistics, mathematical methods in science.

6. Computers and Data Processing. (3) I.

An introductory course on automation of data processing structure of simple computers and its application to automatic control and pattern recognition. Algorithmic languages and translation to computers and their use in problem solving.

Logic (Philosophy 12.)

This course, given in the Department of Philosophy, may be used as a prerequisite to course 125A-125B and is recommended for students taking 135A.

16A-16B. Analytic Geometry and Calculus. (3-3) Yr.

Mr. Bredon

16A. I and II.

Prerequisite: two years of high school algebra; plane geometry, plane trigonometry. 16A-16B is a terminal course for students who do not plan to take further work in mathematics. Students may not receive credit for 16A taken concurrently with or following 1A or 3A, nor for 16B taken concurrently with or following 1B or 3B. Students may not remove deficiencies in 1A or 3A by taking 16A, nor in 3B by taking 16B.

16A. Elements of analytic geometry and calculus.

16B. Continuation of calculus, vectors, and matrices.

Upper Division Courses

104. Introductory Analysis. (3) I and II.

Mr. Freedman, Mr. Gray, Mr. Kupka, Mr. Lewis, Mr. Newberger, Mr. Pugh, Mr. Robinson, Mr. Rothenberg, Mr. Warner, Mr. Whitman

Prerequisite: course 2B or 14B or consent of instructor.

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. Introduction to Real Variables. (3) I and II.

Prerequisite: course 104.

111. Introduction to Abstract Algebra. (3) I and II.

Prerequisite: course 104.

112. Discrete Mathematics. (3) I and II.

Prerequisite: course 104.

113. Linear Algebra. (3) I and II.

Prerequisite: course 104.

115A-115B. Calculus for Scientists. (4-4) Yr.

Lower Division Courses

Mr. Pugh

117. Advanced Calculus. (3) I and II.

Prerequisite: courses 16A-16B.

An upper division course for students who have completed a year of science and who plan to take advanced courses in mathematics.

118. Advanced Calculus. (3) I and II.

Prerequisite: courses 16A-16B.

An upper division course for students who have completed a year of science and who plan to take advanced courses in mathematics.

120A-120B. Advanced Calculus. (4-4) Yr.

Prerequisite: course 118.

122A-122B. Advanced Calculus. (4-4) Yr.

Prerequisite: course 118.

* Not open to students who have completed courses 104 or 105.
105. Integration. (3) I and II.
Mr. Argabright, Mr. Shamir
Prerequisite: course 104.
Functions of bounded variation, Riemann-Stieltjes integration, measure theory, Lebesgue-Stieltjes integration, Fubini and Radon-Nikodym theorems.

111. Introduction to Linear Algebra. (3) I and II.
Mr. Kahn, Mr. Kanno, Mr. Mochizuki
Prerequisite: course 2A. For students in engineering, physical sciences, social sciences, statistics.
Vector spaces, linear transformations, matrices, characteristic values, quadratic forms.

112. Linear Geometry. (3) II.
The Staff
Prerequisite: course 1B.
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.

Discrete Probability (Statistics 112). (3) I and II.

Introduction to the Theory of Statistics (Statistics 113). (3) II.

113A. Abstract Algebra. (3) I and II. Mr. Faudree, Mr. Kupka, Mr. Lehmer,
Mr. Levine, Mr. Lewis, Mr. Mochizuki, Mr. Rhodes, Mr. Shikata
Prerequisite: course 2A or 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.

113B. Linear Algebra. (3) I and II. Mr. Barnes, Mr. McConnel, Mr. Nagano
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.

115A-115B. The Theory of Numbers. (3-3) Yr. Mr. Kobayashi, Mr. Niven
Prerequisite: one year of calculus.
Divisibility, congruences, theory of prime numbers, Diophantine analysis, partitions.

117. Analysis of Mathematical Problems. (3) I.
Mr. Griffiths
Prerequisite: upper division standing in mathematics and consent of 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.

118. Analysis of Mathematical Problems. (3) II.
The Staff
Prerequisite: upper division standing in mathematics and consent of 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.

120A-120B. Advanced Calculus for the Applied Sciences. (3-3) Yr.
Beginning each semester. Mr. Argabright, Mr. Chambre, Mr. Concus,
Mr. Davis, Mr. Meng, Mr. Newberger, Mr. Pinney, Mr. Whitman
Prerequisite: course 14B or 2B. Primarily for students in the physical sciences. One unit of credit is given for 120B taken after 185.

120A. Boundary value problems and orthogonal functions. Laplace transforms.
120B. Partial differential equations of mathematical physics. Functions of a complex variable.

* Not to be given, 1964–1965.
123. Ordinary Differential Equations. (3) I. Mr. Shinbrot
Prerequisite: courses 104, 185 (may be taken concurrently). Some background in Linear Algebra is recommended.
Existence and uniqueness of solutions; linear systems. Other topics selected from: boundary value problems, analytic systems, autonomous systems, Sturm-Liouville theory.

125A–125B. Mathematical Logic. (3–3) Yr. Mr. Addison, Mr. Enderton, Mr. Rowbottom
Prerequisite: one year of calculus or Philosophy 12 or consent of instructor.

126. Introduction to Partial Differential Equations. (3) I. Mr. Protter
Prerequisite: course 104. This course will emphasize theory and should serve as a preparation for Mathematics 222A–222B.

128A. Numerical Analysis. (3) I and II. Mr. Baker, Mr. Kripke, Mr. Lehmer
Prerequisite: courses 2A–2B, or 4A–4B and 119, or 14B.
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) II. The Staff
Prerequisite: courses 2A or 4A–4B, 111 or 113B, 119. 128A is not prerequisite for 128B.

128C. Laboratory for Numerical Analysis. (2) I.
Prerequisite: may be taken only in conjunction with course 128A.

128D. Laboratory for Numerical Analysis. (2) II.
Prerequisite: may be taken only in conjunction with course 128B.

130A–130B. Projective Geometry. (3–3) Yr.
130A. I and II. Mr. Adams, Mr. Brown, Mr. Greenleaf, Mr. Nagano
Prerequisite: course 2A.

131. Algebraic Curves. (3) I. Mr. Seidenberg
Prerequisite: course 130A, 113A, or consent of instructor.

135A. I and II. Mr. Enderton, Mr. Niven, Mr. Rowbottom, Mr. Vaught
Prerequisite: one year of calculus or consent of the instructor. Recommended: Philosophy 12.
135A. Arithmetic of natural numbers based on Peano's axioms. Inductive proofs and recursive definitions. Extension to the integers, rational numbers, and real numbers. Various characterizations of the field of real numbers.

140. Metric Differential Geometry. (3) I and II.  
Mr. Fong, Mr. J. Wolf  
Prerequisite: course 104 or consent of instructor.  
Frenet formulas for curves; first and second fundamental forms of a surface, principal curvatures, geometry on a surface; some global theorems on curves and surfaces.

145. Theory of Boolean Algebras. (3) II.  
The Staff  
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.  
The Staff

160. History of Mathematics. (3) II.  
The Staff  
Prerequisite: courses 2B and 113A.  
History of algebra, geometry, analytic geometry, and calculus from ancient times through the seventeenth century and selected topics from more recent mathematical history. Recommended for the teaching major.

175. Calculus of Variations. (3) II.  
The Staff  
Prerequisite: course 104.  
Euler equations for variational problems; problems of mathematical physics; application of direct methods; Hamilton-Jacobi theory.

185. Introduction to the Theory of Functions of a Complex Variable.  
(3) I and II.  
Mr. Amir, Mr. Bierstedt, Mr. Bungart, Mr. Gilbert, Mr. Gray, Mr. Karush, Mr. Kato, Mr. Rieffel, Mr. Sarason, Mr. Schumitzky  
Prerequisite: course 2B or 14B or 122. Special sections will be arranged for students who have completed course 104.  

188. Mathematical Models in Physics and Engineering. (3) II.  
Mr. Friedman  
Prerequisite: course 104, 113A, 113B, 185, or consent of instructor. Designed primarily for mathematics majors with little or no background in physical sciences.

Study of the relationship between such mathematical concepts as discrete and continuous spectra, resolvents of linear operators, group invariance and some of the physical concepts which arise in the study of dynamical systems and wave propagation.

190A–190B. Survey of Algebra and Analysis. (3–3) Yr.  
Mr. Fong  
For upper division and graduate students in social sciences. Not to be taken in place of 1A–1B.  
The first semester covers analytic geometry, calculus, and partial differentiation. The second semester includes difference equations, matrices, and selected topics related to current literature in social science.

199. Special Study for Advanced Undergraduates. (1–5) I and II.  
The Staff  
Investigation of special problems under the direction of members of the department. In particular, this course offers an opportunity to students with facility in mathematics to anticipate some of the advanced courses by individual study. Restricted to senior honor students.
Graduate Courses

(Concerning conditions for admission to graduate courses, see page 165)

202. Foundations of Analysis. (3) I and II.
   Mr. Amir, Mr. Brown, Mr. Loeve, Mr. R. Moore
   Prerequisite: course 104 and 113A.
   Set theory, the real number system, topological spaces, metric spaces, compactness,
   completeness, function spaces.


203. Measure and Integration. (3) I and II. Mr. Morse
   Prerequisite: course 105 and 202 (202 may be taken concurrently), or consent of
   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.
   Prerequisite: course 104 and 185, or equivalent. Mr. Bremermann
   The theory of analytic functions and topics such as meromorphic functions, entire
   functions, modular functions, and Abelian integrals, analytic theory of differential equa­
   tions, inequalities, etc., to be selected by the instructor.

206. Linear Spaces. (3) I. Mr. Bungart, Mr. Kato
   Prerequisite: course 105, 185, and 202.
   Elementary theory of Banach and Hilbert spaces; linear functionals and operators;
   weak convergence; $L^p$ spaces and C; spectral theorem for bounded self-adjoint operators.

207. Linear Operations. (3) II.
   Prerequisite: course 206 or consent of instructor.
   Completely continuous operators, differential operators, unbounded symmetric opera­
   tors, perturbation theory and additional topics selected by the instructor.

208. Functional Analysis. (3) II.
   Prerequisite: course 206.
   Locally convex linear topological spaces; distributions; Banach algebras; Fourier trans­
   forms; Riesz theory of compact operators.

212. Several Complex Variables. (3) II.
   Prerequisite: course 205A.
   Power series and analytic functions of several variables; analytic sets and ideals of
   holomorphic functions; analytic continuation and envelopes of holomorphy; analytic
   spaces; global problems and sheaf theory.

215A. Algebraic Topology. (3) I and II. Mr. Levine, Mr. Shikata
   Prerequisite: course 113B and 202.
   Fundamental group, covering spaces; simplicial complexes, homology and cohomology
   groups; homotopy; applications to fixed point theorems and classification problems.

215B. Homotopy Theory. (3) II.
   Prerequisite: course 215A.
   Homotopy groups, fiber spaces, loop spaces; relations between homotopy and homology,
   obstruction theory; theorems of Hopf, Hurewicz and Whitehead.

*217. Special Functions and Asymptotic Integration. (3) I.
   Prerequisite: course 185.
   Properties of the Bessel, Legendre, and hypergeometric functions and the asymptotic
   evaluation of integrals by the methods of stationary phase and steepest descents.

* Not to be given, 1964–1965.
Mr. Diliberto, Mr. Pinney
Prerequisite: course 111 or 113B, and 185 (which may be taken concurrently).

220A–220B. Higher Mathematics for Physical Sciences and Engineering.
(3–3) Yr.
Mr. Gilbert, Mr. Schumitzky
Prerequisite: course 2B or 14B, 104, and 185, or consent of instructor. 185 may be taken concurrently. Primarily for students in engineering.

*221. Logarithmic and Newtonian Potential. (3) I.
Mr. Smale
Prerequisite: course 105, 185 or equivalent.

222A–222B. Partial Differential Equations. (3–3) Yr.
Mr. Davis, Mr. Freedman, Mr. Friedman, Mr. Greenleaf, Mr. Rieffel, Mr. Sarason, Mr. Shamir
Prerequisite: course 105, 185, 206, or equivalent.
Theory of initial value and boundary value problems for hyperbolic, parabolic, and elliptic partial differential equations, with emphasis on nonlinear equations.

Mr. Henkin
(Formerly numbered 220C–220D.)
Prerequisite: courses 2B or 14B, 104 and 185, or their equivalents, or consent of instructor.

225A–225B. Metamathematics. (3–3) Yr.
Prerequisite: courses 125A–125B and 135A.

226. Mathematical Logic and Computers. (3) I and II.
Prerequisite: course 125A.
Boolean functions and switching circuits, deterministic computing elements, finite automata, Turing machines, introduction to recursive functions and unsolvable combinatorial problems, selected topics on general algorithmic languages.

227. Theory of Recursive Functions. (3) I and II.
Mr. Addison
Prerequisite: course 225B.
Recursive and recursively enumerable sets of natural numbers: characterizations, significance, and classification. Relativization, degrees of unsolvability. The recursion theorem. Constructive ordinals, the hyperarithmetic and analytical hierarchies. Recursive objects of higher type.

* Not to be given, 1964–1965.
228A–228B. Advanced Numerical Analysis. (3–3) Yr. Mr. Taub
Prerequisite: course 128A–128B and 111 or 113B, or consent of instructor. 228A is not prerequisite to 228B.


228B. Iteration methods, algorithms, relaxation and over-relaxation methods, Newton's method, iteration of higher order, iteration with fixed initial condition. Systems of linear and nonlinear equations, linear and nonlinear eigenvalue problems. Generality of methods emphasized, practical aspects will not be neglected.

230A–230B. Algebraic Geometry. (3–3) Yr. Mr. Rosenlicht
Prerequisite: course 250A or 131.

235A–235B. Set Theory. (3–3) Yr.
Prerequisite: courses 125A and 135A–135B.

240A. Differential Geometry. (3) I and II. Mr. Thomas
Prerequisite: course 104, 113B; 202 (taken concurrently).
Multilinear algebra, differentiable manifolds, tensor bundles, exterior forms; theorems of Stokes and Frobenius; imbedding theorem, connections, curvature, introduction to Riemannian geometry.

240B. Riemannian Geometry. (3) II.
Prerequisite: course 215A and 240A.
Affine connections, curvature tensor, manifolds of constant curvature, completeness. Additional topics selected by the instructor.

241. Complex Manifolds. (3) I. Mr. Griffiths
Prerequisite: course 185 and 240A.
Compact Riemann surfaces, Kahler manifolds; sheaves; theorems of Dolbeault and Hodge.

245A–245B. General Algebraic Systems. (3–3) Yr. Mr. Tarski
Prerequisite: course 113A, 113B, 125A–125B, and 135A.

250A. Groups, Rings and Fields. (3) I and II.
Prerequisite: course 113B. Mr. Bierstedt, Mr. Foster, Mr. Kanno
Group theory through the Jordan-Hölder-Schreier theorem, homomorphism theorems for rings and modules, unique factorization domains, structure of modules over principal ideal domains, field theory through Galois theory.

250B. Topics in Algebra. (3) I and II. Mr. McConnell
Prerequisite: course 250A.
Multilinear algebra and additional topics selected from the following: field theory, valuation theory, ring theory, homological algebra.

251. Ring Theory. (3) II.
Prerequisite: course 250A.
Topics chosen from Noetherian rings, rings with descending chain condition, theory of the radical, homological methods.
252. Representation Theory. (3) I.  
Prerequisite: course 250A.  
Structure of finite dimensional algebras, applications to representations of finite groups, the classical linear groups.

253. Homological Algebra. (3) II.  
Prerequisite: course 250A.  
Modules over a ring, homomorphisms and tensor products of modules, functors and derived functors, homological dimension of rings and modules.

254. Algebraic Number Theory. (3) I.  
Prerequisite: course 250A.  
Valuation theory in number fields and relation to ideal theory, local fields, unit theorem and finiteness of class number, ramification theory.

255A-255B. Foundations of Geometry. (3-3) Yr.  
Prerequisite: course 125A, 130A and 135A.  

259. Transformation Groups. (3) II.  
Prerequisite: course 215A; 240A (taken concurrently) or consent of instructor.  
Topological groups, Haar measure; general theory of topological transformation groups; the existence of slices and applications; the Smith theory of periodic transformations.

260. Topological Groups. (3) I.  
Prerequisite: course 250A and 202.  
Haar measure, locally compact Abelian groups, compact groups.

261A-261B. Lie Groups. (3-3) Yr.  
Prerequisite: course 240A.  
Lie groups and Lie algebras, general structure theory; compact, solvable, complex, and semisimple groups; classification of simple groups, representation theory.

265. Differential Topology. (3) I.  
Prerequisite: course 215A and 240A.  
The imbedding theorem; characteristic classes; Morse theory; additional topics from cobordism, immersion theory, singularities of maps, and the structure of manifolds.

270. Mathematical Theory of Fluid Dynamics. (3) II.  
Development of the fundamental equations describing the behavior of a fluid continuum followed by the treatment of special topics selected to exhibit different physical situations, analytical techniques and approximate methods of solution.

275. Special Topics in Applied Mathematics. (3) II.  
Operator theory, boundary-value problems, and integral equations applied to problems arising from electromagnetic theory, quantum theory, and statistical mechanics.

276A-276B. Special Topics in Topology. (3-3) Yr.  
Prerequisite: course 215A.  
Topics of current interest in topology such as: homotopy theory, fiber bundles, sheaves, cohomology operations, theory of manifolds.

277A-277B. Selected Topics in Differential Geometry. (3) I.  
Prerequisite: course 240A.  
Study of deformation problem in differential geometry; deformation of Riemannian, complex, and other structures, including extrinsic problems. Recent developments in global differential geometry.
278. Selected Topics in Analysis. (3) I.
Prerequisite: Real and Complex Variables.
Elements of harmonic analysis; conjugate function; boundary values of analytic functions; prediction theory.

280A–280B. Mathematical Theory of Relativity. (3–3) Yr. Mr. Taub
Prerequisite: course 140 or consent of instructor.
Special theory of relativity, spinor representation of the Lorentz group, reformulation of classical physical theories in relativistic form, principle of equivalence, Einstein theory of gravitation, cosmological problems.

290. Seminars. (2–6) I and II.
The Staff
Topics in foundations of mathematics, theory of numbers, numerical calculation, analysis, geometry, topology, algebras, and their applications, by means of lectures and informal conferences; work based largely on original memoirs. During 1964–1965, there will be, in particular, lecture seminars on the following subjects, in charge of the persons indicated:
(1) Functional analysis, I, II, Mr. Bade; (2) Topics in Cobordism theory, I, II, Mr. Kahn; (3) Arithmetic on elliptic curves, I, II, Mr. Ogg; (4) Finite semigroups, I, Mr. Rhodes; (5) Algebraic geometry, I, II, Mr. Seidenberg; (6) Logic and foundations, I, II, Mr. Vaught; (7) Functional analysis and differential operators, I, II, Mr. F. Wolf; (8) Geometry of bounded domains, I, II, Mr. J. Wolf.

295. Individual Research. (2–6) I and II.
Intended for candidates for the Ph.D. degree.

299. Reading Course for Graduate Students. (2–6) I and II.
The Staff
Investigation of special problems under the direction of members of the department.

Mathematical Colloquium. (No credit) I and II.
The Staff
Meetings for the presentation of original work by members of the staff and graduate students.

Logic Colloquium. (No credit) I and II.
The Staff
Reports on current research and scholarly work by members of the staff, visitors, and graduate students.

Related Courses in Other Departments
Logic (Philosophy 12).
Statistics. See Department of Statistics.

MILITARY SCIENCE
(Department Office, 149 Harmon Gymnasium)
James D. Land, Colonel, Artillery; Professor of Military Science (Chairman of the Department).
Keith H. Houlson, Lieutenant Colonel, Transportation Corps; Associate Professor of Military Science.
Howell F. Stewart, Major, Artillery; Associate Professor of Military Science.
William R. Flick, Captain, Quartermaster Corps; Assistant Professor of Military Science.
Norman R. Kyle, Captain, Ordnance Corps; Assistant Professor of Military Science.
Vinton L. Rathburn, Captain, Corps of Engineers; Assistant Professor of Military Science.
Lower Division Courses

The Army R.O.T.C. Program is a four-year program comprised of a two-year lower division basic course which is a preparatory program for the enrollment selection in the two-year advanced course. Any male student may enroll in the lower division basic courses provided that he meets the appropriate medical and administrative criteria, is a citizen of the United States, is at least fourteen years of age, and can qualify for appointment as a second lieutenant prior to reaching twenty-eight years of age in connection with the completion of the four-year program. 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.

The A part of a course is not a prerequisite for the B part of a course in either basic or advanced military science.

1A. Military Science I. (2) I.  
The Staff (Mr. Stewart in charge)  
Organization of the Army and R.O.T.C.; individual weapons and marksmanship; leadership laboratory; appropriate academic or military subjects.

1B. Military Science I. (2) II.  
The Staff (Mr. Stewart in charge)  
U. S. Army and National security; American military history; leadership laboratory; appropriate academic or military subjects.

21A. Military Science II. (2) I.  
The Staff (Mr. Flick in charge)  
American military history; leadership laboratory; appropriate academic or military subjects.

21B. Military Science II. (2) II.  
The Staff (Mr. Flick in charge)  
Introduction to operations and basic tactics; map and aerial photograph reading; leadership laboratory; appropriate academic or military subjects.

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 junior 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 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.

The student is furnished an officer-type uniform which becomes his personal property upon successful completion of the advanced course and acceptance of a commission in the United States Army Reserve or the Regular Army. 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 of 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 the Chancellor at Berkeley for scholastic excellence and outstanding qualities of leadership may be designated “Distinguished Military Students.” Such distinguished students may, upon graduation and, upon application, be considered for direct commission in the Regular Army.

For further information about the Reserve Officers’ Training Corps, consult the Professor of Military Science in 149 Harmon Gymnasium.

131A. Military Science III. (3) I. The Staff (Mr. Rathburn in charge)
Prerequisite: course 21A and 21B, or equivalent.
Leadership; military teaching principles; branches of the Army; leadership laboratory; appropriate academic or military subjects.

131B. Military Science III. (3) II. The Staff (Mr. Rathburn in charge)
Prerequisite: course 21A and 21B, or equivalent.
Small unit tactics and communications; leadership laboratory; precamp orientation; one three-day field trip; appropriate academic or military subjects.
141A. Military Science IV. (3) I.  
Prerequisite: course 131A and 131B.  
The Staff (Mr. Kyle in charge)  
Command and staff; estimate of situation and combat orders; military intelligence; military team; training management; logistics; troop movement; leadership laboratory; appropriate academic or military subjects.

141B. Military Science IV. (3) II.  
Prerequisite: course 131A and 131B.  
The Staff (Mr. Kyle in charge)  
Supply and evacuation; motor transportation; leadership; military law; Army administration; U.S. Role in World Affairs; leadership laboratory; appropriate academic or military subjects.

MOLECULAR BIOLOGY  
(Department Office, 229 Molecular Biology and Virus Laboratory)  
Melvin Calvin, Ph.D., Sc.D., Professor of Molecular Biology and of Chemistry and Director, Laboratory of Chemical Biodynamics.  
Michael Doudoroff, Ph.D., Professor of Molecular Biology and of Bacteriology.  
Heinz L. Fraenkel-Conrat, M.D., Ph.D., Professor of Molecular Biology.  
Donald A. Glaser, Ph.D., Professor of Molecular Biology and of Physics.  
C. Arthur Knight, Ph.D., Professor of Molecular Biology.  
Harry Rubin, D.V.M., Professor of Molecular Biology.  
Howard K. Schachman, Ph.D., Professor of Molecular Biology and of Biochemistry.  
Roger Y. Stanier, Ph.D., Professor of Molecular Biology and of Bacteriology.  
Wendell M. Stanley, Ph.D., Sc.D., LL.D., Docteur h.c. (Paris), Professor of Molecular Biology and of Biochemistry and Director of the Virus Laboratory.  
Gunther S. Stent, Ph.D., Professor of Molecular Biology.  
Robley C. Williams, Ph.D., Professor of Molecular Biology and Associate Director of the Virus Laboratory (Chairman of the Department of Molecular Biology).  
Michael J. Chamberlin, Ph.D., Assistant Professor of Molecular Biology.  
Alvin J. Clark, Ph.D., Assistant Professor of Molecular Biology and of Bacteriology.  
John C. Gerhart, Ph.D., Assistant Professor of Molecular Biology.  
Walden K. Roberts, Ph.D., Assistant Professor of Molecular Biology.  
Thomas A. Trautner, Dr. rer. nat., Assistant Professor of Molecular Biology.  

Letters and Science List. All undergraduate courses in molecular biology are included in the Letters and Science List of Courses. For regulations governing this list, see page 91.

Upper Division Courses

111. Introduction to Molecular Virology. (3) I.  
Prerequisite: Chemistry 8; an introductory course in biology.  
Consideration of viruses as infectious particles having chemical, physical, and hereditary characteristics.
199. Special Study for Advanced Undergraduates. (1–2) I and II.

The Staff (Mr. Rubin in charge)

Reading and conference under the direction of a staff member. Restricted senior honor students.

Graduate Courses

(Concerning conditions for admission to graduate courses, see page 165)

200. Biology of Viruses. (3) I. Mr. Trautner, Mr. Rubin
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 of college mathematics.

Dynamics of growth, genetics, radiobiology, neutralization, and interference of animal, bacterial, and plant viruses.

201. General Virology Laboratory. (4) II. Mr. Gerhart
One lecture period and nine hours of laboratory work per week. Prerequisite: Course 200.
Experimental techniques used in research on animal, bacterial, and plant viruses.

203. Optical Analysis of Biological Structures. (3) II. Mr. Williams
Prerequisite: Mathematics 3A–3B–4; Physics 4A–4B–4C; Biochemistry 102 or 100A.
Study of biological macromolecules and integrated structures by analysis of their effects upon incident radiation. Light and x-ray scattering, x-ray crystallographic analysis, birefringence and dichroism, electron microscopy.

*204. Macromolecular Biophysics Laboratory. (4) II. Mr. Schachman, Mr. Chamberlin
One lecture period and nine hours of laboratory work per week. Prerequisite: Biochemistry 206, or consent of instructor.
Experimental techniques used in the isolation, characterization, and study of the structure, synthesis and interactions of macromolecules of biological interest.

*205. Bacterial Genetics Laboratory. (4) I. Mr. Clark
One lecture period and nine hours of laboratory work per week. Prerequisite: Bacteriology 107; Biochemistry 100A–100B, or 102.
Experimental techniques used in research on the genetics of bacteria.

280. Research. (1–9) I and II. The Staff (Mr. Stanley in charge)

290. Seminar.

Recent topics in molecular biology. Students may receive credit for more than one seminar in the same semester.

A. Virology. (1) I and II. Mr. Roberts
B. Mathematical and Physical Analysis of Biological Systems. (1) II. Mr. Glaser
C. Microbial Genetics. (1) II. Mr. Stent
D. Macromolecules. (1) I. Mr. Chamberlin

299. Special Study for Graduate Students. (1–3) I and II.

The Staff (Mr. Stanley in charge)

Reading and conferences under the direction of a staff member.

MUSIC

(Department Office, 104 Morrison Hall)

David D. Boyden, M.A., Mus. D (h.c.), Professor of Music.

Charles C. Cushing, M.A., Professor of Music.

William D. Denny, M.A., Professor of Music (Vice-Chairman of the Department).

†Vincent H. Duckles, Ph.D., Professor of Music.

* Not to be given, 1964–1965.
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.
Lawrence H. Moe, Ph.D., Professor of Music and University Organist (Chairman of the Department).
Joaquin Nin-Culmell, Professor of Music.
Seymour J. Shifrin, M.A., Professor of Music.
Edgar H. Sparks, Ph.D., Professor of Music.
Daniel Heartz, Ph.D., Associate Professor of Music.
Richard L. Crocker, Ph.D., Assistant Professor of Music.
Alan Curtis, Ph.D., Assistant Professor of Music.
† David Lewin, M.F.A., Assistant Professor of Music.
Michael Senturia, A.B., Assistant Professor of Music.

James Berdahl, M.A., Lecturer in Music and Director of Bands.
Jacqueline R. Clark, A.B., Associate in Music.
Elizabeth Davidson, M.A., Associate in Music.
Mary Groom Jones, Lecturer in Music.
George H. Kyme, Ph.D., Lecturer in Music and Supervisor of the Teaching of Music.
James McKelvy, D.M.A., Lecturer in Music.
Marjorie Gear Petray, A.B., Lecturer in Music.
Mary C. Sanks, M.A., Associate in Music.
Verne M. Sellin, B.S., Lecturer in Music for the fall semester.
Abe Sherman, A.B., Lecturer in Music.
E. Rollin Silfies, M.A., Lecturer in Music for the spring semester.
John M. Swackhamer, A.B., Lecturer in Music.

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 91.

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).

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

* In residence spring semester only, 1964–1965.
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:

   History and Literature. Course 121A–121B, and one additional course from this group.
   Performance. Two semester courses in the 100 series from this group.

b. Additional courses from any of the three groups to complete a total of 24 units in the 100 series.

c. 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 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.

Teacher Training. Consult Mr. Elston. Attention is drawn to the following recommended courses: Instrumentation (Music 108), Conducting (Music 112A–112B), Vocal Technique and Methods of Teaching Voice (Music 328A–328B), Instrumental Methods (Music 329), and Choral Repertory (Music 330). See also the Announcement of the School of Education.

Honors Program. Adviser: Mr. Imbrie. Honor students majoring in music who have received grade A in all freshman music courses may take Music 121A–121B in the sophomore year in place of 2C–2D. Such students are then required to take 107A–107B to complete the major. The Honors Seminar H195 is required of senior honor students.

Higher Degrees. See the Announcement of the Graduate Division, Berkeley, 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

Courses open to all students in the University.

Lower Division Courses

10. Basic Musicianship. (2) I and II. The Staff (Mr. Sherman in charge)
The Fundamentals of music, with singing, ear training, harmonization of melodies, and conducting.

Lectures and demonstrations dealing with the rudiments of music and the evolution of musical style from early times to the present.

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.

110. Basic Musicianship. (2) I and II. The Staff (Mr. Kyme in charge)
Prerequisite: course 10 or consent of instructor.
A continuation of course 10 for general students who wish to attain additional facility.

127A. Introduction to Opera. (3) II.
Prerequisite: course 27A or consent of 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.
Prerequisite: course 27A or consent of instructor.

127C. Introduction to Contemporary Music. (3) I.
Prerequisite: course 27A or consent of instructor.

127D. Bach and Handel. (3) II.
Prerequisite: course 27A or consent of instructor.

127E. Mozart and Haydn. (3) I.
Prerequisite: course 27A or consent of the instructor.

127F. Symphonic Literature of the Nineteenth Century. (3) II. Mr. Odegard
Prerequisite: course 27A or consent of the instructor.

127G. Masterworks of Choral Literature. (3) II.
Prerequisite: course 27A or consent of instructor.

Performance
For particulars, see lower division performance courses.
All courses in this group may be repeated once without duplication of credit.

141. Advanced University Symphony Orchestra. (2) I and II. Mr. Senturia
Prerequisite: consent of instructor.

142. University Chamber Band. (1) I. Mr. Berdahl
Prerequisite: consent of instructor.

143. Advanced University Concert Band. (2) II.
Prerequisite: consent of instructor.

144. Advanced University Chorus. (2) I and II.
Prerequisite: 4 units in course 44.
Primarily concerned with major works for chorus and orchestra.

145. Advanced Repertory Chorus. (2) I and II.
Prerequisite: 4 units in course 45.
Primarily concerned with lesser-known significant choral literature.

146. Advanced Chamber Music Ensemble. (1 or 2) I and II.
Prerequisite: consent of instructor.
Mr. Berdahl, Mr. Boyden

148. Advanced Piano Ensemble. (1) I and II. Mrs. Petray

149. Collegium Musicum. (1 or 2) I and II.
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. Beginning each semester.
The Staff (Mr. Swackhamer in charge)
Elements of music, with ear training, sight singing, and dictation.

* Not to be given, 1964–1965.
**C-D. Musicianship.** (1–1) Yr. Beginning each semester.  
The Staff (Mrs. Petray in charge)  
**Prerequisite:** course A–B or consent of instructor.  
A continuation of course A–B, which is prerequisite.

**2A–2B. The Masterworks of Music.** (1–1) Yr.  
Mr. Sparks  
**Prerequisite:** the ability to read music or consent of instructor.  
Guided listening and discussion.

**2C–2D. The Masterworks of Music.** (2–2) Yr.  
Mr. Imbrie  
**Prerequisite:** courses 2A–2B and 3A–3B, or consent of instructor.  
A continuation of course 2A–2B.

**3A–3B. Harmony.** (3–3) Yr. Beginning each semester.  
The Staff (Mr. Cushing in charge)  
**Prerequisite:** course A–B and 2A–2B (may be taken concurrently), or consent of instructor.  
Exercises in writing and at the keyboard.

**3C–3D. Harmony.** (3–3) Yr. Beginning each semester.  
The Staff (Mr. Imbrie in charge)  
A continuation of course 3A–3B, which is prerequisite.

**Upper Division Courses**

**Theory**

**101A–101B. Counterpoint.** (3–3) Yr.  
The Staff (Mr. Cushing in charge)  
**Prerequisite:** course 3D.  
101A. Modal Counterpoint.  
101B. Tonal Counterpoint.

**102A. Keyboard Harmony.** (2) I.  
Mr. Sparks  
**Prerequisite:** course 3D, and 405A, 405B, 405C, 405D or equivalent.

**102B. Score Reading.** (2) II.  
Mrs. Sanks  
**Prerequisite:** course 3D.

**105A–105B. Composition.** (3–3) Yr.  
Mr. Cushing  
**Prerequisite:** course 3C–3D.  
Primarily for juniors.

**105C–105D. Composition.** (3–3) Yr.  
Mr. Elston  
**Prerequisite:** courses 101A–101B, 105A–105B, and consent of the instructor.  
Primarily for seniors.

**106A–106B. Canon and Fugue.** (3–3) Yr.  
Mr. Denny  
**Prerequisite:** course 101B.

**107A–107B. Studies in Musical Analysis.** (3–3) Yr.  
Mr. Senturia  
**Prerequisite:** course 3D.  
Structure in relation to harmonic, polyphonic, rhythmic, and thematic treatment.

**108. Instrumentation.** (3) I.  
Mr. McKelvy  
**Prerequisite:** course 3C–3D. Prospective students of conducting are advised to take this course in their junior year.  
A study of orchestral instruments, analysis of scores, scoring for various instrumental combinations.
MUSIC

*109. Orchestration. (3) II. Mr. Denny
Prerequisite: course 108.

112A–112B. Conducting. (2–2) Yr. Mr. Lawton, Mr. McKelvy
Prerequisite: course 108 (may be taken concurrently).
112A. Choral Conducting.
112B. Instrumental Conducting.

History and Literature

Survey of Western Music

121A–121B. History and Literature of Music. (3–3) Yr. Mr. Crocker
Prerequisite: course 2D and 3D, or consent of instructor.
A study of the development of music from antiquity to the present; lectures, listening, technical analysis, and written reports.

Composers, Forms, Mediums

Courses in this group will be given in rotation. Prerequisite: course 2D and 3D, or consent of instructor.

116B. Keyboard Music of the Baroque Period. (3) I. Mr. Curtis

*116E. The Performance of Baroque Music. (3) II. Mr. Boyden
Prerequisite: experience in playing an instrument or in singing.

*116G. Bach's Well-tempered Clavier. (3) II. Mr. Kerman

*117B. The Operas of Mozart. (3) II. Mr. Heartz

117C. The String Quartets of Beethoven. (3) II. Mr. Sparks

*117D. Haydn. (3) II. Mr. Moe

118B. Piano Music of the Romantic Period. (3) II. Mr. Nin-Culmell

*118D. Wagner's Ring of the Nibelung. (3) II. Mr. Lewin

*118E. Verdi. (3) I. Mr. Kerman

*119C. Modern French Music. (3) II. Mr. Cushing

119D. Chamber Music of the Twentieth Century. (3) I. Mr. Elston

Honors and Special Studies Courses

H195. Honors Seminar. (3) II. Mr. Imbrie

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)

* Not to be given, 1964–1965.
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 165.

200A–200B. Introduction to Musical Scholarship. (3–3) Yr.
Mr. Crocker, Mr. Heartz
Bibliography, research methods, and individual projects typically drawing on manuscripts and early prints in the University of California Music Library.

202. Seminar: Contemporary Music. (3) II.
Mr. Lewin
The topics for 1964–1965 will be Schoenberg’s Second Quartet and String Trio.

203. Seminar in Composition. (3) I and II.
Mr. Shifrin
Prerequisite: course 105C–105D and 106A–106B, one of which may be taken concurrently, with the consent of the instructor.

204. Studies in Musical Analysis. (3) I.
Mr. Shifrin
The topic for 1964–1965 is the concerto and the concertante principle.

208. Proseminar in Music History. (3) I and II.
Mr. Crocker, Mr. Curtis, Mr. Heartz, Mr. Sparks

*208A. Origins to 1430. I. Mr. Crocker.
*208B. 1430–1600. II. Mr. Sparks.
*208C. 1600–1750. I. Mr. Curtis.
*208D. 1730–1830. II. Mr. Heartz.
Comprehensive survey of music history. Study of music and sources; readings in the musicological literature (in English and in other languages); introduction to the main historical problems, methods of analysis, and lines of research.

*210A–210B. Seminar in Mensural Notation. (3–3) Yr.
Mr. Crocker
The topic for 1964 is French music of the late fourteenth century.

212. Seminar: Medieval Studies. (3) I.
Mr. Crocker
The topic for 1964 is French music of the late fourteenth century.

213. Seminar: Music of the Renaissance. (3) II.
Mr. Sparks
The topic for 1964–1965 is the masses of Josquin Desprez and Pierre de la Rue.

*215. Seminar: Research in Music History. (3) I.
Mr. Kerman

*216. Seminar: Baroque Music. (3) II.
Mr. Boyd

*218. Seminar: The Sonata in the Nineteenth Century. (3) I.
Mr. Sparks
(Formerly numbered 214A–214B.)

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.

*225. Seminar: History of Musical Instruments. (3) II.
Mr. Curtis
General historical problems, and special projects with the Salz and De Young Collections and other instruments at the University

* Not to be given, 1964–1965.
298. Special Studies. (2–4) I and II. The Staff (Mr. Heartz 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.

299. Independent Study. (3–6) I and II. The Staff (Mr. Sparks in charge)
Individual study, in consultation with a member of the Faculty, 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 examination.

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. Lord, Mr. Sellin, Mr. Silfies
329A. Stringed Instruments. (1) I and II. Mr. Sellin
329B. Brass Instruments. (1) I. Mr. Lord
329C. Woodwind Instruments. (1) II. Mr. Silfies
329D. Percussion Instruments. (1) I. Mr. Silfies
329E. Orchestra and Band Repertory: Survey and Performance. (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.
Mr. McKelvy
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 candidates for the General Elementary and General Secondary Credentials with a minor in music, with consent of the instructor in charge. Required of music majors who do not pass the entrance examination in piano.

405C–405D. Elementary Piano. (1–1) Yr. Beginning each semester.
Prerequisite: course 405B. Mr. Sparks in charge
Open to candidates for the General Elementary and General Secondary Credentials with a minor in music, with consent of the instructor in charge. Required of music majors who do not pass the entrance examination in piano.

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

† See the Announcement of the School of Education.
natural resources. For the more specialized aspects of resource use and management, see offerings of individual departments.

Agricultural Economics 175. Economics of Natural Resources.
270A–270B. Natural Resource Economics Research.
Botany 115. Plants in Relation to Man.
City and Regional Planning 226. The Metropolitan Region.
Engineering
Civil Engineering 159. Water Institutions and Economics.
Forestry 122. Forest Policy.
Geography 145. Sources and Utilization of Energy.
176. The Relations between Nature and Culture.
History 178A–178B. History of Science and Technology in American Society.
Law 260. Land Use Planning.
Political Science 185A. Public Policy and Administration of Natural Resources.
285A. Regional Planning and Resources Management.
Sociology 135. Social Change in Underdeveloped Countries.
166. Agricultural Oriental Societies.
Zoology 113. Natural History of the Vertebrates.

NAVAL SCIENCE

(Department Office, 25 Callaghan Hall)

J. Dunham Reilly, Captain, U.S.N., Professor of Naval Science (Chairman of the Department).
Robert Lantsberger, Lieutenant (SC) U.S.N., Assistant Professor of Naval Science.
Hugh Praetorius, Lieutenant, U.S.N., Assistant Professor of Naval Science.

Courses are designed for students who are regularly enrolled members of the Naval Reserve Officers’ Training Corps. Details concerning enrollment are available in 25 Callaghan Hall. Candidates must be able to complete the Naval R.O.T.C. curriculum, without serious interference from or with other academic work required for the bachelor’s degree.

Students in the Naval R.O.T.C. 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.
The naval service; naval leadership; basic seamanship; characteristics of naval ships; naval justice; national defense organization; naval communications; concepts of seapower; discipline; logistics.

1B. Evolution of Seapower. (3) II.
Seapower and its influence upon global history; elements of naval strategy and tactics; amphibious doctrine; geopolitics as applied to naval warfare; history of the U. S. Navy.

2A. Naval Weapons. (3) I and II. Mr. Praetorius
Weapons systems, capabilities and limitation, gun systems, antisubmarine warfare systems, guided missiles, nuclear weapons and space technology

Upper Division Courses

101A. Naval Engineering. (3) I.
Nuclear, steam turbine and 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.
To include tactical communications and 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.
Modern strategical and tactical principles, using contemporary historical events as illustrative material.

105M. Amphibious Warfare. (3) I.
Introduction to 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 amphibious operations of World War II. The last half of this course prepares the student for his first active duty and includes naval justice and leadership.

107S. Navy Supply System. (3) I. Mr. Lantsberger
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.
NAVAL SCIENCE; NEAR EASTERN LANGUAGES / 451

108S. Supply Management Afloat. (3) II.  Mr. Lantsberger
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.  Mr. Lantsberger
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.

NEAR EASTERN LANGUAGES

(Department Office, 1229 Dwinelle Hall)

Jacob J. Finkelstein, Ph.D., Professor of Assyriology and Associate Curator of Mesopotamian Archaeology, Museum of Anthropology (Chairman of the Department of Near Eastern Languages).
Walter J. Fischel, Ph.D., Professor of Semitic Languages and Literature.
Walter B. Henning, Ph.D., Professor of Iranian Studies.
Klaus Baer, Ph.D., Associate Professor of Egyptology and of History.
William M. Brinner, Ph.D., Associate Professor of Near Eastern Languages.
John J. Gumperz, Ph.D., Associate Professor of South Asian Languages and Linguistics.
*Gene M. Schramm, Ph.D., Assistant Professor of Semitic Languages.

Ilhan M. Başgöz, Ph.D., Lecturer in Turkish.
Paul G. Essabal, Ph.D., Lecturer in Armenian.
Menachem M. Haran, Ph.D., Visiting Associate Professor of Near Eastern Languages.
Mounah A. Khouri, Ph.D., Acting Assistant Professor of Arabic.
Gerard G. Salinger, Ph.D., Lecturer in Near Eastern Languages.
Abbas Zaryab, Ph.D., Visiting Assistant Professor of Near Eastern Languages.

Letters and Science List. All undergraduate courses in this department are included in the Letters and Science List of Courses.

Departmental Major Advisers: Near East: Mr. Baer; South Asia: Mr. Gumperz.

The Major. A student may elect a major emphasizing Assyriology, Egyptology, Hebrew, Arabic, South Asian Languages, Iranology, Semitic Languages, or Islamic Studies. A major course of studies may be completed by fulfilling the following requirements: 26 upper division units, of which 16 must be in one language or 20 in a combination of languages, as approved by the major adviser. With the consent of the department, certain language

courses taken in other departments may account for 6 of these units, as in the case of Classics 190A–190B (Sanskrit) for students majoring in Iranology or South Asian Languages with emphasis on Hindi. The balance of the required 26 upper division units may be chosen from departmental offerings in Near Eastern or South Asian Civilizations, or in courses of other departments, as approved by the major adviser, such as History 197A–197B (The History of India) for majors in South Asian Languages.

Honors Program: In addition to completing the regular requirements for the major, a candidate for graduation with honors must (a) have a 3.0 grade-point average over-all and within the department and (b) complete the Honors Course H198A–H198B, in which he will prepare an honors thesis in his senior year.

Lecture Courses

Lower Division Courses

1A–1B. Languages and Cultures of the Near East. (2–2) Yr. Mr. Brinner
Course 1A is not prerequisite to 1B.
The growth, structure, and differentiation of ethnic, religious, and language groups in the Arab states, Israel, Turkey, and Iran.

12. Great Books of Hebrew Literature. (2) I. Mr. Fischel
Hebrew literature in translation.

Upper Division Courses

150. Ancient Israel. (3) I. Mr. Haran
The history of Israel from the Patriarchal Age to the end of the Second Commonwealth.

151. Jewish Civilization. (3) II. Mr. Fischel
The social, religious, and cultural aspects of Jewish life in the main centers of Asia, Africa, and Europe from the time of the coming of Islam to the nineteenth century.

152. Religion and Cult in Ancient Palestine. (2) II. Mr. Haran
A study of the cultic institutions of Ancient Israel in the context of its contemporary Palestinian environment.

161A–*161B. The Religions of Ancient Iran. (2–2) Yr. Mr. Henning
Principally devoted to the study of Zoroastrianism and Manichaeanism.

*162A–162B. Introduction to the Comparative Study of the Iranian Languages. (2–2) Yr. Mr. Henning
Prerequisite: familiarity with at least one classical Indo-European language or with the processes of comparative philology, and consent of the instructor.
Survey of the languages of the Iranian branch of the Indo-European family of languages.

163A–163B. History of Persian Literature. (2–2) Yr. Mr. Zaryab
Course 163A is not prerequisite to 163B.
163A. Classical Persian literature from Firdawsi to the beginning of the Safavid era.
163B. Modern Persian literature.

* Not to be given, 1964–1965.
*164A–164B. Civilization of Ancient Iran. (2−2) Yr.  
Mr. Henning
The civilization of the Iranian nations from the beginning to the rise of Islam.

165A–165B. Armenian Civilization. (2−2) Yr.  
Mr. Essabal
Course 165A is not prerequisite to 165B. 
A survey of aspects of Armenian history and literature from earliest times to the present.

165A–165B. Survey of Turkish Literature. (2−2) Yr.  
Mr. Başgöz
(Formerly numbered 139A–139B.) 
Turkish literature in translation from its origins in folklore, through classical literature to the literature of the modern period.

170. Religion and Cosmology of Ancient Mesopotamia (3) I.  Mr. Finkelstein
Discussion of original sources bearing on the religious beliefs and practices of the ancient Mesopotamians.

171. Ancient Western Asia. (3) II.  Mr. Finkelstein
Civilization of Mesopotamia and adjacent regions from its origins to the period of the Persian Empire.

Ancient Egypt (History 109A–109B). (3−3) Yr.  Mr. Baer

180. Rise and Spread of Islamic Society. (3) I.  Mr. Salinger
A chronological survey of the Islamic conquests and domination in the Near East and adjacent areas to the height of the Ottoman Empire.

181. Islamic Institutions. (3) II.  Mr. Fischel
A critical study of the growth and development of the political, legal, and social institutions of Islam. May be repeated for additional credit with consent of the instructor.

190. Modern South Asian Literatures. (3) II.  
Modern literatures of India, Pakistan, and Ceylon in translation.

191A–191B. Literary and Cultural Traditions of India. (2−2) Yr.  
191A is not prerequisite to 191B.
The development of certain basic concepts and ideas as illustrated by ancient, classical, medieval, and modern Indian literature. Analogies will also be drawn from the other arts.

*192. Language Dynamics in South Asia. (2) II.  Mr. Gumperz
Prerequisite: consent of instructor.
Development of modern South Asian vernaculars. Political and social functions of speech diversity in modern India.

193. Linguistic Structures of South Asian Languages. (2) II.  Mr. Gumperz
Prerequisite: Linguistics 100.
Structure and typology of selected South Asian languages.

Languages, Literatures, and Linguistics

Duplication of Credit. A student will not be allowed credit for that part of the first 12 units in a foreign language (elementary and intermediate courses) which duplicate courses previously completed in high school or at another institution of collegiate grade. The first two years of work in a foreign language in high school is considered to be equivalent to one semester in college.

* Not to be given, 1964–1965.
(4 units); each successive year in a foreign language in high school is equal to one additional semester in college (4 units).

## Lower Division Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>10A–10B</td>
<td>Elementary Hebrew (4–4 Yr.)</td>
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<tr>
<td>20A–20B</td>
<td>Elementary Arabic (4–4 Yr.)</td>
<td>Mr. Brinner in charge</td>
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<tr>
<td>30A–30B</td>
<td>Elementary Modern Persian (4–4 Yr.)</td>
<td>Mr. Zaryab</td>
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<tr>
<td>35A–35B</td>
<td>Elementary Modern Turkish (4–4 Yr.)</td>
<td>Mr. Başgöz</td>
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<tr>
<td>36A–36B</td>
<td>Elementary Modern Armenian (4–4 Yr.)</td>
<td>Mr. Essabal</td>
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<tr>
<td>40A–40B</td>
<td>Elementary Spoken Hindi-Urdu (4–4 Yr.)</td>
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<tr>
<td>45A–45B</td>
<td>Elementary Telugu (4–4 Yr.)</td>
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<tr>
<td>46A–46B</td>
<td>Elementary Spoken Tamil (4–4 Yr.)</td>
<td>Mr. Gumperz</td>
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</tbody>
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## Upper Division Courses

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<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>100A–100B</td>
<td>Elementary Egyptian (3–3 Yr.)</td>
<td>Mr. Baer</td>
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<tr>
<td></td>
<td>Middle Egyptian grammar and texts.</td>
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<tr>
<td>101A–101B</td>
<td>Intermediate Egyptian (3–3 Yr.)</td>
<td>Mr. Baer</td>
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<td></td>
<td>Prerequisite: course 100A–100B</td>
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<tr>
<td></td>
<td>Readings in Middle Egyptian hieroglyphic and hieratic texts. Introduction to Old Egyptian.</td>
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<tr>
<td>102A–102B</td>
<td>Elementary Coptic (3–3 Yr.)</td>
<td>Mr. Baer</td>
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<td></td>
<td>Prerequisite: 6 units of Greek, or equivalent.</td>
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<tr>
<td>103A–103B</td>
<td>Elementary Akkadian (3–3 Yr.)</td>
<td>Mr. Finkelstein</td>
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<tr>
<td>104A–104B</td>
<td>Akkadian Letters and Legal Documents (2–2 Yr.)</td>
<td>Mr. Finkelstein</td>
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<td></td>
<td>Prerequisite: course 103A–103B</td>
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<td></td>
<td>Texts from Mesopotamia and adjacent areas in the second millennium B.C. May be repeated for additional credit.</td>
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<tr>
<td>105A–105B</td>
<td>Elementary Sumerian (2–2 Yr.)</td>
<td>Mr. Finkelstein</td>
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<td></td>
<td>Prerequisite: course 103A–103B</td>
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<tr>
<td>110A–110B</td>
<td>Intermediate Hebrew (4–4 Yr.)</td>
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<td>Prerequisite: course 10A–10B or equivalent.</td>
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<tr>
<td>111A–111B</td>
<td>Biblical Hebrew Texts (2–2 Yr.)</td>
<td>Mr. Haran</td>
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<tr>
<td></td>
<td>Prerequisite: course 110A–110B or equivalent.</td>
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<td>May be repeated for additional credit with consent of instructor.</td>
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<tr>
<td>112A–112B</td>
<td>Modern Hebrew Literature (2–2 Yr.)</td>
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<td></td>
<td>Prerequisite: course 110A–110B or equivalent.</td>
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<td>May be repeated for additional credit with consent of instructor.</td>
<td></td>
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</tbody>
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† Offered in alternate years.
* Not to be given, 1964–1965.
113A–113B. Early Postbiblical Hebrew Texts. (2–2) Yr.
Prerequisite: course 110A–110B or equivalent.
May be repeated for additional credit with consent of instructor.

*114A–114B. Medieval Hebrew Literature. (2–2) Yr.
Prerequisite: course 110A–110B or equivalent.
May be repeated for additional credit with consent of instructor.

+116A–116B. Aramaic. (3–3) Yr.
Prerequisite: course 110A–110B or consent of the instructor.

120A–120B. Intermediate Arabic. (4–4) Yr.
Prerequisite: course 20A–20B or equivalent.

121A–121B. Readings in Classical Arabic. (2–2) Yr.
Prerequisite: course 120A–120B or equivalent.
May be repeated for additional credit.

122A–122B. Readings in Modern Arabic. (2–2) Yr.
Prerequisite: course 120A–120B or equivalent.
May be repeated for additional credit.

123A–123B. Arabic Grammar and Composition. (2–2) Yr.
Prerequisite: course 120A–120B and either 121A–121B or 122A–122B or equivalent.

130A–130B. Intermediate Modern Persian. (2–2) Yr.
Prerequisite: course 30A–30B or equivalent.

*131A–131B. Middle Persian. (2–2) Yr.
Prerequisite: course 130A–130B or equivalent.
Manichaean Middle Persian texts, with an introduction to Pahlavi. May be repeated for additional credit.

*132A–132B. Avestan. (1–1) Yr.
Prerequisite: consent of the instructor.
Texts from the Vendidad and the Yashts. May be repeated for additional credit.

*133A–133B. Old Persian. (1–1) Yr.
Prerequisite: consent of the instructor.
Achaemenid inscriptions.

135A–135B. Intermediate Turkish. (2–2) Yr.
Prerequisite: course 35A–35B or equivalent.

(Formerly numbered 132A–132B.)
Prerequisite: course 36A–36B or consent of instructor.

138A–138B. Ottoman Turkish Texts. (2–2) Yr.
Prerequisite: course 35A–35B or consent of instructor.
Study of Turkish texts in Arabic script of the pre-Ataturk Period.

139A–139B. A Survey of Turkish Literature. (2–2) Yr.
Turkish literature in translation from its origins in folklore, through classical literature to the literature of the modern period.

* Not to be given, 1964–1965.
† Offered in alternate years.
140A–140B. Readings in Hindi. (4–4) Yr.
Prerequisite: course 40A–40B or equivalent.
Graded readings in modern Hindi prose.

141A–141B. Advanced Readings and Composition in Hindi. (1–4; 1–4) Yr.
Prerequisite: course 140A–140B.
Texts selected according to individual requirements. May be repeated for additional credit.

142A–142B. Readings in Urdu. (4–4) Yr.
Prerequisite: course 40A–40B or equivalent.
Graded readings in modern Urdu prose.

143A–143B. Advanced Readings and Composition in Urdu. (1–4; 1–4) Yr.
Prerequisite: course 30A–30B and 142A–142B or equivalent.
Texts selected according to individual requirements. May be repeated for additional credit.

144A–144B. Hindi Prose Styles. (3–3) Yr.
Prerequisite: course 40A–40B.
Literary and conversational prose styles and their function in modern Indian society.

145A–145B. Intermediate Telugu. (4–4) Yr.
Prerequisite: course 45A–45B or equivalent.

146A–146B. Intermediate Tamil. (4–4) Yr.
Prerequisite: course 46A–46B or equivalent.

149A–149B. Studies in South Asian Languages. (2–2) Yr.
Prerequisite: consent of instructor.
Directed study in South Asian languages other than Hindi-Urdu for nonmajors. Subject to availability of staff.

H198A–H198B. Senior Honors. (2–2) Yr.
Prerequisite: limited to senior honors candidates.
Directed study centering upon preparation of an honors thesis.

199. Special Study for Advanced Undergraduates. (1–5) I and II.
Restricted to senior honor students.

Graduate Courses
(Concerning conditions for admission to graduate courses, see page 165)

201A–201B. Later Stages of Egyptian. (3–3) Yr.
Prerequisite: course 101A–101B and 102A–102B.
Introduction to late Egyptian and Demotic.

204A–204B. Advanced Akkadian. (2–2) Yr.
(Formerly numbered 251A–251B.)
Major literary compositions.

205A–205B. Advanced Sumerian. (2–2) Yr.
(Formerly numbered 252A–252B.)
Readings in early historical texts.

* Not to be given, 1964–1965.
† Offered in alternate years.
‡ To be given if a sufficient number of students enroll.
210A–210B. Semitic Linguistic Structures. (2–2) Yr.
Prerequisite: Linguistics 130 and 140, plus 12 upper-division units of a Semitic language.

211A–211B. Advanced Biblical Hebrew. (2–2) Yr.
(Formerly numbered 224A–224B.)
Prerequisite: course 110A–110B.
Reading and grammatical analysis of prophetical or poetical books of the Bible, such as Amos, Isaiah, Jeremiah, or Psalms.

220. Advanced Arabic.
Prerequisite: 12 units of upper division work in Arabic.

220A–220B. Classical and Modern Arabic Poetry. (2–2) Yr. Mr. Khouri
Prerequisite: course 110A–110B.

220C–220D. Classical Arabic Prose. (2–2) Yr. Mr. Salinger
Either series may be repeated for additional credit.

230A–230B. Advanced Persian. (2–2) Yr. Mr. Henning, Mr. Zaryab
Prerequisite: course 130A–130B.
Classical poetry, with special attention to the epics. May be repeated for additional credit.

231A–231B. Sogdian. (1–1) Yr.
Prerequisite: consent of the instructor.
Reading of Buddhist and Manichaean texts. May be repeated for additional credit.

232A–232B. Advanced Avestan. (2–2) Yr.
Mr. Henning
Prerequisite: course 132A–132B or consent of instructor.
Reading of Younger Avestan texts, especially Yashts, and of selected passages from the Gathas.

233A–233B. Advanced Middle Iranian. (1–1) Yr.
Mr. Henning
Prerequisite: course 131A–131B or consent of instructor.
Parthian and Middle Persian texts, taken from the Zoroastrian and Manichean literatures.

236A–236B. Classical Armenian. (2–2) Yr.
Mr. Essabal
Prerequisite: working knowledge of modern Armenian or of one of the early Indo-European languages, such as Latin, Greek, or Sanskrit.

236A is not prerequisite to 236B.
The structure of Classical Armenian and its place among the Indo-European languages.

290A–290B. Special Study. Yr.
The Staff
Credit up to a maximum of 12 units awarded according to work completed.

291A–291B. Seminar. (2–2) Yr.
The Staff
Students may receive credit for more than one seminar in the same semester. May be repeated without duplication of credit with consent of the instructor.
(a) Akkadian, Mr. Finkelstein; (b) Arabic, Mr. Brinner, Mr. Khouri, Mr. Salinger; (c) Egyptian, Mr. Baer; (d) Hebrew, Mr. Fischel, Mr. Haran; (e) Iranian, Mr. Henning; (f) Persian, Mr. Henning, Mr. Zaryab; (g) Semitics, Mr. Haran; (h) South Asian Languages, Mr. Gumperz; (i) South Asian Literatures,
Maynard A. Joslyn, Ph.D., Professor of Food Technology.
Judson T. Landis, Ph.D., Professor of Family Sociology.
Gordon Mackinney, Ph.D., Professor of Food Technology.
Sheldon Margen, M.D., Professor of Human Nutrition and of Social Welfare.
*Harold S. Olcott, Ph.D., Professor of Marine Food Science.
E. L. Robert Stokstad, Ph.D., Professor of Nutrition.
Jessie V. Coles, Ph.D., Professor of Home Economics, Emeritus.
Bessie B. Cook (Bessie Cook Jeffers), Ph.D., Professor of Nutrition, Emeritus.
William V. Cruess, Ph.D., Professor of Food Technology, Emeritus.
Helen L. Gillum, Ph.D., Professor of Nutrition, Emeritus.
Agnes Fay Morgan, Ph.D., Professor of Nutrition, Emeritus.
Ruth Okey, Ph.D., Professor of Nutrition, Emeritus.
W. Duane Brown, Ph.D., Associate Professor of Marine Food Science.
Richard L. Lyman, Ph.D., Associate Professor of Nutrition.
Mary Ann Williams, Ph.D., Associate Professor of Nutrition.
Barbara M. Kennedy (Barbara Kennedy Johnson), Ph.D., Assistant Professor of Nutrition.
Rosemarie Ostwald, Ph.D., Assistant Professor of Nutrition.

Mildred J. Bennett, Ph.D., Lecturer in Nutrition.
Ellsworth C. Dougherty, Ph.D., M.D., Lecturer in Comparative Nutrition.
Cecil Entenman, Ph.D., Lecturer in Nutritional Sciences.
Karl A. Folkers, Ph.D., Lecturer in Vitamin Chemistry.
Henrietta Henderson, B.S., Cert.Diet., Lecturer in Hospital Dietetics.
Ruth L. Huememann, D.Sc., Associate Professor of Public Health Nutrition.
Samuel Lepkovsky, Ph.D., Professor of Poultry Husbandry.
Virginia R. McMasters, M.S., Lecturer in Dietetics.
Ruth C. Steinkamp, M.D., Lecturer in Human Nutrition.
Gaylord P. Whitlock, Ph.D., Lecturer in Nutrition Education.


Departmental Adviser: Miss Kennedy.

 Majors in Nutritional Sciences: Dietetics, Food Science, Nutrition.

The B.S. degree in nutritional sciences is granted upon the completion of one of these majors. The following five items must be satisfied:

1. General University requirements.
2. College of Agriculture requirements (see page 65).

2 In residence spring semester only, 1964–1965.
NUTRITIONAL SCIENCES / 459

3. Nutritional Sciences Curriculum requirements: (a) General—bacteriology, 4 units; biochemistry, 3 units; chemistry, 13 units; economics, 3 units; English and/or speech, 6 units; physics, 3 units; physiology, 3 units. (b) Nutritional sciences and related fields—courses in nutritional sciences depending on major selected, 21–35 units. Related courses in other departments depending on major selected, 8–32 units. (c) Electives (restricted)—anthropology, art, foreign language, geography, geology, history, music, philosophy, political science, psychology, sociology; or additional units in economics and English, 15 units.

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), 18–41 units.

5. Certain courses are required, and, where applicable, may be used in partial satisfaction of (3) above. For details, see the ANNOUNCEMENT OF THE COLLEGE OF AGRICULTURE, BERKELEY, available without charge.

Honors. Information concerning honors may be obtained from the Dean’s Office, College of Agriculture.

NUTRITIONAL SCIENCES

Lower Division Courses

1. Introduction to Nutritional Sciences. (3) II.
   The Staff (Mr. Stokstad in charge)
   Prerequisite: Chemistry 1A. Recommended: Chemistry 8. Intended primarily for majors. Introduction to the chemical, biochemical, and physiological aspects of compounds in foods and their nutritional significance.

10. Survey of Nutritional Sciences. (3) I.
    The Staff (Mr. Briggs in charge)
    Primarily for nonmajors. Broad aspects of nutritional sciences and food components and their importance to life and mankind. Not open to students who have had course 1.

11. Foods as Sources of Nutrients. (2) I.
    Miss Kennedy
    Prerequisite: course 1; Chemistry 1A, 8.
    Composition of foods; chemical and physical changes in preparation and preservation.

11L. Foods as Sources of Nutrients—Laboratory. (2) I.
    Miss Kennedy
    Prerequisite: course 11 (to be taken concurrently).

12. Experimental Food Study. (3) II.
    Miss Kennedy
    (Formerly Nutrition 2.)
    Lecture and laboratory. Prerequisite: course 11 and 11L. (Primarily for majors in dietetics.
    Chemical and physical changes involved in food preparation, preservation, and storage as they affect acceptability.

Upper Division Courses

100. Food Economics. (3) I.
    The Staff (Mr. Briggs in charge)
    Lecture and laboratory. Prerequisite: course 11, 11L; Business Administration 160 or Agricultural Economics 130.
    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.  
Lecture and Laboratory. Prerequisite: course 11 (may be taken concurrently); Chemistry 1B, 8; or Chemistry 1B and 8 with grades of at least B.  
Principles of quantitative analysis applied to food materials; chemical analysis of typical carbohydrate, fat, and protein foods.

*101B. Advanced Food Analysis. (3) II.  
Lecture and laboratory. Prerequisite: course 101A or Chemistry 5 with a grade of at least B. Given in spring semester of even-numbered years.

Official analytical methods and legal standards for foods. Examination for deterioration and adulteration.

102. Principles and Practices of Food Processing. (3) I.  
Mr. Joslyn  
Prerequisite: Chemistry 1A–1B and 8; Bacteriology 1 and 4; and a course in botany, zoology or physiology.  
Preparation, preservation and utilization of foods and food products.

103. Biochemical Aspects of Food Processing. (3) II.  
Mr. Olcott  
Prerequisite: Chemistry 1A–1B, and 8; Bacteriology 1 and 4.

Chemical, physical, and nutritional properties of foods and their changes during processing and storage.

104. Enzymes in Foods and Nutrition. (3) I.  
Mr. Joslyn  
Prerequisite: Biochemistry 102.  
Control and utilization of enzymes in preparation and preservation of foods and food products and the enzymatic aspects of digestion.

105. The Natural Coloring Matters. (3) II.  
Mr. Mackinney  
Lecture and laboratory. Prerequisite: 3 units of 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.

108. Introduction to Food Research. (2) II.  
Miss Kennedy  
Prerequisite: course 101A or Chemistry 5.  
Proseminar on current research in the chemistry of food composition, preparation, and control.

108L. Introduction to Food Research Laboratory. (2) II.  
Miss Kennedy  
Prerequisite: course 108, to be taken concurrently.

110. Nutrition. (3) I and II.  
Miss Williams  
Prerequisite: Chemistry 1A or high school chemistry; Physiology 1. Primarily for students not majoring in Nutritional Sciences. Not open for credit to students who have taken Nutritional Sciences 112.

Essential nutrients and their functions in human nutrition.

112. Human Nutrition. (3) I.  
Mrs. Calloway, Mr. Margen  
Lectures and laboratory. Prerequisite: course 1 and 11; Biochemistry 100A or 102; Physiology 1.

Scientific principles of meeting the metabolic and nutritional needs of normal individuals throughout the life span.

114. Laboratory Methods in Metabolism. (4) II.  
Miss Williams  
Lectures and laboratory. Prerequisite: course 101A or Chemistry 5; Biochemistry 102 (may be taken concurrently).  
Introduction to quantitative chemical methods used in nutrition research.

* Not to be given, 1964–1965.
115. Therapeutic Nutrition (3) II.  Mrs. Calloway
Lectures and laboratory. Prerequisite: course 112.
Biochemical, physiological, and nutritional basis for therapeutic treatment of various conditions and diseases in man by dietary means.

118A–118B. Experimental Nutrition. (2–2) Yr.  Mr. Lyman
Prerequisite: course 112 (may be taken concurrently), 114, and Biochemistry 102; or Biochemistry 100A–100B and 101A–101B.
Principles and experimental aspects of biochemistry and physiology as applied to the nutritional sciences.

118C–118D. Experimental Nutrition Laboratory. (2–2) Yr.  Mr. Lyman, Mrs. Ostwald
Prerequisite: course 118A–118B (may be taken concurrently) or equivalent.
Quantitative laboratory techniques used in research in nutrition.

121A–121B. Problems of Quantity Food Service. (4–4) Yr. Mrs. McMasters
Lectures and laboratory. Prerequisite: course 12. Recommended: Business Administration 1A or 10 and Business Administration 151 or Psychology 185.
121A. Quantity preparation of food: acceptability, retention of nutrients, economy.
121B. Organization and management of quantity food service.

198. Directed Group Study. (1–5) I and II. The Staff (Mr. Briggs in charge)
Prerequisite: consent of the instructor.

199. Special Study for Advanced Undergraduates. (1–5) I and II.
The Staff (Mr. Briggs in charge)
Prerequisite: senior standing, 3.0 grade-point average, and approval of the adviser.

Graduate Courses

(Concerning conditions for admission to graduate courses, see page 165)

201A–201B. Seminar in Nutrition. (1–2; 1–2) Yr. Mr. Brown, Mr. Briggs
One lecture for each unit. Prerequisite: limited to first-year graduate students.
Introduction to research in nutritional sciences; emphasis on reporting and critical evaluation of topics in the current nutritional science literature.

*205. Biochemical Aspects of Protein Nutrition. (2) II.  Mr. Brown
Prerequisite: Biochemistry 100A and B, or 102, or consent of instructor.
Nutrition of proteins relative to their structure and chemical properties. Includes experimental methods. To be given in even-numbered years.

219. Vitamin Analysis. (3) II.  Miss Williams
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.

290. Advanced Seminars in Nutritional Sciences. (1–4) I and II. The Staff
One hour for each unit.
Open to qualified graduate students. May be repeated for credit.
Areas of study in the various seminars may vary each semester but will include discussions of recent research in experimental nutrition, human nutrition, foods, and dietetics.

299. Research in Food and Nutrition. (1–9) I and II.
The Staff (Mr. Briggs 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.
Open only to selected graduate students.
Conferences and supervised practice in the dietary department of the University of California Hospital and clinics.

FAMILY SOCIOLOGY

137. Marriage and the Family. (3) I and II.
(Formerly Nutritional Sciences 137.)
Contemporary family life, with attention to personality development and mental health; psychological interpretations of social and sexual roles; cultural contrasts and marriage; dynamics of marriage interaction and parent-child relationships.

138. The Contemporary American Family. (3) II.
(Formerly Nutritional Sciences 138.)
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.
(Formerly Nutritional Sciences 139.)
Various social factors, social groupings, and social contexts in relation to the social development of the child.

Graduate Course

237. Seminar in Family Sociology. (2) II.

OPTOMETRY

(Department Office, 101 Optometry Building)

Horace Barlow, M.D., Professor of Physiological Optics and Optometry.
Elwin Marg, Ph.D., Professor of Physiological Optics and Optometry.
Meredith W. Morgan, Ph.D., Professor of Physiological Optics and Optometry (Chairman of the Department).
Gerald Westheimer, Ph.D., Professor of Physiological Optics and Optometry.
Kenneth B. Stoddard, Ph.D., Professor of Physiological Optics and Optometry, Emeritus.
Jack T. Hobson, B.S., Assistant Professor of Optometry, Emeritus.
Merton Flom, Ph.D., Associate Professor of Physiological Optics and Optometry.
Henry Peters, M.A., Associate Professor of Optometry.
Richard M. Hill, Ph.D., M.Opt., Assistant Professor of Physiological Optics and Optometry.

OPTOMETRY

(Department Office, 101 Optometry Building)

Horace Barlow, M.D., Professor of Physiological Optics and Optometry.
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Jack T. Hobson, B.S., Assistant Professor of Optometry, Emeritus.
Merton Flom, Ph.D., Associate Professor of Physiological Optics and Optometry.
Henry Peters, M.A., Associate Professor of Optometry.
Richard M. Hill, Ph.D., M.Opt., Assistant Professor of Physiological Optics and Optometry.

2 In residence spring semester only, 1964-1965.
Robert B. Mandell, Ph.D., O.D., Assistant Professor of Physiological Optics and Optometry
Marshall B. Atkinson, M.D., Assistant Clinical Professor of Ophthalmology.
Morton D. Sarver, M.S., Assistant Clinical Professor of Optometry.
Harvey Arnold, B.S., Clinical Instructor in Optometry.
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.
Joseph P. Farrington, B.S., Clinical Instructor in Optometry.
Allan N. Freid, M.Opt. Clinical Instructor in Optometry.
Robert F. Harrigan, B.S., Clinical Instructor in Optometry.
Monroe J. Hirsch, Ph.D., Clinical Instructor in Optometry.
Kenton E. Kerr, M.Opt., Clinical Instructor in Optometry.
Kermit Kors, M.Opt., Clinical Instructor in Optometry.
Robert W. Lester, A.B., Clinical Instructor in Optometry.
Leonard Osias, B.S., Clinical Instructor in Optometry.
William R. Pinkerton, M.Opt., Clinical Instructor in Optometry.
Ellen Takahashi, M.Opt., Clinical Instructor in Optometry.

Leon Lewis, M.D., Lecturer in Medicine and Pathology.

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 91.

Upper Division Courses

Prerequisite. Physics 2A–2B, 3A–3B, Chemistry 1A, 8, Mathematics 16A, 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.

Laws of optics, ray tracing, design of ophthalmic instruments and lenses.

102A–102B. Theoretical Optometry. (3–4) Yr. Mr. Westheimer, Mr. Hill

One unit of laboratory will be given the second semester.

The eye as an optical instrument; the states of refraction as optical and biological variables, correlated visual sensations, and optical methods of correction.

† 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—Human Anatomy
- Zoology 1A—Comparative 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.
103A–103B. Advanced Theoretical Optometry. (3–3) Yr.  Mr. Morgan
Prerequisite: course 102A–102B.
Extension of course 102A–102B to binocular vision: binocular accommodation, ocular movements, fusion, and the anomalies of binocular vision.

Professional Courses

401A–401B. Ophthalmic and Mechanical Optics. (2–2) Yr.  Mr. Peters, Mr. Kerr
Lectures and laboratory.
Lectures: development of lenses and spectacles, and the properties of available ophthalmic lenses. Laboratory: lens surfacing, edging, beveling, mounting and neutralization, and frame fitting and adjustment.

404A–404B. Practical Optometry. (3–3) Yr.  Mr. Morgan, Mr. Flom
Prerequisite: course 102A–102B and 401A–401B.
Instruments and techniques used in the examination and treatment of the eyes and vision interpretation of examination results, and the prescribing of lenses and/or orthoptics.

406A–406B. Optometry Clinic. (2–2) Yr.  The Staff (Mr. Peters in charge)
Prerequisite: course 102–102B, 401A–401B and Physiology 115.
Complete physical eye examinations of clinic patients. The prescribing of ophthalmic devices for the alleviation of abnormal visual conditions.

407A–407B. Introduction to Pathology of the Eye. (1–2) Yr.  Mr. Lewis, Mr. Peters
Prerequisite: Physiology 115.
Lectures and demonstrations: introduction to pathology, systemic diseases which have ocular manifestations and the identification of pathological conditions of the eye.

499. Special Study for Advanced Undergraduates. (1–4) I and II.  The Staff (Mr. Morgan in charge)

Graduate Courses

(Concerning conditions for admission to graduate courses, see page 165)
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. Peters in charge)
The examination and treatment with lenses and/or orthoptics of patients with visual anomalies.

212A–212B. Advanced Clinical Procedures. (3–3) Yr.  Mr. Hill, Mr. Mandell, Mr. Peters
Lectures and class assignments on aniseikonia, strabismus and other binocular anomalies; occupational, school and subnormal vision; contact and telescopic lenses; and allied subjects.

214A–214B. Seminar in Clinical Problems. (2–2) Yr.  Mr. Morgan

216A–216B. Advanced Pathology of the Eye. (2–2) Yr.  Mr. Atkinson
A more detailed consideration of the topics covered in course 407A–407B with particular reference to the determination of diseases of the visual system in clinic patients.

217. Optometric Law, Economics and Practice. (1) II.  Mr. Sarver
PHYSIOLOGICAL OPTICS

Upper Division Courses

105A–105B. Physiological Optics. (3–3) Yr. Mr. Barlow, Mr. Mandell
Prerequisite: 105A: consent of instructor; 105B: Physics 106A–106B and Physiology 115.
105A. The psychophysics and physiological psychology of the light, form and color senses.
105B. Neurophysiology of the visual system; radiation and illumination.

106A–106B. Laboratory in Physiological Optics. (1–1) Yr.
Laboratory to accompany 105A–105B. Mr. Barlow, Mr. Mandell

109. Physiological Optics. (3) I. Mr. Mandell
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 165)

201A–201B. Seminar in Physiological Optics. (2–2) Yr.
Mr. Barlow, Mr. Flom, Mr. Westheimer

203. Space Perception and Binocular Vision. (2) I. Mr. Flom
*205. The Evolution of the Visual System (1) II. Mr. Flom
207. Recent Developments in Visual Science. (1) II. Mr. Flom
Prerequisite: graduate standing in the School of Optometry or consent of instructor.
Critical analysis and discussion of assigned readings in the current literature on physiological optics.

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).
Geometrical Optics (Physics 106A).
Physical Optics (Physics 106B).
General Human Anatomy (Anatomy 25).

ORIENTAL LANGUAGES

(Department Office, 102 Durant Hall)

Peter A. Boedberg, Ph.D., Agassiz Professor of Oriental Languages and Literature.
Denzel Carr, Ph.D., Professor of Oriental Languages.
Kun Chang, Ph.D., Professor of Oriental Languages.
Shih-Hsiang Chen, B.Litt., Professor of Chinese.

* Not to be given, 1964–1965.
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 91.

Departmental Major Advisers: Mr. Chang (Chinese); Mr. Mills (Japanese); Mr. Bosson (Altaic Languages).

The Major—Required:

1. Chinese: courses 1C, 2C, 3C, 4C, 100; 106 and one other upper division course in Modern Chinese; 143 and one other upper division course in Classical Chinese; other courses in Chinese to make a total of 24 upper division units; also, 4 to 6 units of another Oriental language, either lower or upper division (among these, upper division courses may also be counted among the 24 upper division units).

Undergraduate students expecting to proceed to the M.A. or Ph.D. degree in Oriental Languages and emphasis on Chinese must take courses 104 and 104E (at least 4 units) and, in their senior year, 133A–133B.

2. Japanese: courses 1J, 2J, 3J, 4J, 4C, 100, 119, 129A, 129B, 129C, 131, and other courses in Japanese to make up a total of 24 upper division units. (Recommended: course 143 which may be counted among the 24 upper division units required.)

3. Altaic Languages: courses 1M, 2M (for Mongol emphasis) or Near Eastern Languages 35A–35B (for Turkish emphasis); courses 1J, 2J, or 1K, 2K; 100, 154A–154B, 174A–174B, 176A–176B, and other relevant courses as designated by adviser (e.g., 154E, 164A–164B, 194, Near Eastern Languages 139A–139B) to make a total of 24 upper division units.

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 (Peoples of Southeast Asia), 120 (Language and Culture), 147 (People and Cultures of the Pacific Islands), 186 (Ethnology of Japan); Architecture 128 (Architectural History—Oriental); Art 1D (History of Oriental Art), 160A–160B (History of Early Oriental Art). Geography 154B (China); 59C (Culture of Early Asia); History 148B (Chinaku); 150 (Philosophy); Linguistic 258B (Phonetics); Modern Societies 195 (Modern China).

Honors Program. Students must have an average of 3.0, not necessarily in the program, to remain in the Honors Program. In order to obtain the Honors Program degree, the student must have a grade point average of 3.5 or better. Writing a senior thesis under the supervision of an advisor is required. The thesis will be written in the senior year of regular residence fall semester only, 1964–1965.
Honors Program. An undergraduate student who has completed 16 units of language courses in the department, and has an over-all grade-point average of 3.0, may apply to the departmental chairman for admission to the honors program. 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.

Lower Division Courses

Duplication of Credit. A student will not be allowed credit for that part of the first 12 units in a foreign language (elementary and intermediate courses) which duplicate courses previously completed in high school or at another institution of collegiate grade. (Conversation courses are not considered to duplicate previous credit.) The first two years of work in a foreign language in high school is considered to be equivalent to one semester in college (4 units); each successive year in a foreign language in high school is equal to one additional semester in college (4 units).

1C. Elementary Chinese. (4) I. 
(Formerly numbered 1.)
Class meets five hours a week.
Introduction to Mandarin ("Modern Chinese").

2C. Elementary Chinese (continued). (4) II. 
(Formerly numbered 2.)
Class meets five hours a week. Prerequisite: course 1C.
Mandarin continued.

3C. Intermediate Chinese. (4) I. 
(Formerly numbered 6.)
Class meets five hours a week. Prerequisite: course 2C.
Mandarin continued.

4C. Intermediate Chinese (continued). (4) I and II. 
(Formerly numbered 3.)
Class meets five hours a week. Prerequisite: course 3C or 3J.
Introduction to "Classical" Chinese.
1J. Elementary Modern Japanese. (4) I.  
Mr. Nakamura, Mr. Aoki  
(Formerly numbered 9.)  
Class meets five hours a week.

2J. Elementary Modern Japanese. (4) II.  
Mr. Nakamura, Mr. Aoki  
(Formerly numbered 19.)  
Class meets five hours a week. Prerequisite: course 2J.

3J. Intermediate Modern Japanese. (4) I.  
Mr. Nakamura  
(Formerly numbered 39.)  
Prerequisite: course 2I, or equivalent.

4J. Introduction to Classical Japanese. (2) II.  
Mr. Nakamura  
Prerequisite: course 3J. To be taken concurrently with course 119.

1K. Elementary Korean. (4) I.  
Mr. Rogers  
(Formerly numbered 7A.)  
Class meets five hours a week.

2K. Elementary Korean (continued). (4) II.  
Mr. Rogers  
(Formerly numbered 7B.)  
Class meets five hours a week. Prerequisite: course 1K.

1M. Modern Mongolian (Khalkha). (4) I.  
Mr. Bosson  
(Formerly numbered 14.)  
Class meets five hours a week.  
An introduction to the official language of the Mongolian People’s Republic; graded readings in literary and expository texts.

2M. Modern Mongolian (Khalkha) (continued). (4) II.  
Mr. Bosson  
Class meets five hours a week. Prerequisite: course 1M.

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.

16. Mandarin Composition. (2) II.  
Mr. Birch  
Prerequisite: course 3C.

17. Introduction to the Study of Chinese Characters. (2) I.  
Mr. Boodberg

18. Readings in Indonesian. (3) II.  
Mr. Carr  
Prerequisite: course 8, or equivalent.

23. Introduction to Chinese Philology. (2) II.  
Mr. Schafer  
Prerequisite: course 2C.  
Basic conceptions of philology and textual criticism.

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.

Mr. Boodberg  
Lectures and readings on the great classics of Eastern Asia, in English translation.  
Course 38A is not prerequisite to 38B.

* Not to be given, 1964–1965.
### Upper Division Courses

Course 4C is prerequisite to all upper division courses in Chinese; course 106 is prerequisite to all upper division courses in Mandarin ("Modern Chinese") except course 124A–124B; course 143 is prerequisite to all upper division courses in Classical Chinese. Course 4J is prerequisite to all upper division courses in Japanese except course 119.

At the direction of the instructor, lower division courses in Near Eastern Languages, Classics, (Sanskrit, Greek, or Latin) and Linguistics may be designated as prerequisite to upper division courses in Indonesian, Mongolian, Old Turkish, and Tibetan.

#### 100. Languages of Eastern Asia. (2) I.
Mr. Aoki
Required of all majors in Oriental languages.
A survey course on the nature and distribution of main languages of Eastern Asia.

#### 103. Classical Chinese: Historical Texts. (3) II.
Mr. Schafer
Prerequisite: course 143.

#### 104. Studies in Ancient Chinese Literature: Philological Analysis of Texts. (3) I.
Mr. Boodberg
Prerequisite: six upper division units in Chinese. May be repeated for credit.
Topics and text will vary from year to year.

#### 106. Contemporary Chinese Writers. (3) I.
Mr. Birch
Prerequisite: course 4C.
Readings in all genres of Chinese literature since 1917.

#### 107. Intermediate Korean. (2) I and II.
Mr. Rogers
Prerequisite: course 1K, 2K, or equivalent. May be repeated for credit.

#### 109. Readings in Modern Japanese (Expository Prose). (3) I.
Mr. Nakamura
Prerequisite: course 119.

#### 113. Classical Chinese: Canonical and Philosophical Texts. (2) II.
Mr. Schafer
Prerequisite: course 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 3J or the equivalent.

#### 123. Chinese Grammar. (3) II.
Mr. Chang
Prerequisites: course 106 and Linguistics 35.

#### 124A–124B. Readings in Modern Chinese. (2–2) Yr.
Mr. Birch, Mr. Chen
Prerequisite: 124A: course 4C; 124B: course 106 or 124A.
124A. Texts on social and political topics. Mr. Birch
124B. Texts of literary and philosophical interest. Mr. Chen

* Not to be given, 1964–1965.
128. Classical Malay Literature. (2) I. Mr. Carr
Prerequisite: course 18.
Reading of Sêjarah Melayu and other standard texts in Roman and Arabic characters.

129A. Readings in Classical Japanese Literature: Prose. (3) I. Mr. Mills
Prerequisite: course 4j and 119.

129B. Readings in Classical Japanese Literature: Verse. (3) II. Mr. Mills
Prerequisite: course 4j and 119. 129A is not prerequisite to 129B.

129C. Readings in Classical Japanese Literature: Drama. (3) I. Mr. Mills
Prerequisite: course 4j and 119. Courses 129A, 129B are not prerequisite to 129C.

131. Japanese Bibliography. (2) I. Mr. Mills
Prerequisite: course 119.
Open to juniors.

133A–133B. Chinese Bibliography. (2–2) Yr. Miss Huff
Prerequisite: course 143.
Open to seniors.

134A–134B. Cantonese. (2–2) Yr. Mr. Aoki
Not open to students with previous experience in standard Cantonese.

135. Phonology of Ancient Chinese. (3) I. Mr. Chang
Prerequisite: course 143.

138. Modern Indonesian and Malay Literature. (3) II. Mr. Carr
Prerequisite: course 18 or the equivalent.

139. Japanese Grammar. (2) I. Mr. Aoki
Prerequisite: course 4j and 119.
Studies in the structure and history of the Japanese language.

143. Classical Chinese: Medieval Texts (Cultural and Literary). (3) I. Mr. Schafer
Prerequisite: course 4c.

149A–149B. Advanced Colloquial Japanese. (2–2) Yr. Mr. Nakamura
Prerequisite: course 3j. 149A is not prerequisite to 149B.
Training in the active use of colloquial Japanese. Lectures in Japanese on elements of
Japanese culture will be given in the second semester.

154A–154B. Classical Mongolian. (4–4) Yr. Mr. Bosson
(Formerly offered as course 154.)
Prerequisite: consent of instructor.

156. Readings in Chinese Vernacular Literature. (2) I. Mr. Birch
Prerequisite: course 106.

159. Readings in Contemporary Japanese Literature. (3) II. Mr. Aoki
Prerequisite: course 119.
Fiction and drama from the Meiji period to the present.

164A–164B. Tibetan. (3–3) Yr. Mr. Bosson
(Formerly numbered 164.)
Prerequisite: consent of instructor.
Introduction to the grammar of standard literary Tibetan; graded readings in Tibetan
prose from literary and historical sources.

* Not to be given, 1964–1965.
176A–176B. Old Turkish. (3–3) Yr. Mr. Bosson
Prerequisite: consent of instructor.
Introduction to the language of the early Central Asian Turks; analysis of texts from ‘runic’ inscriptions, Uighur and Chaghatay.

*187. Philological Laboratory. (2) II. Philological analysis of an Oriental language, using textual material.

191A–191B. Masterpieces of Chinese Literature and Literary Criticism. (2–2) Yr. Mr. Chen
Prerequisite: course 143. 191A is not prerequisite to 191B.
191A. Verse.
191B. Belles-lettres.

191C–191D. Masterpieces of Chinese Literature and Literary Criticism. (2–2) Yr. Mr. Chen
Prerequisite: 191C: course 143; 191D: course 106. Course 191A–191B is not prerequisite to course 191C. Course 191C is not prerequisite to course 191D.

*194. Sino-Altaica. (3) II. Mr. Boodberg
Prerequisite: 16 units of Chinese language courses.
Problems in texts pertaining to the history of the Chinese frontier with special reference to China’s early relations with Altaic-speaking peoples.

H195. Honors Course. (1–6) I and II. The Staff (Mr. Birch 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. Birch in charge)

199. Special Individual Study. (1–5) I and II. Mr. Birch in charge
Prerequisite: restricted to senior honors students in Oriental Languages.

Lecture Courses
Prerequisite: junior standing. Knowledge of an Oriental language not required.

*104E. Studies in Ancient Chinese Literature: Interpretation. (1) I and II. Mr. Boodberg
May be repeated for credit. Topics will vary from semester to semester.

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) I. Mr. Schaefer
From the beginning to modern times, emphasizing Chinese, Buddhist, and Western influences.

*142C. Civilizations of Eastern Asia: China. (3) I. Mr. Schaefer
Emphasis on material culture, technology, and science.

* Not to be given, 1964–1965.
142J. Civilizations of Eastern Asia: Japan. (3) II.  
Mr. Mills  
A broad survey of Japanese civilization dealing with cultural, literary, religious, and social developments.

142K. Civilizations of Eastern Asia: Korea. (2) II.  
Mr. Rogers  
The development of Korean civilization; emphasis on Chinese influence.

*152. Japanese Literature and the West. (2) II.  
A comparative approach toward modern Japanese literature.

*154E. The Mongols, Their Language and Literature. (1) I.  
Mr. Bosson

*163. Readings in Pacific Literature in English Translation. (2) II. Mr. Carr  
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) II.  
Mr. Birch  
Fiction 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.

All courses may be repeated for credit with consent of the instructor.

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.

213. Seminar in Philological Analysis of Ancient Chinese Texts. (2) II.  
Mr. Boodberg

216. Texts on the Civilization of Medieval China. (2) I.  
Mr. Schafer  
(Formerly numbered 216A–216B.)

217A–217B. Seminar in Philological Analysis of Koryo and Yi Dynasty Sources. (2–2) Yr.  
Mr. Rogers

229. Seminar in Japanese Literature. (2) I and II.  
Mr. Mills

235. Seminar in Chinese Dialectology. (2) II.  
Mr. Chang

236A–236B. Seminar in Contemporary Chinese Writings on Linguistics. (2–2) Yr.  
Mr. Chang

239. Seminar in Japanese Linguistics. (2) II.  
Mr. Aoki

* Not to be given, 1964–1965.
249. Seminar in Japanese Poetry. (2) II.

Emphasis on presentation, style and structure of Japanese poetry. Brief review of the evolution of the Manyo, the Kokin, and the Shinkokin, and stress on Kindai shika.

250. Research. (1-4) I and II.

The Staff (Mr. Birch in charge)

1G. Chinese for Graduate Students. (No credit) II.

Prerequisite: one semester of Chinese.

Readings in modern "literary style" for graduate students not in the Department of Oriental Languages.

PALEONTOLOGY

(Department Office, 193 Earth Sciences Building)

J. Wyatt Durham, Ph.D., Professor of Paleontology and Curator of Mesozoic and Cenozoic Invertebrates in the Museum of Paleontology.

Joseph T. Gregory, Ph.D., Professor of Paleontology and Curator of Lower Vertebrates in the Museum of Paleontology (Chairman of the Department).

Robert M. Kleinpell, Ph.D., Professor of Paleontology and Curator of Mesozoic and Tertiary Foraminifera in the Museum of Paleontology.

Donald E. Savage, Ph.D., Professor of Paleontology and Curator of Higher Vertebrates 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.

Zach M. Arnold, Ph.D., Associate Professor of Paleontology, Curator of Pleistocene and Recent Microorganisms (Vice-Chairman of the Department).

William B. N. Berry, Ph.D., Associate Professor of Paleontology, Curator of Paleozoic Invertebrates in the Museum of Paleontology, and Associate Director of the Museum of Paleontology.

Wayne L. Fry, Ph.D., Associate Professor of Paleontology and Curator of Paleobotany in the Museum of Paleontology.

Harry D. MacGinitie, Ph.D., Visiting Professor of Paleontology for fall semester.

Samuel P. Welles, Ph.D., Lecturer in Paleontology and Principal Museum Paleontologist in the Museum of Paleontology.

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 91.

Departmental Major Adviser: Mr. Savage.

Graduate Adviser: Mr. Gregory

* Not to be given, 1964–1965.
1 In residence fall semester only, 1964–1965.
2 In residence spring semester only, 1964–1965.
The Major. Undergraduate majors are designed to provide a broad acquaintance with the field of paleontology and related sciences suitable as a foundation for advanced study. Either geological or biological aspects may be emphasized.

The major shall include: Paleontology I, 3; Geology 5; Zoology 1A or Botany 1; Chemistry 1A; and either German or French as a foreign language. Majors with geological emphasis require Physics 2A and Geology 6; vertebrate paleontology requires Zoology 1B.

All majors must include Paleontology 111, 112, 120, and a year sequence of related advanced courses in paleontology. Majors with geological emphasis shall include Geology 103, 105, and 5 additional upper division units in geology. Majors with biological emphasis shall include either Genetics 100 or 103A-103B or Zoology 114; one of the following: Botany 110, Zoology 106, or Zoology 108; and 4 additional upper division units in zoology or botany related to the field of concentration. A list of recommended courses in related fields will be provided by the adviser upon request.

Either an advanced course in field geology or a course at a marine biological station or biological camp is recommended during the summer between junior and senior years.

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. Students accepted in the honors program are required to complete course H195.

Lower Division Courses

1. General Paleontology: History of Life. (3) I and II.  Mr. Arnold, Mr. Savage

   Two lectures and one two-hour laboratory period per week; field trip.
   Methods of interpreting 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.  Mr. Gregory

   Two lectures and one three-hour laboratory period per week; field trips. Prerequisite: course 1 or Zoology 1A or Geology 5 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) I and II.  Mr. Arnold, Mr. Savage

   Two lectures per week; one or more field excursions half day Saturday. 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.  Mr. Berry

   Two lectures and two three-hour laboratory periods per week. Prerequisite: course 1, or Zoology 1A.
   Paleobiology, morphology, and systematics of the invertebrates.
112. Stratigraphic Paleontology. (4) II. Mr. Berry, Mr. Savage
Two lectures and two three-hour laboratory periods per week. Prerequisite: course 111 or equivalent.
Elements of biostratigraphy and the stratigraphic sequence of fossils.

114A. Micropaleontology. (3) I. Mr. Kleinpell
One lecture and two three-hour laboratory periods per week. Prerequisite: course 112.
Principles of biostratigraphic correlation with emphasis on the Foraminifera.

114B. Micropaleontology. (3) II. Mr. Arnold
One lecture and two three-hour laboratory periods per week. Prerequisite: course 112 or consent of instructor.
Paleobiology of microorganisms with emphasis on the Foraminifera.

116. Paleozoic Invertebrates. (4) II. Mr. Berry
Two lectures and two three-hour laboratory periods per week. 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. Mr. Durham
Two lectures and two three-hour laboratory periods per week. Prerequisite: course 111 or Zoology 108.
Advanced studies in mollusks, echinoids, corals and other invertebrates.

120. Paleobotany. (3) II. Mr. Fry
Two lectures and one three-hour laboratory period per week. Prerequisite: consent of 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 spring 1965); (2) Paleobotany for students with comprehensive training in botany.

121. Floras of the Past. (3) I. Mr. MacGinitie
One lecture and two three-hour laboratory periods per week.

125. History of the Lower Vertebrates. (4) I. Mr. Gregory
Two lectures 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 and two three-hour laboratory periods per week. Prerequisite: course 126.

136. Paleozoic and Early Mesozoic of North America. (4) II. Mr. Berry
Three lectures and one laboratory period per week, field trips. Prerequisite: course 111 and 112.

139. Cenozoic History of the West Coast of North America. (4) II. Mr. Kleinpell
Three lectures and one three-hour laboratory period per week. Assigned readings. Prerequisite: course 114A.
Emphasis on correlation, sequence, and relationships of foraminiferal faunas.

170. History of Paleontology. (2) II. Mr. Gregory
Two lectures per week. Prerequisite: consent of instructor.
Discovery and development of ideas, principles, and methods; modern trends and theories.

* Not to be given, 1964–1965.
H195. Honors Thesis. (5) I and II.

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.

Restricted to senior honors students in paleontology.
Special problems or reading assignments.

Graduate Courses

(Concerning conditions for admission to graduate courses, see page 165)

*222. Introduction to Palynology. (4) I.

Two lectures and two three-hour laboratory periods per week.
Prerequisite: Botany 120; Paleontology 120 or Botany 110.
Principles of pollen analysis.

*223. Stratigraphic Palynology. (3) II.

Prerequisite: course 222.

237. 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, 112, and consent of instructor.
Studies of original literature and materials on invertebrate paleontology and stratigraphy.

250. Seminars in Paleontology. (2) I and II.

Advanced study and current literature in various fields of paleontology. Topics vary from year to year. During 1964–1965 the following seminars will probably be offered: (a) Biostratigraphy, I, Mr. Berry; (b) Micropaleontology, I, Mr. Kleinpell; (c) Fossil Mammals, II, Mr. Stirton; (d) Paleontology of lower vertebrates, II, Mr. Gregory; (e) Invertebrate Paleontology, I and II, Mr. Durham; (f) Paleobotany, II, Mr. Fry; (g) Paleobiology of microorganisms, I and II, Mr. Arnold; (h) Problems in Mammalian Paleontology, I, Mr. Savage.

299. Research in Paleontology. (1–6) I and II.

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 in the Earth Sciences 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

An outstanding collection of books and pamphlets on paleontology and related fields is incorporated in the Earth Sciences Library, a branch of the General Library housed in the Earth Sciences Building.

PARASITOLOGY

(See Entomology and Parasitology.

PHILOSOPHY

(Deartment Office, 4401 Dwinelle Hall)

Karl Aschenbrenner, Ph.D., Professor of Philosophy.
William Craig, Ph.D., Professor of Philosophy.
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 of Social Science.
Paul K. Feyerabend, Ph.D., Professor of Philosophy.
Isabel C. Hungerland, Ph.D., Professor of Philosophy.
Benson Mates, Ph.D., Professor of Philosophy.
David Rynin, Ph.D., Professor of Philosophy.
Edward W. Strong, Ph.D., Professor of Philosophy.
Joseph Tussman, Ph.D., Professor of Philosophy.
Jacob Loewenberg, Ph.D., LL.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.
Ernest W. Adams, Ph.D., Associate Professor of Philosophy.
Wallace I. Matson, Ph.D., Associate Professor of Philosophy.
John R. Searle, D.Phil., Associate Professor of Philosophy.
David S. Shwayder, D.Phil., Associate Professor of Philosophy.
Celestine J. Sullivan, Ph.D., Associate Professor of Philosophy.
Price Carlsson, Ph.D., Assistant Professor of Philosophy.
Charles S. Chihara, Ph.D., Assistant Professor of Philosophy.
Thompson E. Clarke, Ph.D., Assistant Professor of Philosophy.
Thomas Nagel, Ph.D., Assistant Professor of Philosophy.
Barry G. Stroud, Ph.D., Assistant Professor of Philosophy.

2 In residence fall semester only, 1964–1965.
Michael Ayers, Ph.D., Lecturer in Philosophy for the fall semester.
George Myro, M.A., Visiting Assistant Professor of Philosophy.
David F. Pears, M.A., Visiting Professor of Philosophy for the fall semester.

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 91.

Departmental Major Adviser: Mr. Charlson.

The Major. A total of 34 units is required in the major program. The following courses are required for a major program in the department: 20A–20B, 12, 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.

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. 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.

Higher Degrees. See the Announcement of the Graduate Division, Berkeley. Attention is called to the requirement of a reading knowledge of French and German for the Ph.D. in philosophy. Students who contemplate advanced study in philosophy should prepare themselves for this requirement in their undergraduate years.

Lower Division Courses

6A–6B. Introduction to Philosophy. (3–3) Yr, Beginning each semester.

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.

101. Philosophy of History

104. Ethical Theory

112. Philosophy of the Natural Sciences

125. Theory of Knowledge

127. Philosophy of Religion

*Not to be counted toward requirements of the major.
12. Introduction to Logic. (4) I and II.  
Mr. Adams, Mr. Craig, Mr. Chihara,  
Mr. Clarke, Mr. Mates, Mr. Myro

Two lectures and two section meetings per week.

20A–20B. History of Philosophy. (3–3) Yr. Beginning each semester.  
Mr. Aschenbrenner, Mr. Dennes, Mr. Nagel,  
Mr. Stroud, 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. Nagel, II.  
20B. From the Scholastics to Kant: Mr. Stroud, I; Mr. Aschenbrenner, Mr. Sullivan, 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 and II.  
Mrs. Hungerland, Mr. Chihara

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 and II.  
Mr. Dennes, Mr. Nagel

Moral values; the concepts of good and right; the criteria of conduct.

108. Social Philosophy. (3) II.  

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) I.  
Mr. Ayers

The nature and the validity of religious ideas.

125. Theory of Value. (3) II.  
Mr. Rynin

The principles of evaluation in relation to both individual and social problems.

127. Philosophy of History. (3) II.  
Mr. Charlson

Theories of history: Augustine, Vico, Hegel, and others.

* Not to be given, 1964–1965.
128. Political Philosophy. (3) I.
Analysis of political obligation and related problems.
Mr. Tussman

136A–136B. Aesthetics. (3–3) Yr.
Course 136A is not prerequisite to 136B.
Form, expression, representation, style; interpretation and evaluation.
136A. The visual arts.
136B. Literature and music.
At the discretion of the instructor, the general prerequisite for upper division courses in philosophy may be waived for major students of literature or the arts.
Mr. Carlson

137. Aesthetic Theories. (3) II.
A study of aesthetic theories based on historical and recent materials.
Mr. Aschenbrenner

140. Philosophy of Law. (3) II.
Philosophical problems arising in the legal context.
Mr. Tussman

146A–146B. Philosophy in Literature. (3–3) Yr. Mr. Sullivan, ———
Philosophical issues as expressed in poetry, drama, and the novel.
At the discretion of the instructor, the general prerequisite may be waived for major students in literature or in the fine arts.

147. Theory of Historical Inquiry. (3) II.

Group B
Courses dealing with the methods of reflective thinking and the more general features of experience.

111. Metaphysics. (3) I.
Mr. Myro

113A–113B. Logic. (3–3) Yr.
Prerequisite: course 12 or equivalent.
Mr. Craig

114. Theory of Knowledge. (3) I and II.
Mr. Clarke, ———

120A–120B. Scientific Method. (3–3) Yr.
Methodology of the mathematical, the natural, and the social sciences.
Mr. Feyerabend

124. Philosophy of Science. (3) I.
Prerequisite: course 12.
Central topic: axiomatic analysis of concepts of geometry (theoretical and applied), physics, and unobservables in behavioral science.
Mr. Adams

133A–133B. Philosophy of Language. (3–3) Yr. Mr. Searle, Mr. Shwayder
The logical structure of language: propositions, reference, truth, predication and related concepts.
Mr. Shwayder, Mr. Clarke

§138. Recent British Philosophy. (3) I.
Prerequisite: 6 units in 6A–6B or 20A–20B, or course 101.
Mr. Pears

*141. Modal Logic. (3) II.
(Formally numbered 119.)
Prerequisite: course 12 or equivalent
§ Not to be given, 1964–1965.
§ Approved for one offering only, 1964–1965.
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.

161. Semantics. (3) I.
Mr. Chihara

Prerequisite: 6 units of philosophy, or equivalent at the discretion of instructor. Recommended: an acquaintance with the truth-tables techniques of elementary propositional logic.

A systematic discussion of the theory of meaning based on the verifiability principle: criteria and procedures for ascertaining the significance of linguistic expressions of the several main types developed against the background of a general theory of signs.

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.

116. Plato. (3) I.
Mr. Nagel

117. Aristotle. (3) II.
Mr. Matson

118. Spinoza. (3) I.
Mr. Sullivan

121. Hobbes. (3) I.
Mr. Matson

Development of Scientific Thought and Technique (History 105A–105B)
(3–3) Yr.
Mr. Hahn


129. Leibniz. (3) II.
Mr. Searle

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. Sullivan

139. Philosophy of Kierkegaard. (3) II.
Mr. Matson

Prerequisite: course 6A–6B, or 20A–20B, or 101, or consent of the instructor. The philosophical writings of Kierkegaard.

145. American Philosophy. (3) II.
Mr. Rynin

171. Greek Philosophy from Thales to Democritus. (3) I.
Mr. Matson

Prerequisite: course 20A.
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.

* Not to be given, 1964–1965.
*183. Locke. (3) II.  Mr. Shwayder
184. Berkeley. (3) II.  Mr. Mates
185. Hume. (3) II.  Mr. Dennes
188. Post-Kantian Idealism. (3) II.
The philosophies of Fichte, Hegel, and Schelling.
189. Modern German Philosophy. (3) II.
German phenomenology from Brentano to Heidegger.
191. Marxism. (3) I.
The philosophical and sociological theories of Marx and Engels; historical materialism and ideology; theory of the state; the later Marxists; contemporary Marxist thought.
H195. Philosophy Tutorial. (3) II.  The Staff (Mr. Charlson 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.  Mr. Ayers
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.
Restricted to senior honor students.  The Staff (Mr. Charlson in charge)

Graduate Courses

(Concerning conditions for admission to graduate courses, see page 165)

250. Special Studies. (1–6) I and II.  The Staff (Mr. Sullivan in charge)
Enrollment is ordinarily restricted to students who have been admitted to candidacy for the doctor's degree.

290. Seminar. (3) I and II.  The Staff (Mr. Sullivan in charge)
Advanced study in various fields of philosophy. Topics will vary from year to year. The program for 1964–1965 will probably include seminars in: (a) Aesthetics, I, Charlson and Hungerland; (b) Problems in Philosophy of Mathematics, II, Chihara; (c) Theory of Knowledge, I, Clarke; (d) Logic, II, Craig; (e) Ethics, II, Dennes; (f) Marxism, I, Feuer; (g) Philosophy of the Social Sciences, II, Feuer; (h) Philosophy of Science, I, Feyerabend; (i) The History of Logic, I, Mates; (j) Truth, II, Matson; (k) Philosophy of Mind, I, Myr; (l) Sex and Death, I, Nagel; (m) _, I, Pears; (n) _, II, Rynin; (o) Contemporary Philosophy, II, Searle; (p) Statements, I, Shwayder; (q) Metaphysics, I, Stroud; (r) Legal and Political Philosophy, II, Tussman.

** PHYSICAL EDUCATION**

(Department Office, 103 Harmon Gymnasium)

Anna S. Espenschade, Ph.D., Professor of Physical Education (Vice-Chairman, Division for Women).
Franklin M. Henry, Ph.D., Professor of Physical Education.

* Not to be given, 1964–1965.
Carl L. Nordly, Ph.D., Professor of Physical Education (Chairman of the Department).
Pauline Hodgson, Ph.D., Professor of Physical Education, Emeritus.
Sarah R. Davis, A.B., Assistant Professor of Physical Education, Emeritus.
Frederica Bernhard, M.S., Supervisor 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.

Joseph Royce, Ph.D., Associate Professor of Physical Education.
David H. Clarke, Ph.D., Assistant Professor of Physical Education.
Helen M. Eckert, Ph.D., Assistant Professor of Physical Education.
Mary Lou Norrie, Ph.D., Assistant Professor of Physical Education.
Kooman Boycheff, Ph.D., Supervisor of Physical Education.

Lance Flanagan, Ed.D., Supervisor of Physical Education.
Charles J. Keeney, A.B., Supervisor of Physical Education.
Ralph D. Miller, M.A., Supervisor of Physical Education.
Edgar Nemir, A.B., LL.B., Supervisor of Physical Education.

Frances A. Bloland, M.S., Assistant Supervisor of Physical Education.
Peter J. Cutino, M.S., Assistant Supervisor of Physical Education.
June Day, M.S., Assistant Supervisor of Physical Education.
John Z. Ostarelo, A.B., Assistant Supervisor of Physical Education.
Roberta J. Park, M.A., Assistant Supervisor of Physical Education.
Barbara A. Saltzsieder, M.E.D., Assistant Supervisor of Physical Education.

Doris White, M.A., Assistant Supervisor of Physical Education.
Thomas S. Yukic, Ed.D., Assistant Supervisor of Physical Education and Coordinator of Recreation.

John J. Flanagan, M.S., Junior Supervisor of Physical Education.
Frank Hailand, M.A., Junior Supervisor of Physical Education.
Shirley P. King, M.Ed., Junior Supervisor of Physical Education.
Alvin R. Kyte, A.B., Junior Supervisor of Physical Education.
Beverly McComb, M.A., Junior Supervisor of Physical Education.
William J. Stone, M.S., Junior Supervisor of Physical Education.

Clara L. Allison, Ed.D., Acting Assistant Professor of Physical Education.
Raymond L. Willsey, B.S., Lecturer in Physical Education.
George Wolfman, A.B., Lecturer in Physical Education.

Letters and Science List. Course 105 and 130 are included in the Letters and Science List of Courses. For regulations governing this list, see page 91.

Departmental Major Advisers: for women, Miss Espenschade, Miss Allison; for men, Mr. Nordly, Mr. Clarke, Mr. Henry, Mr. Royce.

The Major. High school chemistry or the equivalent, Anatomy 25, Physics 10, Physiology 1, 1L, Psychology 1A, Nutritional Sciences 110, 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 or 111; plus 6 units selected from the following: Anthropology 118, 119, 162, Psychology 102, 104, 107, Psychology 112, 113, 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. Flanagan; women consult Miss Espenschade; 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, BERKELEY, and the ANNOUNCEMENT OF THE SCHOOL OF EDUCATION.

The incidental fee payable by all students at the time of registration entitles students to use of gymnasiaums, 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 $10.50; for bowling, $8; sailing, $12.

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 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: badminton, basketball, bodybuilding, bowling, boxing,
circuit training, diving, fencing, golf, gymnastics, handball, judo, squash, swimming, lifesaving, trampoline, tennis, weight training, 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, golf, gymnastics, football, rugby, swimming, soccer, tennis, track and field, waterpolo, and wrestling. A sport “in season” may be taken for 1 unit.

**Lower Division Courses for Women**

26. Physical Education Activities. (½) I and II.

The Staff (Miss Espenschade in charge)

Most sections meet twice weekly at various hours.

The following activities are offered for women who are in good physical condition.

**Sports:** badminton, basketball, diving, field hockey, golf, lifesaving, softball, tennis, swimming, and officiating.

**General Exercise:** apparatus, tumbling, trampoline, and rhythmic conditioning exercises.

**Individual Exercise:** body mechanics, posture and fitness exercises adapted to individual needs.

**Lower Division Courses for Men and Women**

5A. First Aid. (1) I and II. Miss Norrie, Miss Wendt

Standard and advanced course.

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, sailing, and trampoline.

**Dance:** modern, folk, elementary ballet, and social.

**Elementary School Activities:** dance and games

20. Introduction to Physical Education. (1) I and II. Miss Norrie

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

Prerequisite: 2 semesters of dance, or consent of instructor.

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**

132M. Curriculum in Physical Education. (2) II. Mr. Clarke

(Formerly numbered 132.)

Prerequisite: course 130.

Principles of curriculum development applied to physical education including the instructional program, intramural sports and interscholastic athletics.

**171. Conditioning of Athletes and Care of Injuries. (2) II. Mr. Royce**

Lectures and laboratory. Prerequisite: Red Cross First Aid Certificate, Physiology 1 or Anatomy 25.

Conditioning and care of athletes; sleep, diet, health, and activity habits. Care of injuries, with special emphasis on therapy, taping, and protective equipment.

† To be given if a sufficient number of students enroll.
Upper Division Courses for Women

132W. Curriculum in Physical Education. (2) I. Miss Espenshade
   (Formerly numbered 132.)
   Prerequisite: course 130.
   Principles of curriculum development applied to physical education including the
   instructional program, intramural sports and interscholastic athletics.

   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 Saltzsieder
   Lectures and laboratory. Recommended: course 101. 165A is not prerequisite to 165B.

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; Physics 10.
   Physical structure and muscular movements in various physical education activities.
   Anatomical concepts and physical laws applied to joint and muscular action.

102. Corrective Physical Education. (3) II. Mr. Clarke
   Prerequisite: course 101.

105. Physiological Hygiene. (4) II. Mr. Henry
   Lectures and laboratory. Prerequisite: high school chemistry; Nutritional Sciences 110;
   Physiology 1, 1L.
   The physiology of exercise; diet, ventilation, training, fatigue, and health in relation to
   physical activity. Individual differences in cardiovascular and respiratory function.

110. Psychologic Bases of Physical Activity. (2) I. Miss Norrie
   Two lectures and one section meeting per week.
   Prerequisite: Psychology 1A.
   Perception, motivation, learning, and emotion in relation to physical activities; reaction
   time and coordination. Personal adjustment and social behavior as observed in play. The
   psychology of competition.

111. Motor Development. (2) II. Miss Eckert
   Prerequisite: Psychology 1A, course 135A.
   Motor development from birth to maturity, age changes, sex and individual differences,
   maturation, and motor learning in childhood and adolescence, relation of motor perform­
   ance to other aspects of behavior.

120. Sports in American Society. (2) I. Mr. Flanagan
   Prerequisite: junior standing, Sociology 1 or consent of instructor.
   Interrelationships of sports and physical recreation with other aspects of American cul­
   ture. Emphasis on the twentieth century.

130. History and Theories of Physical Education. (3) II. Miss Allison
   Prerequisite: course 20; Psychology 1A; three units from History 4A–4B, or 17A–17B.
   Ideas and practices in physical education in selected periods in the United States and
   other countries.
131. Organization and Administration of Physical Education. (2) I.  
Prerequisite: course 130.  
Mr. Clarke  
Principles, policies, and administrative procedures pertaining to departmental organization, personnel, facilities, equipment and supplies, finance, health and safety, public relations and legal aspects.

135A–135B. Measurement and Evaluation in Physical Education. (2–2) Yr.  
135A. II; 135B. I.  
Miss Espenschade, Mr. Henry  
Prerequisite: Education 100A or a course in statistics.

140. Community Recreation. (2) I.  
Mr. Yukie  
Prerequisite: junior standing; Sociology 1 or consent of instructor.  
Nature, scope and historical background of organized recreation in community life. Purpose, functions and interrelationships of community groups which serve recreational needs. Principles of organization, leadership, programming, facilities, financing.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor</th>
<th>Credits</th>
<th>Prerequisite/Notes</th>
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</thead>
<tbody>
<tr>
<td>H195</td>
<td>Honors Course. (2–4) I and II.</td>
<td>The Staff (Mr. Nordly in charge)</td>
<td>I and II</td>
<td>Special study and/or research in the field of the major.</td>
</tr>
<tr>
<td>H196</td>
<td>Honors Thesis. (2) I and II.</td>
<td>The Staff (Mr. Nordly in charge)</td>
<td>I and II</td>
<td>Special study and/or research in the field of the major.</td>
</tr>
<tr>
<td>199</td>
<td>Special Study for Advanced Undergraduates. (1–5) I and II.</td>
<td>The Staff (Mr. Nordly in charge)</td>
<td>I and II</td>
<td>Special study and/or research in the field of the major.</td>
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</tbody>
</table>

**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. Keeney, Mr. Frey, Mr. Ostarello  
Prerequisite: course 1 (gymnastics).  
Stunts, tumbling, apparatus, calisthenics, weightlifting, bodybuilding.

342. The Theory and Teaching of Combative Activities. (1) II.  
Mr. Nemir, Mr. Uchida  
Prerequisite: course 1 (combatives).  
Boxing, wrestling, combative games.

344. The Theory and Teaching of Field Sports. (2) II.  
Mr. Keeney, Mr. Frey, Mr. Kyte, Mr. Willsey, 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. Kyte  
Prerequisite: course 1 (court sports).  
Badminton, basketball, handball, tennis, volleyball.
Graduate Courses for Men and Women

200. Seminar in Physical Education. (2) I. Review of literature and research methods. Mr. Clarke

201. Seminar in Movement and Body Mechanics. (2) II. Neurophysiological concepts, physical laws, and kinesiology. Mr. Royce

205. Seminar in Physiological Hygiene. (2) I. 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. Mr. Henry

210. Seminar in Psychologic Bases of Physical Activity. (2) II. 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. Mr. Henry

211. Seminar in Motor Development. (2) II. Contemporary theories of development. Changing motor abilities and behavior from childhood through youth and age. Miss Espenshade

Prerequisite: course 111.

230. Seminar in Cultural and Historical Foundations of Physical Education. (2) I. Miss Allison

231. Administration of Physical Education. (2) I. Mr. Nordly

290. Research. (1-6) I and II. The Staff (Mr. Nordly in charge)

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. Fetter, Ph.D., Professor of Physics.
Donald A. Glaser, Ph.D., Professor of Physics.
Gerson Goldhaber, Ph.D., Professor of Physics.
Erwin L. Hahn, Ph.D., Professor of Physics.
August C. Helmholz, Ph.D., Professor of Physics.
Carson D. Jeffries, 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.
Walter D. Knight, Ph.D., Professor of Physics.
Edwin M. McMillan, Ph.D., Professor of Physics and Director of the Lawrence Radiation Laboratory.

Stanley Mandelstam, Ph.D., Professor of Physics.
Burton J. Moyer, Ph.D., Professor of Physics (Chairman of the Department).
William A. Nierenberg, Ph.D., Professor of Physics.

† To be given if a sufficient number of students enroll.
Alan M. Portis, Ph.D., Professor of Physics.
Wilson M. Powell, Ph.D., Professor of Physics.
†Frederick Reif, Ph.D., Professor of Physics.
John H. Reynolds, Ph.D., Professor of Physics.
Arthur H. Rosenfeld, Ph.D., Professor of Physics.
Malvin A. Ruderman, Ph.D., Professor of Physics.
Emilio G. Segré, Ph.D., Professor of Physics.
M. Lynn Stevenson, Ph.D., Professor of Physics (Vice-Chairman of the Department).
Robert L. Thornton, Ph.D., Professor of Physics.
Michael Tinkham, Ph.D., Professor of Physics.
George H. Trilling, 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.
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.
Hiram W. Edwards, Ph.D., Associate Professor of Physics, Emeritus.
Kinsey A. Anderson, Ph.D., Associate Professor of Physics.
Robert R. Brown, Ph.D., Associate Professor of Physics.
William Chinowsky, Ph.D., Associate Professor of Physics.
Frank S. Crawford, Ph.D., Associate Professor of Physics.
Kenneth M. Crowe, Ph.D., Associate Professor of Physics.
Sumner P. Davis, Ph.D., Associate Professor of Physics.
Klaus Dransfeld, Ph.D., Associate Professor of Physics.
Sheldon L. Glashow, Ph.D., Associate Professor of Physics.
Leroy T. Kerth, Ph.D., Associate Professor of Physics.
Donald H. Miller, Ph.D., Associate Professor of Physics.
Charles L. Schwartz, Ph.D., Associate Professor of Physics.
Howard A. Shugart, Ph.D., Associate Professor of Physics.
Herbert M. Steiner, Ph.D., Associate Professor of Physics.
*Robert D. Tripp, Ph.D., Associate Professor of Physics.
Steven Weinberg, Ph.D., Associate Professor of Physics.
*Eyvind H. Wichmann, Ph.D., Associate Professor of Physics.
Thomas J. Ypsilantis, Ph.D., Associate Professor of Physics.
Charles Zemach, Ph.D., Associate Professor of Physics.
Harry H. Bingham, Ph.D., Assistant Professor of Physics.
Marvin L. Cohen, Ph.D., Assistant Professor of Physics.
Eugene D. Commins, Ph.D., Assistant Professor of Physics.
Robert P. Ely, Ph.D., Assistant Professor of Physics.

* Absent on leave, 1964–1965
1 In residence fall semester only, 1964–1965.
2 In residence spring semester only, 1964–1965.
Richard Marrus, Ph.D., Assistant Professor of Physics.

Robert W. Birge, Ph.D., Lecturer in Physics.
Auriol R. Bonney, Ph.D., Lecturer in Physics.
Frederick W. Byron, Jr., Ph.D., Acting Assistant Professor of Physics.
Ian T. Drummond, Ph.D., Acting Assistant Professor of Physics.
Vernon J. Ehlers, Ph.D., Lecturer in Physics.
Tom Elioff, Ph.D., Lecturer in Physics.
James W. Garland, Jr., Ph.D., Acting Assistant Professor of Physics.
Rodney C. Greenhow, Ph.D., Acting Assistant Professor of Physics.
Robert W. Huff, Ph.D., Lecturer in Physics.
Robert J. Hull, Ph.D., Lecturer in Physics.
David L. Judd, Ph.D., Senior Lecturer in Physics.
Allan N. Kaufman, Ph.D., Lecturer in Physics.
Robert W. Kenney, Ph.D., Lecturer in Physics.
Herbert Kleiman, Ph.D., Acting Assistant Professor of Physics.
Wulf B. Kunkel, Ph.D., Lecturer in Physics.
William M. Layson, Ph.D., Lecturer in Physics.
Elliott Leader, Ph.D., Lecturer in Physics.
Joseph V. Lepore, Ph.D., Lecturer in Physics.
Douglas McColm, Ph.D., Lecturer in Physics.
Janice B. Shafer, Ph.D., Lecturer in Physics.
Samuel Silver, Ph.D., Professor of Engineering Science and Director of the Space Sciences Laboratory.
John M. Stone, Ph.D., Lecturer in Physics.

MEDICAL PHYSICS

John W. Gofman, M.D., Ph.D., Professor of Medical Physics and Associate Director, Lawrence Radiation Laboratory, Livermore.
Hardin B. Jones, Ph.D., Professor of Medical Physics and of Physiology and Assistant Director of the Donner Laboratory.
Thomas H. Jukes, Ph.D., Professor in Residence of Medical Physics.
John H. Lawrence, M.D., Professor of Medical Physics and Director of the Donner Laboratory.
Cornelius A. Tobias, Ph.D., Professor of Medical Physics (Vice-Chairman of the Division).
John H. Northrup, Ph.D., Sc.D., LL.D., Professor of Bacteriology and Professor of Biophysics, Emeritus.
Hans J. Bremermann, Ph.D., Associate Professor of Medical Physics and of Mathematics.
Robert H. Haynes, Ph.D., Associate Professor of Medical Physics.
Robert K. Mortimer, Ph.D., Associate Professor of Medical Physics.

In residence fall semester only, 1964–1965.
Letters and Science List. All undergraduate courses in physics are included in the Letters and Science List of Courses. For regulations governing this list, see page 91.

Departmental Major Advisers: Mr. Chinowsky, Mr. Kip, Mr. Knight, Mr. Reif, Mr. Ross, Mr. Steiner.

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 with the departmental adviser concerning the several possibilities. The following sequences are ordinarily required: 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 (or preferably 4A, 4B). The preceding physics and mathematics courses constitute the minimum preparation for most upper division physics courses.

The physics major must include the following courses: Physics 105A–105B, 108, 110A–110B, 110C or 110D, 115, and 121. Physics 112 is very strongly recommended, and is a prerequisite for graduate work. Mathematics 185 is also recommended; Mathematics 104 is desirable for students intending to pursue graduate work. A reading knowledge of two of the three languages Russian, German, and French is advisable.

Mathematics 2B will be counted as upper division units for majors in physics.

Physics

Honors Program. Students with a grade-point average of 3.0 or better may consult the major adviser concerning the honors program. The honors program requires completion of the major and at least two semesters of Physics H197, and the recommendation of the departmental advisers. Special research work which may be taken as Physics 199 (2 units) 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, Mr. Nichols.

**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. Davis. (See section on Program of Study in Engineering Physics, page 76.

**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

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.

Required for premedical students. Recommended for all students who elect course 2A–2B.

Experimental work planned to accompany the lectures in course 2A–2B.

4A. General Physics. (4) I and II. Mr. Knight, Mr. Ross

Three lectures and one discussion section per week. Prerequisite: Mathematics 3A or 1A; Mathematics 3B or 1B should be taken concurrently. 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. Crawford, Mr. Kip

Three lectures and one three-hour laboratory section per week, with an additional one-hour discussion group per week. Prerequisite: course 4A; Mathematics 3A–3B or 1A–1B; Mathematics 4A or 2A should be taken concurrently. 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, Mr. Wichmann

Three lectures and one three-hour laboratory period per week. Prerequisite: course 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. Ehlers, Mr. Helmholz

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, 11A, or equivalent.

A brief presentation of some of the more important phenomena in physics, with experimental illustrations.
11A–11B. Foundations of Physical Science. (3–3) Yr.  Mr. Knight

Two lectures and one three-hour laboratory period per week. 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 completed other courses in the Departments of Chemistry and Physics; sponsored jointly by Chemistry-Physics.

Elementary quantitative study of matter, radiation, gravitation, electromagnetism, quantum theory, chemical binding, thermodynamics, kinetic theory, relativity, nuclear structure. Necessary mathematical foundations will be introduced.

49. Supplementary Work in Lower Division Physics. (1–3) I and II.

Students with partial credit in lower division physics courses may, with the consent of 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 106A, 106B.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>104. Mathematical Methods in Physics. (3) I and II.</td>
<td>Mr. Ypsilantis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>105A–105B. Analytic Mechanics. (3–2) Yr.</td>
<td>Mr. Crowe, Mr. Helmholz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>106A. Geometrical Optics. (3)</td>
<td>Mr. Hull</td>
<td></td>
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<tr>
<td>106B. Physical Optics. (3)</td>
<td>Mr. Hull</td>
<td></td>
<td></td>
</tr>
<tr>
<td>108. Physical Optics. (3)</td>
<td>Mr. Stone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>110A–110B. Electricity and Magnetism. (3–3) Yr.</td>
<td>Mr. Brode, Mr. Powell, Mr. Thornton</td>
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</tbody>
</table>

### 104. Mathematical Methods in Physics. (3) I and II.

Prerequisite: senior standing, or consent of instructor.

Emphasizing vectors, matrices, symmetry principles, and invariance principles.

### 105A–105B. Analytic Mechanics. (3–2) Yr. Beginning each semester.

- 105A: Mr. Crowe
- 105B: Mr. Helmholz

Prerequisite: differential equations (may be taken concurrently).

Fundamental principles of Newtonian mechanics. Brief introduction to Lagrange's and Hamilton's equations.

### 106A. Geometrical Optics. (3) I.

(Formerly numbered 108A.)

Two lectures and one three-hour laboratory period per week. Prerequisite: course 2A–2B, 3A–3B. Not open to physics majors.

Geometrical methods applied to the optics of mirrors, prisms, and lenses.

### 106B. Physical Optics. (3) II.

(Formerly numbered 108B.)

Two lectures and one three-hour laboratory period per week. Prerequisite: course 2A–2B, 3A–3B. Course 106A is not prerequisite to 106B. Not open to physics majors.

Phenomena of diffraction, interference, and polarization of light, and their applications.

### 108. Physical Optics. (3) I and II.

(Formerly numbered 108B.)

Two lectures and one three-hour laboratory period per week, with a third lecture scheduled for certain weeks in lieu of laboratory. Prerequisite: course 4A, 4B, 4C and calculus.

Phenomena of physical optics and properties of radiation based on the Lorentz electron theory.

### 110A–110B. Electricity and Magnetism. (3–3) Yr. Beginning each semester.

- 110A: I and II.
- 110B: I and II.

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. Birge, Mr. Shapiro
Use and calibration of electrical instruments and electronic devices.

110D. Modern Physics Laboratory. (2) I and II. Mr. Shugart, Mr. Birge
Prerequisite: course 121.
Experimental foundation for the theory of atomic and nuclear structure.

112. Thermodynamics and Kinetic Theory. (3) I and II. Mr. Reif
Prerequisite: course 121 required; 105A recommended.
Thermodynamics and the kinetic theory of gases, with an introduction to statistical mechanics.

115. Introduction to Quantum Mechanics. (3) I and II.
Prerequisite: course 105A and 121. Mr. Goldhaber, Mr. Steiner
The classical background, basic ideas, and methods of quantum mechanics, with applications to atomic physics.

121. Introduction to Atomic Physics. (3) I and II.
Mr. Commins, Mr. Jeffries, Mr. Miller
Special relativity, electron physics, atomic structure, spectroscopy, X rays.

124. Introductory Nuclear Physics. (3) I and II.
Prerequisite: course 121.

I: 129A; II: 129A, 129B. Mr. Segrè, Mr. Trilling
Prerequisite: course 121, 115 or 137A–137B.
Designed to cover more thoroughly the material of course 124, including magnetic moments, mesons, high-energy physics.

132. Modern Physics. (3) I. Mrs. Shafer
Prerequisite: Physics 2A–2B, 3A–3B, or equivalent, or consent of instructor.
Not open for credit to students who have had course 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.

137A–137B. Atomic Physics and Quantum Mechanics. (3–3) Yr. Mr. Stevenson
Prerequisite: recommended that course 105A be taken concurrently.
Special relativity, electron physics, atomic structure, spectroscopy, X rays, methods of quantum mechanics with applications to atomic physics. Because atomic physics is taught in both semesters, the student is advised to take both 137A and 137B. Not open to students who have received credit for course 115 or 121.

140. Introduction to Solid State Physics. (3) II. Mr. Kip
Prerequisite: course 121.
An elementary survey of the classification and properties of solids. Ionic, covalent, molecular, metallic and semiconducting crystals. Dielectric, thermal, magnetic, conductive, and mechanical properties. Superconductivity, ferromagnetism, defects in solids.

141A–141B. Solid State Physics. (3–3) I and II. Mr. Hahn
Prerequisite: course 115 to be taken concurrently, preferably with 141A.
A thorough introductory course in modern solid-state physics. Crystal symmetry; electromagnetic, elastic, and particle waves in periodic lattices; thermal, magnetic, and dielectric properties; magnetic order; magnetic resonance; theory of metals and semiconductors; superconductivity.
142. Introduction to Plasma Physics. (3)  Mr. Kunkel
Prerequisites: course 112 and 121, senior standing; or consent of instructor. Microscopic processes in ionized gases, motion of charged particles in electromagnetic fields, macroscopic equations, transport phenomena, magnetohydrodynamics, waves, instabilities, shock waves. Application to natural and man-made plasmas, e.g., in space science, electrical discharges, and controlled thermonuclear research.

H197. Physics Honors Course. (2) I and II.  Mr. Kerth, Mr. Steiner
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. Moyer 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. Restricted to senior honor students.

Graduate Courses
(Concerning conditions for admission to graduate courses, see page 165)

205A. Advanced Dynamics. (3–3) I and II.  Mr. Judd, Mr. Wichmann

205B. Advanced Dynamics. (3) II.
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.  Mr. Miller
Prerequisite: Physics 108 and Physics 121.
Emission, absorption, and propagation of light treated classically. Limits of classical theory. Transition to quantum theory through the correspondence principle.

210A–210B. Theory of Electricity and Magnetism. (3–3) Yr. Beginning each semester  Mr. Chamberlain, Mr. Chinowsky, Mr. Karplus, Mr. Lepore
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.  Mr. Watson, Mr. Zemach
220. Advanced Statistical Mechanics. (3) II.  
Mr. Watson  
Prerequisite: Physics 219 or consent of 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.  
Mr. Leader, Mr. Nierenberg, Mr. Ruderman  

*222. Mathematical Methods of Theoretical Physics. (3) II.  
The setting up and solution of differential and integro-differential equations; statistical and algebraic methods for the treatment of problems of physics.

223. Group Theory and Quantum Mechanics. (3) I and II.  
Mr. Schwartz, Mr. Tinkham  
Prerequisite: course 221A, or consent of the instructor.  
Quantum mechanics of atoms, molecules, and solids, emphasizing group theoretical methods.

224A–224B. Nuclear Physics. (3–3) Yr.  
Mr. Chew  
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.  
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.

Beginning each semester.  
Mr. Weinberg, Mr. Mandelstam  
Prerequisite: course 221A–221B, or equivalent.  

231. Theory of General Relativity. (2) I and II.  
Mr. Weinberg, Mr. Wichmann  

The Staff (Mr. Fretter in charge)  
Consent of instructor required.  
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.

§239. Physics of the Upper Atmosphere. (3) I.  
Mr. Silver  
Prerequisite: course 121; course 110A–110B or Electrical Engineering 117A–117B.  
Structure and dynamics of the atmosphere. Current views on photochemical reactions; diffusion and mass transport phenomena; electromagnetic properties of the ionosphere as an equilibrium system; effects of turbulence; dynamics of the atmosphere as a plasma.

* Not to be given, 1964–1965.
§ Approved for one offering only, 1964–1965.
240A–240B. Quantum Theory of Solids. (3–3) I and II. Mr. Kittel
Prerequisite: course 221A or equivalent course; 141A–141B is recommended.
Phonon, magnon, plasmon, polaron and electron fields in solids and their interactions;
superconductivity; many-body techniques; Green's functions; Brillouin zones and symmetry;
excitons; impurity states; transport processes; Fermi surfaces; neutron scattering;
recoilless emission; theoretical methods in magnetic resonance.

242A–242B. Theoretical Plasma Physics. (3–3) Yr. Mr. Kaufman
Prerequisite: Second-year graduate standing, course 210A–210B, 219, 142; or consent of instructor.
Analysis of plasma behavior according to the Vlasov, Fokker-Planck, guiding center,
and hydromagnetic descriptions. Study of equilibria, stability, linear and nonlinear oscillations,
transport, and interaction with radiation. Rigorous kinetic theory.

245. Elementary Particles and Resonances. (3) I. Mr. Rosenfeld
Prerequisite: course 221A.
For students working on the experimental physics of the elementary particles and
their higher resonances. Classification of their properties according to mass, isotopic spin,
strangeness, parity, and C- and G-parity. Systematization of the experimental data on
particle production and decay.

246. Topics in Scattering Theory. (3) II. Mr. Watson
Prerequisite: Course 221A–221B, or equivalent, or consent of instructor.
Wave packets and asymptotic fields: rearrangement collisions, analytic structure of scattering matrices,
application of variational principles.

290. Seminar. (2) I and II. The Staff (Mr. Moyer in charge)

295. Research. (1–6) I and II. The Staff (Mr. Moyer in charge)

299. Special Study for Graduate Students. (1–4) I and II.
The Staff (Mr. Moyer in charge)
Prerequisite: graduate standing.
This course is arranged to allow qualified graduate students to investigate possible research fields or to pursue
problems of interest through reading or nonlaboratory study under the direction of faculty members who agree to give such supervision.

Related Courses in Other Departments
Physical Biochemistry (Biochemistry 206).
Principles of Geophysics (Geophysics 122A–122B).
Elastic Waves (Geophysics 204A–204B).
Advanced Seismometry (Geophysics 217).
Development of Scientific Thought and Technique (History 105A–105B).
Seminar in the History of Science (History of Science 205).
Seminar (Philosophy 290).
Radiation Physiology (Physiology 108).
MEDICAL PHYSICS

Lower Division Course

25. Atomic Radiation and Life. (2) I and II. Mr. Mel
Basic aspects of atomic radiations with examples from 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. For liberal arts as well as science students.

Upper Division Courses

126. Artificial Radioactivity in the Biological Sciences. (2) I and II. Mr. Gofman, Mr. Nichols, Mr. Hayes
Prerequisite: course 2A–2B; Chemistry 1A–1B, and one of the following: Zoology 1A–1B; Physiology 1, 1L; or Botany 1.
Theory, methods, and interpretation of the use of artificial radioactive elements for research in the biological sciences. Emphasis on the role of radioactive tracers in metabolism.

126L. Artificial Radioactivity in the Biological Sciences. (1) I and II.
Prerequisite: course 126. May be taken concurrently. Mr. Nichols, Mr. Hayes
Laboratory work to accompany course 126.

128A–128B. Nuclear and Radiation Physics in Biology. (3–3) Yr. Mr. Haynes, Mr. Wallace
128A. Mr. Haynes; two lectures and one three-hour laboratory period per week.
128B. Mr. Wallace; three lectures (no laboratory) per week.
Prerequisite: course 4A–4B–4C, or equivalent, calculus.

131. Biological Effects of Radiation. (3) II. Mr. Mortimer
One lecture and two three-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 on modification of physical and biological parameters.

133A–133B. Physics of Biological Systems. (3–3) Yr.
133A: Mr. Mel; 133B: Mr. Tobias. Mr. Mel, Mr. Tobias, Mr. Haynes
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. Introduces students to the topics, technique and methods of research. Credit determined by faculty sponsor.
Graduate Courses

225A–225B. Isotopes in Experimental Medicine. (2–2) Yr.
Mr. Rosenthal, Mr. Lawrence, Mr. Parker

One lecture and one three-hour demonstration per week. Prerequisite: graduate standing in one of the biological or medical sciences.


234. The Experimental Foundations for the Physics of Biological Systems.
(2) II.
The Staff (Mr. Nichols in charge)

Prerequisite: course 133A–133B, or their equivalent, and consent of the instructor.

Physical properties of biological systems at the atomic, molecular, cellular, and organismal level.

290. Seminar. (1–3) I and II.
The Staff

Advanced study in various fields of biophysics and medical physics.

Topics vary from year to year. Program for 1964–1965 may include seminars in (g) Effects of Radiation in Mammals, II, Kelly and Dobson; (j) Informational Macromolecules, II, Jukes; (n) Theoretical Biophysics, I, Bremermann, II, Rescigno; (p) Progress in Biophysics, I, Haynes, II, Katchalsky; (q) Physiology of Circulation, I, Jones and Dobson; (x) Electrical Biophysics, I and II, Mackay; (z) Experimental Medicine, I and II, Lawrence.

299. Research: Medical Physics and Biophysics. (1–6) I and II.
The Staff (Mr. Jones in charge)

G. Staff Seminar in Medical Physics. (No credit) I and II.

The Staff (Mr. Lawrence in charge)

Weekly presentation by members of the staff and visitors.

Related Courses in Other Departments

Physical Biochemistry (Biochemistry 206).

Nuclear Chemistry (Chemistry 123).

Chemical Instrumentation (Chemistry 125).

Principles of Genetics (Genetics 100).

General Physiology (Physiology 100A–100B).

Radiation Physiology (Physiology 108).

Properties of Colloidal Particles and Systems (Soils 114).

Introduction to Physiochemical Biology (Zoology 101).

Laboratory in Physiochemical Biology (Zoology 102).

Genetics (Zoology 114).

Human Genetics (Zoology 115).

Optics and Metrology in Biology (Zoology 119A–119B).

Electrical Measurements in Biology (Zoology 120).

PHYSIOLOGY

(Department of Anatomy and Physiology; for courses in Anatomy, see page 173.)

(Office, 2549 Life Sciences Building)

I. Lyon Chaikoff, M.D., Ph.D., Professor of Physiology.

Hardin B. Jones, Ph.D., Professor of Physiology and of Medical Physics.
Ernest L. Dobson, Ph.D., Lecturer in Physiology.
Gilbert S. Gordon, Jr., Ph.D., M.D., Associate Professor of Medicine.
Lola S. Kelly, Ph.D., Lecturer in Medical Physics and Biophysics.
Elwin Marg, Ph.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 92.

*Departmental Major Advisers:* Mr. Cook, Mr. Pace.

**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), and one of the following: 8 (4), 8L (5) or 12 (5); Mathematics 1A–1B, 3A–3B or 16A–16B. Recommended: Anatomy 25; Chemistry 109; Physics 132.

The major must include courses 100A–100B (6), 100L (3), 110A–110B (6), 112 (3); the remaining 6 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 above.
3. Take at least 6 units of course 199 which is designated "Special Study for Advanced Undergraduates." The special study involved may, at the discretion of the department, consist of a reading program or elementary experimental or laboratory work, or both.
4. Pass with a grade of C or better Chemistry 109 (Physical Chemistry) or Physics 132 (Modern Physics).
5. 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.
IL. Introductory Physiology. Laboratory. (2) I and II.  
Mr. Macey  
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. Packer, Mr. Macey, Mr. McLaren  
Prerequisite: Chemistry 1A–1B, 8 or 12; Physics 2A–2B; course 1–1L, or Zoology 1A–1B, or Botany 1, or consent of the instructor. 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 and its regulatory mechanisms.

100L. General Physiology Laboratory. (3) I.  
Mr. Packer  
Prerequisite: course 100A (should be taken concurrently).

102. Physiology of Human Development. (2) I.  
Mrs. Timiras  
Prerequisite: course 1, or Zoology 1A–1B, or equivalent.  
Functional changes in man from prenatal life to maturity.

104. Physiology of the Endocrines. (2) I.  
Mr. Chaikoff, Mr. Gordon  
Prerequisite: course 1–1L, or Zoology 1A–1B, or consent of the instructor.  
The lectures are all at Berkeley. There are in addition occasional clinical demonstrations at the Medical Center in San Francisco.

104L. Physiology of the Endocrines, Laboratory. (2) I.  
Mr. Chaikoff, Mrs. Timiras, Mr. Evans  
Prerequisite: course 104 (may be taken concurrently).

105. Physiology of the Aging Process. (2) II.  
Mr. Chaikoff, Mr. Cook, Mr. Jones, Mrs. Timiras  
Prerequisite: course 1, or Zoology 1A–1B, or equivalent.  
Physiological changes from maturity to old age.

107. Environmental Physiology. (3) II.  
Mr. Pace  
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.  
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. Marg, 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–120B. Comparative Physiology. (3–3) Yr.  Mr. Cook  
(Formerly numbered 120A, 120B, 120C.)  
Prerequisite: Chemistry 1A–1B, Physics 2A–2B, and course 1–1L or Zoology 1A–1B.  
120A. A comparative survey of the muscular, nervous, sensory and circulatory systems of animals.  
120B. Respiration, blood, digestion, metabolism, excretion, and endocrines.  

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 165)  
200. Seminar in Cell Physiology. (1) II.  Mr. Packer  
Prerequisite: course 100A–100B and Chemistry 109, or consent of instructor.  
201A–201B. Research. (2–8; 2–8) Yr.  The Staff (Mr. Cook in charge)  
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: consent of the instructor.  
207. Seminar in Environmental Physiology. (1) I.  Mr. Pace  
Prerequisite: courses 107 and 110A–110B.  
Topics will vary from year to year.  
210. Physiological Transport Processes. (2) II.  Mr. Macey  
Prerequisite: differential and integral calculus, elementary physiology. Recommended:  
Physical Chemistry 110A–110B.  
Transport processes in metabolic systems with selected applications to passive and excitable membranes, cellular, cardiovascular, renal, and respiratory systems.  
217. Space Physiology. (2) II.  Mr. Pace  
Prerequisite: course 107, 110A–110B. Recommended: course 108 and 207.  
Lectures and discussion of the physiological effects encountered by the mammal during extraterrestrial space flight.  
402. Physiological Instrumentation. (2) I and II.  The Staff  
Prerequisite: graduate standing in Physiology or consent of instructor.  
Laboratory course on modern physical techniques in physiological research. Topics will  
cover problems in the detection, amplification, and recording of bioelectrical phenomena,  
together with the use and design of transducers.  
Seminar in Physiology. (No credit) I and II.  The Staff  
Approximately two meetings per month.  
Department meetings for the presentation of original work by the faculty, visiting lec-  
turers, and graduate students.  

PLANT NUTRITION  
(See Soils and Plant Nutrition.)
PLANT PATHOLOGY

(Department Office, 147 Hilgard Hall)

Kenneth F. Baker, Ph.D., Professor of Plant Pathology.
William C. Snyder, Ph.D., Professor of Plant Pathology (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.
Peter A. Ark, Ph.D., Professor of Plant Pathology, Emeritus.
James T. Barrett, Ph.D., Professor of Plant Pathology, Emeritus.
Max W. Gardner, Ph.D., D.Sc. (hon.c.), Professor of Plant Pathology, Emeritus.
Thomas E. Rawlins, Ph.D., Professor of Plant Pathology, Emeritus.
H. Earl Thomas, Ph.D., Professor of Plant Pathology, Emeritus.
A. Herbert Gold, Ph.D., Associate Professor of Plant Pathology.
John R. Parmeter, Jr., Ph.D., Associate Professor of Plant Pathology.
Robert D. Raabe, Ph.D., Associate Professor of Plant Pathology.
David E. Schlegel, Ph.D., Associate Professor of Plant Pathology.
Fields W. Cobb, Jr., Ph.D., Assistant Professor of Plant Pathology.
Milton N. Schroth, Ph.D., Assistant Professor of Plant Pathology.
Tewfik A. Toussoun, Ph.D., Assistant Professor of Plant Pathology.
Albert R. Weinhold, Ph.D., Assistant Professor of Plant Pathology.

Robert V. Bega, Ph.D., Lecturer in Forest Pathology.

Departmental Major Adviser: Mr. Weinhold.

The Major in Plant Pathology. To obtain a B.S. degree in this major, the following five items must be satisfied: (1) General University requirements. (2) College of Agriculture requirements (see page 65). (3) Plant Science Curriculum requirements: (a) General—Botany and plant physiology, 9 units. Chemistry, 13 units. Economics, 3 units. English and/or speech, 6 units. Physics, 3 units. (b) Agriculture—Entomology and parasitology, 4 units. Genetics, 4 units. Irrigation, plant nutrition, or soils, 3 units. Plant pathology, 4 units. Upper division courses in either the major or a closely related field with approval of major adviser, 12 units. (c) Electives (restricted) selected from the two areas listed below (16 units). 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, so-

† Not including Mathematics C or D.
‡ In addition to University requirements.
ciology, 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 units. (5) Certain courses are required by the major and, where applicable, may be used in partial satisfaction of 3 above. For details, see the ANNOUNCEMENT OF THE COLLEGE OF AGRICULTURE, BERKELEY, available without charge.

Honors. Information concerning honors may be obtained from the Dean’s Office, College of Agriculture.

Upper Division Courses

100. Forest Pathology. (3) II. Mr. Parmeter, Mr. Cobb
   Lectures and laboratory. Prerequisite: Botany 1. Restricted to forestry students.
   Diseases of forest plants.

120. Plant Diseases. (4) I. Mr. Raabe, Mr. Schroth
   Lectures and laboratory. Prerequisite: Botany 1. Recommended: Bacteriology 1 or 2, and 4.
   A general course on the nature, cause, and control of plant diseases.

199. Special Study for Advanced Undergraduates. (1-5) I and II.
   The Staff (Mr. Weinhold in charge)

Graduate Courses

(Concerning conditions for admission to graduate courses, see page 165)

201. Seminar in Plant Pathology. (1) I and II. Mr. Parmeter, Mr. Cobb

210. Physiology of Plant Pathogens. (4) I. Mr. Weinhold
   Lectures and laboratory. Prerequisite: course 222; Chemistry 5 and 8, or equivalent.
   Recommended: Botany 140; Biochemistry 102.
   Physiology and biochemistry of host-parasite relationships.

211. Bacterial Diseases of Plants. (3) II. Mr. Schroth
   Lecture and laboratory. Prerequisite: course 120; Biochemistry 102; Bacteriology 1 and 4, or consent of instructor.
   Biology and pathogenesis of bacterial diseases of plants.

212. Epidemiology and Diagnosis of Plant Diseases. (4) I.
   Mr. Toussoun, Mr. Snyder
   Lectures and laboratory. Prerequisite: consent of instructor.
   Experience in field and laboratory diagnosis of plant diseases.

222. Plant Pathology Methods. (3) II.
   Mr. Schlegel
   (Formerly numbered 122.)
   Lecture and laboratory. Prerequisite: course 120.
   Laboratory methods used in the study of plant diseases.

223. Principles of Plant Pathology. (3) II.
   Mr. Wilhelm
   (Formerly numbered 123.)
   Prerequisite: course 120.
   Principles broadly applicable to fungus, bacterial, virus, and nutritional diseases of plants.

225. History and Literature of Plant Pathology. (3) II.
   Mr. Baker
   Lectures with discussions.
   Prerequisite: consent of the instructor.
   The development of concepts in plant pathology.
226. Plant Virology. (3) II.
(Formerly numbered 126.)
Lecture and laboratory. Prerequisite: course 120 or consent of instructor.
Viruses as causal agents of plant diseases.

227. Plant Disease Control. (3) I.
(Formerly numbered 127.)
Lecture and laboratory. Prerequisite: course 120.
Exclusion, eradication, protection, immunization, therapy.

299. Research in Plant Pathology. (1-9) I and II.

Mr. Gold

Mr. Yarwood

Mr. Snyder in charge)

POLITICAL SCIENCE

(Department Office, 210 Barrows Hall)

Charles Aikin, LL.B., Ph.D., Professor of Political Science.
David E. Apter, Ph.D., Professor of Political Science.
Eric C. Bellquist, Ph.D., Professor of Political Science.
Ernst B. Haas, 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.
*Herbert McClosky, 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 (Chairman of the Department).

Paul Seabury, Ph.D., Professor of Political Science.
Jacobus ten Broek, S.J.D., Litt.D., Professor of Political Science.
Julian Towster, Ph.D., J.D., Professor of Political Science.
*Dwight Waldo, Ph.D., Professor of Political Science, Director of the Institute of Governmental Studies, and Ford Rotating Professor of Governmental Affairs for the spring semester.

*Sheldon S. Wolin, Ph.D., Professor of Political Science.
§Thomas C. Blaisdell, Jr., Professor of Political Science, Emeritus.
Joseph P. Harris, Ph.D., Professor of Political Science, Emeritus.


In residence spring semester only, 1964–1965.
§Recalled to active service, 1964–1965.
Letters and Science List. All undergraduate courses in political science are included in the Letters and Science List of Courses. For regulations governing this list, see page 91.

The American Institutions Requirement. This requirement may be satisfied by completing an approved course, or by passing an examination. See page 52.

Departmental Major Advisers: Mr. Aikin, Mr. Bellquist, Mr. Blaisdell, Mr. Jones, Mr. Lenczowski, Mr. Lipson, Mr. Townsend, Mr. Towser.

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–2A–2B, Government 1A, Social Science 10, 11, 12, 13, 14.

The spring semester.

Andrew Janos, Ph.D., Assistant Professor of Political Science.
Chalmers A. Johnson, Ph.D., Assistant Professor of Political Science.
Arend Lijphart, Ph.D., Assistant Professor of Political Science.
Clément H. Moore, Ph.D., Assistant Professor of Political Science.
Ralph H. Retzlaff, Ph.D., Assistant Professor of Political Science.
Michael Rogin, Ph.D., Assistant Professor of Political Science.
Saul Silverman, Ph.D., Assistant Professor of Political Science.
James R. Townsend, Ph.D., Assistant Professor of Political Science.
Aaron Wildavsky, Ph.D., Assistant Professor of Political Science.
Charles Tarlton, Ph.D., Instructor in Political Science.

Virginia T. Adloff, Ph.D., Lecturer in Political Science for the spring semester.
Joan Bondurant, Ph.D., Lecturer in Political Science.
Hugh M. Clokie, Ph.D., Lecturer in Political Science.
David Daube, Ph.D., D.C.L., Dr. h.c., Ford Rotating Professor of Governmental Affairs.
Margaret W. Fisher, Ph.D., Lecturer in Political Science.
William H. Gardner, M.S., Lecturer in Political Science.
Wyndraeth H. Morris-Jones, B.Sc., Visiting Professor of Political Science.
Joseph Schlesinger, Ph.D., Visiting Professor of Political Science.
Peter Sperlich, Ph.D., Acting Assistant Professor of Political Science.
Gilbert Steiner, Ph.D., Visiting Professor of Political Science.
M. George Zaninovich, Ph.D., Acting Assistant Professor of Political Science.
17B. Students whose major field of undergraduate concentration will be in Group VI (Parties, Pressure Groups, Public Opinion and Political Behavior) 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. 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; Sociology 1, 30.

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 110, and to complete two of the following courses: 120, 157A, 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 three courses in one of the following seven groups: I. American Government; II. Political Theory; III. International Relations; IV. Comparative Government and Area Studies; V. Public Law and Jurisprudence; VI. Parties, Pressure Groups, Public Opinion and Political Behavior; VII. Public Administration and Public Policy.

Majors in the department will include in their programs, normally in the junior year, four core courses (two each semester), one each from any four groups in the following list including the group emphasized:

I. 101
II. 110, 118A, 118B
III. 120
IV. 140A, 141A, 147A
V. 150, 157A, 157B
VI. 161A, 161B, 162, 163
VII. 181

Majors planning to emphasize the study of a region or country should begin their language preparation early, and students contemplating advanced graduate work should continue their study of French and/or German. Those considering a career in the Foreign Service of the United States or other overseas employment should obtain proficiency in one of those languages, Russian, or Spanish.

Honors Program. Attention is directed to the Honors Program, described below under course 198A–198B. Applicants should consult one of the instructors in the course.

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 in Public Administration. The minimum requirement for admission to the program is 12 units of substantial upper division courses in economics, political science, psychology, cultural anthropology, history or sociology, or their equivalents. For further information, see Mr. Mosher.

**Lower Division Courses**

1. Introduction to Government. (3) I and II.  
   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.  
   Two lectures and two section meetings per week.  
   Mr. Lipson, Mr. Janos  
   A comparative study of constitutional principles, governmental institutions, and political problems of selected national governments.

10. Foundations of Legal Institutions. (3) I.  
   Mr. ten Broek  
   (Formerly numbered 150A.)  
   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.

33A–33B. American Studies. (3–3) Yr.  
   Mr. Regin  
   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 162 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.

**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, 157A, 157B, 158, 159A, 159B, 163, 182.)
100. Government in the United States. (3) I and II. Mr. Bellquist.

(Formerly numbered 100A.)
I: Section I, Mr. Bellquist; Section II, ________.
II: Section I, ________; Section II, ________.
Not open to students who have taken course 1. Specifically intended for students who wish to fulfill the institutions part of the History and Institutions requirement. This course will not be counted toward the concentration in Group I.
A survey of the powers, structure, and operations of government, primarily at the national level.

101. Basic Factors in American Politics. (3) II. Mr. Steiner

(Formerly numbered 101A.)
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. Effects of urbanization on the orientation of American politics.

102. State Government and Politics. (3) II. Mr. Wildavsky

Organization of state government; federal-state relations; elections and politics; the courts; county government; current administrative problems. Empirical material will be drawn from California.

103. Urban Government and Politics. (3) I. Mr. Steiner

(Formerly numbered 103A.)
Urbanization and the growth of cities; the metropolitan community; historical development of local government; general patterns of central-local relations; local politics and decision-making; administrative organization and process. A comparative study with emphasis on the United States.

104. The American Presidency. (3) I. Mr. Wildavsky

Analysis of the major functions, problems, and institutions of the presidency. Special attention will be given to the topics of leadership, staffing, executive-legislative relations, and policy formation.

105. The Legislative Process. (3) II. Mr. Bellquist

(Formerly numbered 105A.)
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.

106. The Conduct of American Foreign Relations. (3) II. Mr. Bellquist

(Formerly numbered 128B.)
Constitutional arrangements, federal-state relations, and national supremacy. The roles of the President in his various capacities, the Senate, the House of Representatives, key committees, and pressure groups. The Department of State and the U. S. Foreign Service. The Military. NSC, USIA, other official agencies and Public Opinion.

Group II—Political Theory

Courses 140A and 157A or 157B meet requirements of concentration.

110. Contemporary Issues and Political Theory. (3) I and II.

Mr. Jacobson, ________; Mr. Tarlton, Mr. Zaninovich

(Formerly numbered 110A.)
I: Mr. Tarlton, Mr. Zaninovich; II: Mr. Jacobson, ________.
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.

* Not to be given, 1964-1965.
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113. American Political Theory. (3) I.  
Mr. Jacobson  
Basic problems of political theory as viewed within the context of American history and institutions.

*114. Political Pluralism. (3) I.  
Mr. Schaar  
An examination of the historical, legal, and theoretical aspects of pluralism; pluralism as doctrine and reality. Special attention will be paid to the concepts of majoritarianism, constitutionalism, membership, oligarchy, constituency, and obligation.

*115. Development of Political Thought in Asia. (3) II.  
(Formerly numbered 115.)  
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.

116. Soviet Political Theory. (3) I.  
Mr. Towster  
(Formerly numbered 116A.)  

118A-118B. History of Political Theory. (3—3) Yr.  
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. 
This course is divided into two sections for the undergraduate and graduate students.

118C. History of Political Theory. (3) I.  
Prerequisite: course 118A—118B or consent of instructor.  
The examination of major political theories since the mid-nineteenth century; changing conceptions of the nature of theory.

Group III—International Relations

Students whose group concentration is in international relations may, with the approval of their major adviser, take courses in Group III (International Relations) or Group IV (Comparative Government and Area Studies) interchangeably except for courses 120 and 140A—B. Course 106 also meets the requirements of concentration.

120. Elements of International Relations. (3) I and II.  
Mr. Blaisdell, Mr. Lijphart, Mr. Seabury, Mr. Zaninovich  
(Formerly numbered 120A.)  
I: Section I, Mr. Seabury, Section II, Mr. Zaninovich.  
II: Section I, Mr. Lijphart, Section II, Mr. Blaisdell.  
Analysis of ideological, legal, military, and economic factors creating harmony and hostility among nations. Development of international institutions reflecting and molding such factors.

121A. International Organization. (3) I.  
Mr. Haas  
(Formerly numbered 121.)  
Military security, peaceful change and social-economic welfare under the United Nations System.  
* Not to be given, 1964—1965.
121B. Regional Communities and Associations. (3) II. Mr. Haas
Regional organizations concerned with peace, welfare and federal union in Europe, the
Western Hemisphere, Africa and the Middle East.

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 per­
sons. Diplomatic and consular intercourse; treaties and executive agreements; pacific
settlement; war and neutrality.

123. Politics and Military Strategy. (3) I. Mr. Blaisdell
The interrelationships among military strategy, technology, science; relationships be­
tween strategic doctrine, national security concepts, and domestic politics.

128A. Concepts in American Foreign Policy. (3) II. 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.

131. Soviet Foreign Policy. (3) II. Mr. Towster
(Formerly numbered 131A.)
The concept, content, and control of Soviet foreign relations. Basic theories of world
politics. Traditions and sources of external behavior. Pursuits in particular areas and fields
of activity. Formal instrumentalities and indirect tools of Soviet diplomacy. Methods,
strategy, and tactics. Change and continuity in Russian and Soviet policy.

Group IV—Comparative Government and Area Studies
Courses in this group may be taken, with the approval of the major adviser, to satisfy the concentration requirements in international relations, except for
140A–140B. Courses 115 and 116 meet requirements of concentration.

140A–140B. Comparative Analysis of Political Systems. (3–3) Yr. Mr. Apter
140A. Survey of social and political theory of relevance to comparative studies. Identi­
fication of some of the main developments in modern theory, not only in political science,
but in related disciplines. The emphasis will be on systems theory, structural and be­
havioral forms.
140B. Application of comparative method to the study of authority and political develop­
ment.

141A–141B. Government and Politics in the Soviet Union. (3–3) Yr. Mr. Silverman
141A. Demographic, historical and ideological bases of Soviet rule. The social and
governmental structure. Nationalities and federalism. The Party, trade unions and co­
operatives. The church; courts, prosecutors and organs of policy. Statics and dynamics of
power in the U.S.S.R.
141B. Prerequisite: course 141A and/or permission of instructor.

141C–141D. Government and Politics in Eastern Europe. (3–3) Yr. Mr. Janos
141C. A study of the political process in relation to social structure and national diver­
sity. A comparison of Communist and prewar political systems, and an analysis of con­
temporary political developments.
141D. The rise of the nation state, and the persistence of nationalist aspirations. Rela­
tions with the West and the Soviet Union with a particular reference to national com­
munism and “domesticism.”

* Not to be given, 1964–1965.
141E. Communist Bloc Relationships. (3) II. Mr. Silverman
   An analysis of relations among the Communist parties and states. Emphasis upon ideological and policy differences; organizational structures and decision-making processes.

142A–142B. Government and Politics in the Middle East. (3–3) Yr. Mr. Lenczowski

142A. The Middle Eastern Political Community (II). Foundations of Islamic society and its political institutions; transformation of the traditional state into a modern state; constitutionalism, nationalism, and revolutionary reformism; political parties and ideologies; current religious and cultural trends.

142B. The Middle East in World Affairs (II). International relations and domestic politics of contemporary states in the Middle East; policies and strategy of major powers; supranational movements; regional political and security organizations. The area comprises Turkey, Iran, Afghanistan, Israel, and the Arab countries.

143A–143B. Government and Politics in Northeast Asia. (3–3) Yr. Mr. Townsend, Mr. Johnson
   The structure and evolution of political institutions in China, Japan and Korea. Emphasis upon such topics as nationalism, political modernization, and ideology.

143C. Government and Politics in Southeast Asia. (3) II. (Formerly numbered 143B.)
   The structure and evolution of political institutions in Southeast Asia in the post-colonial period.

145A–145B. Government and Politics in South Asia. (3–3) Yr. Mr. Morris-Jones
   A comparative analysis of development and change in the political systems of contemporary South Asia. Attention will be given to the relationship between the political systems and social, cultural, economic and psychological factors in these countries.

146A–146B. Government and Politics in Tropical Africa. (3–3). Yr. Mr. Rosberg, Mrs. Adloff

146A. Political Development and Change in Africa. Mr. Rosberg
   Major constituent factors shaping African politics and institutions; concepts and patterns of political change; nationalism, political groups, ideology and nation building.

146B. African States and World Politics. Mrs. Adloff, Mr. Rosberg
   Selected studies of African states and the politics of racial differentiation in southern Africa; pan-Africanism and inter-African state relations; international relations of African countries and the policies and actions of major powers towards Africa.

147A–147B. Government and Politics in Britain and the Commonwealth. (3–3) Yr. Mr. Lipson, Mr. Clokie
   (Formerly numbered 144A–144B.)

147A. (II) The British political tradition; evolution from oligarchy to democracy; elections and parties; the constitutional system; parliament, cabinet, and administration; functions of the welfare state. Mr. Lipson

147B. (I) The development from empire to commonwealth; the contemporary commonwealth, as an association of independent states; centripetal and centrifugal factors; comparative study of the politics and institutions of the older dominions. Mr. Clokie

147C–147D. Government and Politics in Western Europe. (3–3) Yr. Mr. Lijphart, Mr. Clokie
   (Formerly numbered 147A–147B.)

147C. France and Germany. An analysis of the development, organization, operation, and problems of the French and German political systems.

147D. Italy and Switzerland. An analysis of the development, organization, operation, and problems of the Italian and Swiss political systems.

* Not to be given, 1964–1965.
147E. Government and Politics of the Northern European Countries. (3) II.  
(Formerly numbered 147C.)  
Mr. Bellquist  
Constitutionalism and parliamentarism in the Scandinavian states—Denmark, Finland, Iceland, Norway, and Sweden. Constitutional history and present governmental systems. Inter-Scandinavian cooperation.

(Formerly numbered 148.)  
148A. Basic characteristics of the political process in Latin America; problems of development, modernization, and political change. Inter-American relations in Latin American world affairs.  
148B. Constitutionalism; government structure; political groups; problems of foreign policy of Latin America on a country by country basis. Special emphasis on Mexico, Argentina, Brazil and Chile.

Group V—Public Law and Jurisprudence

150. Comparative Law. (3) II.  
Mr. Casper  
Prerequisite: at least one course in public or private law.  
An introduction to common law, civil law, and Soviet law, and the role of these legal systems in developing governmental processes as well as in the positions of persons within each of them.

151. Elements of Jurisprudence. (3) II.  
(Formerly numbered 150B.)  
Mr. Casper  
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.

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.

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.

159A-159B. Administration of Justice. (3-3) Yr.  
Mr. ten Broek  
(Formerly numbered 159.)  
159A. Organization, staffing and functioning of state courts—trial, special and appellate. The role of state courts in relation to federal powers and limitations, to state legislature and state administration. Lawyers and Bar associations. Investigative and enforcement officials.  
159B. Jurisdiction and operation of federal courts. U. S. Supreme Court as apex of judicial system and as political institution. Charter and organs of the U.N. in creating and interpreting international law. International Court of Justice and international politics.

* Not to be given, 1964–1965.
Group VI—Parties, Pressure Groups, Public Opinion, and Political Behavior

160. Pressure Groups and Political Power. (3) I. Mr. Rogin
(Formerly numbered 160A–160B.)
Private power and public policy: 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. Introduction to Political Behavior. (3–3) Yr. Mr. Sperlich
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.

162. Public Opinion. (3) I. Mr. Bellquist
(Formerly numbered 162A.)

163. Political Parties. (3) I and II.
I: Section I, ---; Section II, Mr. Tarlton; II: Section I, ---; Section II, Mr. Tarlton.
Nature and functions of political parties; origin, development, structure, economic and social composition, internal management and control; relation of parties and pressure groups to legislation and administration.

**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

Courses 104 and 156 meet requirements of concentration.

181. Elements of Public Administration. (3) I and II.
I. Mr. Mosher; II. Mr. Ichman. Mr. Ichman, Mr. Mosher
The function of administrative institutions in society; the growth of administration as an art and science; contemporary and comparative forms and theories of organization and bureaucracy; the responsibilities of public servants.

**182. Public Policy and the Planning Process. (3) II.** Mr. Lepawsky
The substantive policies of government in relation to economic, social and political programs; the process of policy formulation; governmental planning; administrative programming in the execution of governmental policies and public projects.

183. The Public Service in the Modern State. (3) II. Mr. Mosher
The role of civil servants in society; specialization and professionalization of public employees; human relations in organizations, recruitment and training of public personnel; elements of public personnel administration.

184. Financial Administration and Fiscal Management. (3) I. Mr. Blaisdell
Financial administration in the modern state—American, comparative, historical; fiscal implications of governmental activity; the budget process in public administration; management devices to secure administrative accountability and political responsibility.

* Not to be given, 1964–1965.
185. Natural Resources Policy and Administration. (3) I. Mr. Lepawsky

(Formerly numbered 185A.)
Impact of public policies upon the natural environment; administration of programs for the development and conservation of natural resources; governmental regulation and public management of land, water, mineral, and energy resources.

186. Welfare Policy and Administration. (3) II. Mr. ten Broek
Impact of public policies upon the social environment; public protection, conservation and development of human resources; legal, political, and administrative institutions and processes of federal, state, and local governments in health, education, and welfare.

Non-Group Courses

194A–194B. Politics and Literature. (3–3) Yr. Mr. Burdick
An analysis of the use of literature as a means of political expression and for purposes of political action. Literature as a method of molding public opinion and exerting pressure upon political elites.

197. Scope and Method in Political Science. (3) I. Mr. Sperlich
Introduction to the theory and methods of Political Science research, including problems in comparative, historical, and institutional analysis, the use of documents, problems of measurement and quantitative procedures.

198A–198B. Honors Program. (3–3) Yr. ——, ——, Mr. Townsend
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. Townsend in charge)

Graduate Instruction

Group I—American Government

Graduate Courses

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).

200A. Government and Politics in the United States. (3) II. Mr. Rogin
A comprehensive examination at the advanced level of American political institutions and concepts. The course will also treat research methods and problems in the field.

200B. Federalism and Intergovernmental Relations. (3) I. Mr. Steiner
(Formerly numbered 270C.)
The relationship of constitutional doctrine and political thought to the organization and practice of intergovernmental relations.

* Not to be given, 1964–1965.
Graduate Seminars

201. Research in American Government. (3) I.  
(Formerly numbered 251.)
Some major problems concerning the nature and structure of American government. Constitutionalism and its evolution; the separation of powers; judicial review; civil liberties; federalism and intergovernmental relations.

202. State Government and Politics. (3) II.  
(Formerly numbered 272.)

203. Government and Politics in Metropolitan Areas. (3) II.  
Mr. Steiner  
(Formerly numbered 282.)
The relationship of governmental, economic, social, and physical organization of metropolitan areas to metropolitan planning, decision-making, and administration.

205. Legislative Process. (3) II.  
Mr. Jones  
(Formerly numbered 252A–252B.)
A comparative study of selected problems of the legislative process in the United States and abroad, with field research on legislative behavior in local city councils.

400A–400B. Field Work in the Legislative Process. (4–4) Yr.  
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.

Group II—Political Theory

Graduate Courses

210. Problems in Recent and Contemporary Political Theory. (3) II.  
(Formerly numbered 209A–209B.)
Prerequisite: course 118A–118B or consent of instructor.
Selected problems in political theory since the middle of the nineteenth century: Marxism, the rise of modern social science, and recent formulations of the nature of political theory.

211. Concepts of Political Philosophy. (3) II.  
(Formerly numbered 201.)
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.

219A–219B. Political Theory. (3–3) Yr.  
Mr. Jacobson  
(Formerly numbered 208A–208B.)
219A. Politics and Political Theory as Science.  
219B. Politics and Political Theory as Art.

Graduate Seminars

212. Problems in Political Theory. (3) I.  
(Formerly numbered 293.)
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.

213. American Political Theory. (3) II.  
Mr. Jacobson  
(Formerly numbered 291.)
Basic problems of political theory will be examined within the context of American political development.

* Not to be given, 1964–1965.
214A—214B. European Political Theory. (3—3) Yr.  Mr. Zaninovich

(Formerly numbered 292A—292B.)

214A. Examination of the elements of socialist thought; theories of “mass society”; rise of modern totalitarian thought

214B. Study of emergent political thought; relevant aspects of psychoanalysis, the political novel, sociology; the theory of totalitarianism.

216. Doctrines of Revolutionary Strategy. (3) I.  Mr. Johnson

(Formerly numbered 294.)

Study of the prescriptive writings of revolutionary leaders, e.g., Mao Tse-Tung. Comparative analysis of revolutionary behavior, millenarian movements, guerrilla warfare, and suppression of revolution. Lectures, core readings, research papers.

217. Recent Indian Political Thought. (3) I.  Miss Bondurant

(Formerly numbered 210.)

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.

218. Development of Political Thought in the Middle East. (3) II.  Mr. Lenczowski

Group III—International Relations

Graduate Courses

220A. Theories of International Relations. (3) I.  Mr. Haas

(Formerly numbered 220.)

Origin, application and utility of major concepts featured in the study of international relations. Relation of various strands of political and social theory to international relations.

221. Nationalism and Imperialism. (3) II.

Themes in the theory of nation-building, illustrated with Western and non-Western case studies.

228A. American Foreign Policy. (3) I.  Mr. Seabury

(Formerly numbered 263A.)

Strategic-military, political, economic, and cultural aspects of American foreign policy.

Graduate Seminars

220B. Seminar in International Relations. (3) II.

(Formerly numbered 203A and 260.)

Advanced research on concepts and principles of international relations and foreign policy.

222A—222B. Seminar in International Law. (3—3) Yr.  Mr. Riesenfeld

(Formerly numbered 262.)

222A. II:

Selected problems in modern international law.

223. National Security. (3) II.  Mr. Blaisdell

(Formerly numbered 228.)

Prerequisite: Political Science 123.

Strategic concepts, natural resources, economic potential and trade policy, and the development of new weapons in relation to foreign policy.

* Not to be given, 1964—1965.
228B. Seminar in American Foreign Policy. (3) II.  
Mr. Seabury  
(Formerly numbered 263B.)  
The theme of the seminar is designed each semester by consultation with the students desiring to work in the field of current American foreign policy.

230. International Organization. (3) I.  
Mr. Haas  
(Formerly numbered 261.)  
The application of social science theory to research on international organizations.

**Group IV—Comparative Government and Area Studies**

**Graduate Courses**

240A–240B. Comparative Politics of Western Areas. (3–3) Yr. Mr. Lijphart  
(Formerly numbered 202A–202B.)  
240A. The comparative study of politics; development of subject matter and methodology; political culture and social structure; electoral systems; governmental structures and functions.  
240B. The comparative study of political parties; the origins, development, structures, programs, and clientele of parties; the relation of party systems to constitutional forms; the comparative study of interest groups.


The comparative analysis of the processes of political modernization and change in developing countries. Major emphasis will be given to comparative analytical theory and methodology.

240E–240F. Communist Political Systems. (3–3) Yr.  
240E. Mr. Silverman  
240F. Mr. Johnson  
Mr. Silverman, Mr. Johnson  
An analysis of the interrelations between Communist systems with particular reference to institutional and ideological differences, presented at an advanced level for graduate students. Discussion and papers required.

**Graduate Seminars**

Mr. Bellquist  
(Formerly numbered 240A–240B.)  
Unless well prepared in European government, beginning graduate students are not admitted to this seminar.

Mr. Towster

Mr. Janos  
241C. A study of Eastern Europe as an underdeveloped area before World War II. Social change and political movements. Problems of economic development and political pluralism.  
241D. The structure of power in the countries of Communist Eastern Europe. Variations and changes in the pattern of Communist political systems.

242A–242B. Major Problems of the Middle East. (3–3) Yr.  
Mr. Lenczowski

Mr. Scalapino  
A study of basic social, economic, and cultural problems of the contemporary Far East area.

* Not to be given, 1964–1965.
243C°–243D. Political Problems of Southeast Asia. (3–3) Yr.
An advanced study of significant political and governmental problems of the countries of Southeast Asia, with emphasis on the changing cultural and economic conditions, institutional arrangements, and ideological conflicts prevalent in the area.

*243E. Government and Politics in Japan. (3) I. Mr. Scalapino
(Formerly numbered 216.)
Selected topics in contemporary Japanese politics.

(Formerly numbered 215A–215B.) Mr. Johnson, Mr. Townsend
I. Mr. Johnson, Mr. Townsend.
An analysis of basic political institutions and theories in modern China with particular emphasis upon the Communist era.

*244. Nationalism, Religion and Ideology; the Search for Authority in the New Nations. (3) II. Mr. Apter
This seminar will deal with problems of political values, the evolution of legitimate authority, the status of political ideas and religious beliefs and the search for new political forms in nations which emerged from colonial status after 1945.

245A–245B. Problems of India and Pakistan. (3–3) Yr. Mr. Morris-Jones

245C. Social and Political Change in South Asia. (3) II. Miss Bondurant
An exploration of theories of social change as they relate to political developments in India, Pakistan, and the Himalayan Border States.

246A–246B. African Political Institutions. (3–3) Yr. Mr. Rosberg
(Formerly numbered 246.)

247A–247B. Politics in the United Kingdom and Commonwealth. (3–3) Yr. Mr. Lipson

247A. II. Advanced research into problems of British politics and institutions of government.
247B. Advanced research into problems of politics and government in Commonwealth countries.

248A–248B. Governments and International Relations of Latin America. (3–3) Yr.

249A. Scope and Method: Comparative Government. (3) I. Mr. Lipson
(Formerly numbered 240E.)
Prerequisite: open only to teaching assistants in Political Science 2.
Comparative politics of Western and non-Western countries; parliamentary democracy, oligarchy, and totalitarian government; problems of politics in industrialized and late-developing nations.

Group V—Public Law and Jurisprudence

Graduate Seminars

250A–250B. Seminar in Comparative Law. (3–3) Yr. Mr. Casper
Prerequisite: course 150, or at least one course in public or private law.
A comparative study of legal processes within Western and Communist systems of law, and an examination of the impact of such systems on the exercise of public power and on the determination of private rights and privileges.

* Not to be given, 1964–1965.
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251. Jurisprudence. (3) I.
(Formerly numbered 256.)
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.

252. Seminar in Roman Law. (3) II.
Prerequisite: one University course in either private law or public law.
This seminar covers a study of basic ideas and techniques of Roman law and the impact of the Roman law system on modern civil law.

*255A–255B. Legal Order of a Communist State. (3–3) Yr.
(Formerly numbered 151A–151B.)

257A–257B. Constitutional and Administrative Law. (3–3) Yr.
Mr. Aikin
Fundamental principles of constitutional law; leading cases; judicial decisions affecting the liabilities, rights, duties, and procedures of governmental officers and agencies.

*258A–258B. Seminar in Administration of Justice. (3–3) Yr.
Selected problems.

*258C. Dynamics of Legal Institutions. (3) I.
Selected problems.

Group VI—Parties, Pressure Groups, Public Opinion and Political Behavior
Graduate Courses

260A. Pressure Groups. (3) II.
The role of organized groups in the political process; strategy of access; membership; meaning and measurement of group influence; group theories of politics.

261A*-261B. Political Behavior. (3–3) Yr.
(Formerly numbered 253A–253B.)
Prerequisite: previous work in 161A–161B, or equivalent courses.
A comprehensive review of the major topics in political behavior through intensive examination of the theories, findings, and proceedings of the most significant studies in the field.

262A–262B. Political Parties and Public Opinion. (3–3) Yr.
A consideration of significant aspects of the theory, structure, and role of political parties in modern government. Nature and role of public opinion in modern government; major factors affecting its expression and mobilization; attitude studies and their relation to political behavior.

269A–269B. Research Methods and Procedures. (3–3) Yr.
Comprehensive review of research methods in Political Science, emphasizing actual research techniques and procedures; methods of observation and data collection, survey and experimental design, field studies, sampling, interviewing, questionnaire construction, scaling, data processing and analysis, uses of library and aggregative data.

a Not to be given, 1964–1965.
Graduate Seminars

**260B. Private Power and Public Policy. (3) II.**
(Formerly numbered 258.)
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.

**261C–261D. Seminar in Political Behavior. (3–3) Yr.**
Prerequisite: course 161A–161B, or 261A–261B.
Research seminar on selected topics in political behavior, affording experience in research design, procedures, and analysis, and the preparation of a research report.

**263A°–263B. Parties and Politics. (3–3) Yr.**
(Formerly numbered 259A–259B.)

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Group VII—Public Administration and Public Policy

Graduate Courses

**271A. Public Administration: Principles and Practices. (3) I.**
Mr. Mosher
(Formerly numbered 204A.)
The historical development and contemporary status of administrative institutions, the principles and practices of public administration, and the processes of public management.

**271B. Public Administration: Policy Aspects. (3) II.**
Mr. Lepawsky
(Formerly numbered 204B.)
The process of policy-formulation, governmental planning and programming, and administrative decision-making.

**272A–272B. Municipal Government and Administration. (3–3) Yr.**
(Formerly numbered 235A–235B.)
Mr. Lee, Mr. Gardner
The social, political, economic, and legal background in which municipal administration is set. The facilities and processes—organization, budgeting, accounting, personnel, and management methods of the municipal administrator.

**280A. Administrative Theory. (3) I.**
Mr. Waldo
A survey of the literature of organization and management theory, emphasizing the major writers and distinctive contribution of the various disciplines.

Graduate Seminars

**280B. Seminar in Administrative Theory. (3) II.**
Mr. Waldo
Intensive study of selected areas of organizational and management theory.

**283. Public Personnel Administration. (3) II.**
Mr. Mosher
Categories and methods of employment of public servants; problems in public service administration.

**284. Financial Administration and Budgeting. (3) I.**
Mr. Wildavsky
(Formerly numbered 274.)
Budgets as political instruments. Budgetary calculations and strategies primarily in American national government but also in Soviet and American industrial firms and foreign governments. Core readings and research paper emphasizing theoretical statements about how budgets are and ought to be made.

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* Not to be given, 1964–1965.
285. Regional Planning and Resources Management. (3) I. Mr. Lepawsky
(Formerly numbered 285A-285B.)
Public policies and the planning process as related to regionalism and to the resource-based activities of society; ecological and environmental aspects of public administration; historical and comparative aspects of natural resources administration.

287A. Comparative National Administration. (3) II. Mr. Ilchman
(Formerly numbered 271.)
Analytical comparison of administrative systems of various countries in different stages of their national development.

287B. Comparative Subnational Government and Administration. (3) II.
The devolution, decentralization, and distribution of functions and responsibilities in the modern state. Comparative and historical processes of provincial, regional, and local administration in states at different stages of development.

*289. Administrative Research and Analysis. (3) II.
Methods of administrative research with particular emphasis upon the analysis of the organization and management of operating units in government.

Courses Common to All Groups

298. Individual Study. (1-4) I and II. The Staff
Prerequisite: consent of instructor and graduate adviser.
Open to qualified graduate students who wish to pursue special studies and research under the direction of a member of the staff.

299. Directed Research. (1-6) I and II. The Staff
Prerequisite: consent of thesis supervisor and graduate adviser.
Open to qualified graduate students who wish to pursue special studies and research under the direction of a member of the staff.

400A-400B. Field Work in the Legislative Process. (4-4) Yr. 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.

POLTRY HUSBANDRY

(Department Office, 100 Poultry Husbandry Laboratory)

Samuel Lepkovsky, Ph.D., Professor of Poultry Husbandry.
Lewis W. Taylor, Ph.D., Professor of Poultry Husbandry.

Fredric W. Hill, Ph.D., Professor of Poultry Husbandry, (Chairman of the Department), Davis.
I. Michael Lerner, Ph.D., Professor of Genetics.

Major Adviser: Mr. Taylor.

The Major in Poultry Husbandry. To obtain a B.S. degree in this major, the following five items must be satisfied and part of the work must be taken at Davis: (1) General University requirements. (2) College of Agriculture re-

* Not to be given, 1964-1965.
requirements (see page 65). (3) Animal Science Curriculum requirements: (a) General—Bacteriology or botany, 4 units. Chemistry and/or biochemistry, 16 units. Economics, 3 units. English and/or speech, 6 units. Physics, 6 units. Zoology, 8 units. (b) Agriculture—Animal nutrition, 3 units. Animal pathology, parasitology, or additional zoology, 3 units. Animal physiology, 5 units. Genetics, 4 units. Upper division courses in either the major or a closely related field with approval of major adviser, 12 units. (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), 54 units. (5) Certain courses are required by the major and, where applicable, may be used in partial satisfaction of requirement 3 above. For details, see the ANNOUNCEMENTS OF THE COLLEGE OF AGRICULTURE, available without charge.

Honors.—Information concerning honors may be obtained from the Dean’s Office, College of Agriculture.

**Upper Division Courses**

*102. Experimental Incubation. (3) II.*

Mr. Taylor

Lectures and laboratory. Prerequisite: Zoology 100 or 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 instructor.

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: 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 165)

200A–200B. Research in Poultry Husbandry. (1–6; 1–6) Yr.

Mr. Lepkovsky, Mr. Lerner, Mr. Taylor

**PSYCHOLOGY**

(Department Office, 3210 Tolman Hall)

†Frank A. Beach, Jr., Ph.D., Professor of Psychology.

*Jack Block, Ph.D., Professor of Psychology.

Clarence W. Brown, Ph.D., Professor of Psychology.

Richard S. Crutchfield, Ph.D., Professor of Psychology (Chairman of the Department).

†Edwin E. Ghiselli, Ph.D., Professor of Psychology.

* Not to be given, 1964–1965.
Harrison G. Gough, Ph.D., Professor of Psychology and Associate Director, Institute of Personality Assessment and Research.
Mason Haire, Ph.D., Professor of Psychology.
Sheldon J. Korchin, Ph.D., Professor of Psychology.
David Krech, Ph.D., Professor of Psychology.
*Richard S. Lazarus, Ph.D., Professor of Psychology.
Donald W. MacKinnon, Ph.D., Professor of Psychology and Director, Institute of Personality Assessment and Research.
*Paul H. Mussen, Ph.D., Professor of Psychology.
Leo J. Postman, Ph.D., Professor of Psychology and Director, Institute for Human Learning.
*Donald A. Riley, Ph.D., Professor of Psychology.
Mark R. Rosenzweig, Ph.D., Professor of Psychology (Vice-Chairman of the Department).
Theodore R. Sarbin, Ph.D., Professor of Psychology (Vice-Chairman of the Department).
Alex C. Sherriffs, Ph.D., Professor of Psychology.
*M. Brewster Smith, Ph.D., Professor of Psychology and Associate Director, Institute of Human Development.
*Robert Choate Tryon, Ph.D., Professor of Psychology.
Read D. Tuddenham, Ph.D., Professor of Psychology.
Olga L. Bridgman, M.D., Ph.D., Sc.D., Professor of Psychology, Emeritus.
Catherine Landreth, Ph.D., Professor of Psychology, Emeritus.
Jean Walker Macfarlane, Ph.D., Professor of Psychology, Emeritus.
Egerton L. Ballachev, Ph.D., Associate Professor of Psychology (Vice-Chairman of the Department).
Tom N. Cornsweet, Ph.D., Associate Professor of Psychology.
*Rheem F. Jarrett, Ph.D., Associate Professor of Psychology.
Gerald E. McClearn, Ph.D., Associate Professor of Psychology.
'John P. McKee, Ph.D., Associate Professor of Psychology.
Lyman W. Porter, Ph.D., Associate Professor of Psychology.
'Benbow F. Ritchie, Ph.D., Associate Professor of Psychology.
Hubert S. Coffey, Ph.D., Associate Clinical Professor of Psychology.
Philip A. Cowan, Ph.D., Assistant Professor of Psychology.
Geoffrey Keppel, Ph.D., Assistant Professor of Psychology.
Jonas Langer, Ph.D., Assistant Professor of Psychology.
Wayne C. Lee, Ph.D., Assistant Professor of Psychology.
Peter B. Lenrow, Ph.D., Assistant Professor of Psychology.
Gerald A. Mendelsohn, Ph.D., Assistant Professor of Psychology.
William M. Meredith, Ph.D., Assistant Professor of Psychology.
Edward E. Sampson, Ph.D., Assistant Professor of Psychology.
Dan I. Slobin, Ph.D., Assistant Professor of Psychology.

' In residence fall semester only, 1964–1965.

Edward N. Cole, Ph.D., Associate Professor of Speech.
Susan M. Fields, Ph.D., Professor of Speech.
Robert E. McCaughey, Ph.D., Associate Professor of Psychology.
Marjorie P. Young, Ph.D., Associate Professor of Psychology.

Letters of instruction, except 104, 105, 106, 107, and 108, are available from the following.

Department of Psychology:
Machover, M., Department of Psychology.
Rosenzweig, M., Professor of Psychology.

The major points of the course are based on the following book: The principles of social psychology. The text assigned to the instructor should be followed by the student. The text is available at the University Bookstore.

The instructor should consult this course on the following topics:

1. Social psychology.
2. Personality and motivation.
3. Perception.
4. Learning.
5. Intelligence.

Ph.D. candidates may take courses in either the major or minor division of psychology. A student may take courses in either the major or minor division of psychology without regard to the degree taken. A student may take courses in either the major or minor division of psychology without regard to the degree taken.

Not less than 12 credits are required for the major division of psychology. Courses in the major division of psychology should be taken for credit. Only courses taken for credit in the major division of psychology will count towards the major.

Courses in the major division of psychology should be taken for credit in order to count towards the major. Courses taken for credit in the major division of psychology will count towards the major.

A student may take courses in either the major or minor division of psychology without regard to the degree taken. A student may take courses in either the major or minor division of psychology without regard to the degree taken.

A student may take courses in either the major or minor division of psychology without regard to the degree taken. A student may take courses in either the major or minor division of psychology without regard to the degree taken.
Edward N. Barnhart, Ph.D., Lecturer in Psychology and Associate Professor of Speech.

Susan M. Ervin, Ph.D., Lecturer in Psychology and Assistant Professor of Speech.

Robert E. Harris, Ph.D., Lecturer in Psychology and Professor of Medical Psychology.

Marjorie P. Honzik, Ph.D., Lecturer in Psychology.

**Letters and Science List.** All undergraduate courses in this department except 104, 114, 117, 185, 186, and 187 are included in the Letters and Science List of Courses. For regulations governing this list, see page 91.

**Department Major Advisers:** Mr. Ballachey, Mr. Cowan, Mr. Gough, Mr. Keppel, Mr. Krech, Mr. Lee, Mr. Lenrow, Mr. McClearn, Mr. Meredith, Mr. Rosenzweig, Mr. Tuddenham.

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 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 to include the following: (1) 100A, 100B, 100C, 100D, 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 (see below); (4) a minimum of 3 courses divided between the following two lists of courses: (a) 108A, 108B, 130A, 130B, 131, 147, 151. (b) 114, 117, 142, 143, 144, 149, 165A, 165B; (5) a minimum of 3 units from among the following: 104, 107, 146B, 186. Certain 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 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 or 168.
Developmental Psychology: courses 112, and 113 or 114.
Differential Psychology: courses 146A and 146B or 149 or 165A or 165B.
Experimental Psychology: courses 130A or 130B or 131.
Industrial Psychology: courses 185, and 187 or 188.
Personality: courses 148A, and 148B or 136 or 145 or 149.
Physiological Psychology: courses 108A, 108B.
Social Psychology: courses 140, and 142 or 143 or 144.

Honors Program. The honors program consists of courses H101 and H102, to be taken in the junior year, and H195 to be taken in each semester of the senior year.

**Lower Division Courses**

1A. General Psychology. (3) I and II. Mr. Krech, Mr. Haire
Three lectures and one section meeting per week. Open to entering freshmen.

1B. General Psychology. (3) I and II. Mr. Keppel, Mr. Jarrett
Two lectures and one three-hour laboratory per week. Prerequisite: course 1A.
A continuation of course 1A. Application of the scientific method in the study of behavior.

5. Introduction to Psychological Measurements. (3) I and II. Mr. Brown
Three hours of lecture 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.

14. Childhood and Adolescence. (3) I and II. Mr. McKee
Prerequisite: course 1A. Primarily for nonmajors.
Intellectual, social, and personality development during childhood and adolescence.

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.
Dynamics of normal personality development. Family relationships, social adjustment, and factors modifying self-evaluation.

**Upper Division Courses**

Unless otherwise stated, courses 1A, 1B, and junior standing are prerequisite to all upper division courses.
100A–100B–100C–100D. Survey of General Psychology. (2–2–2–2) I and II. Mr. Jarrett, Mr. Howe, Mr. Mussen, Mr. Ballachey

Prerequisite: course 1A, 1B, 5.

Advanced coverage of concepts, theories, methods, and findings related to selected special topics representing a broad spectrum of scientific psychology.

100A. Sensory and perceptual processes. I. Mr. Jarrett

100B. Introduction to principles of learning, performance, and thinking. II. Mr. Howe.

100C. Developmental and differential variability. I. Mr. Mussen.

100D. Personal and social aspects of behavior. II. Mr. Ballachey.

H101. Honors Seminar. (3) I and II. Mr. Ritchie, Mr. Krech

Restricted to students who are (1) either honors students in psychology or have a similar status in some other University department, and who, in addition, (2) have been accepted by the course instructor.

Theoretical and experimental analysis of current problems in perception, motivation, learning, and problem-solving.

H102. Honors Seminar. (3) I and II. Mr. MacKinnon, Mr. Tuddenham

Restricted as for H101.

Theoretical and experimental analysis of current problems in mental abilities, mental development, personality, social attitudes, group behavior, and mental disorders.

104. The Psychological Test. (3) I. Mr. Meredith

Lectures and laboratory. Prerequisite: course 1A, 1B, 5.

Theory, logic and methodology of psychological measurements, including attitude scales and psychological tests.

105. Psychology of Speech and Communication. (3) II. Mr. Meredith

Prerequisite: course 1A, 1B, 5.

Research and theories of communication including physical, physiological and psychological aspects of speech sounds, auditory perception and communication.

107. Advanced Statistical Methods in Psychology. (3) I and II. Mr. Jarrett, Mr. Meredith

Lectures and laboratory. Prerequisite: course 5 or an equivalent course.

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: course 1A, 1B, 5, and Physiology I and IL or consent of instructor.

Relations between behavior and biological processes. Coordination of behavior; nervous and endocrine systems; sensory and perceptual processes; physiological processes in motivation, maturation and learning.

109. Mathematical Models in Psychology. (3) I. Mr. Lee

Prerequisite: course 5 and 107, or consent of instructor.

Survey at an elementary mathematical level of models of perception, learning, cognition, and motivation.

112. Developmental Psychology. (3) II. Mr. Cowan

Prerequisite: course 1A, 1B, 5. Primarily for majors in psychology. Not open to students who have taken course 111 or Home Economics 132.

Development of motor functions, social and emotional traits, language, and mental abilities. Individual differences as related to physical, social, and psychological factors.

113. Adolescence and Maturity. (3) II. Mr. McKee

Prerequisite: course 1A, 1B, 5. Primarily for majors in psychology.

A survey of current research.
114. Laboratory in Child Psychology. (2) II. Mr. Langer
One hour of lecture and three hours of laboratory per week to be arranged. Prerequisite: course 1A, 1B, 5 (with grade of A or B) and either 111, 112, Education 111, or Home Economics 132.
Empirical methods of investigation used in child psychology.
Students will conduct an original investigation.

116. Tests and Measurements of Infants and Preschool Children. (2) I. Mrs. Honzik
Prerequisite: course 5 and 112.
Measurement of mental, physical, motor and personality development of infants and young children. Class demonstrations. Theory and empirical research discussed.

117. Laboratory Tests and Measurements of Infants and Preschool Children. (2) I. Mrs. Honzik
Prerequisite: consent of instructor.
Laboratory work accompanying course 116.

118. Introduction to History and Systems of Psychology. (3) I. Mr. Howe
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. Nineteenth-century structuralism, functionalism, behaviorism, Gestalt psychology, and psychoanalysis.

120. Contemporary Psychology. (3) II. Mr. Jarrett
Prerequisite: course 1A, 1B, and at least 6 upper division units in psychology. Primarily for seniors.
Contemporary aims, methods, and achievements in psychology.

130A–130B. Learning and Thinking. (3–3) Yr. Mr. Peterson, Mr. Keppel
(Formerly numbered 130 and 135.)
Two hours of lecture and four hours of laboratory per week.
Prerequisite: course 1A, 1B, and 5.
Theoretical and experimental analysis of conditioning, learning, transfer of training, memory and thinking.
130A. The major emphasis will be on conditioning, verbal learning, motor learning, and retention.
130B. The major emphasis will be on concept learning, problem solving and thinking.

131. Perception. (3) II. Mr. Cornsweet
Two hours of lecture and four hours of laboratory per week.
Prerequisite: course 100A.
Lecture and laboratory work, with primary emphasis on the psycho-physiological relationships involved in the perception of brightness, color and form.

134. Motivation. (3) I. Mr. Ballachey, Mr. Sampson
Prerequisite: course 1A, 1B, and at least 6 upper division units in psychology. Primarily for seniors and graduates.
Primary and secondary drives; theories of drives in animal, child, experimental, social, and abnormal psychology.

136. Psychology of the Unconscious. (3) II. Mr. MacKinnon
Prerequisite: course 1A.
Nature and role of unconscious psychological processes in behavior.

140. Social Psychology. (3) I and II. Mr. Ballachey, Mr. Sampson
(Formerly numbered 145A.)
Prerequisite: course 1A. Primarily for majors in psychology, may not be taken for credit by students who have received credit for 141.
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.
141. The Psychology of Social Problems. (3) I and II.

Prerequisite: course 1A. Primarily for nonmajors; may not be taken for credit by students who have received credit for 140.
Selected social problems in the light of social psychological research and theory. Such problems as mental illness, prejudice and desegregation, propaganda, delinquency, social conflict, will be treated.

142. Attitudes, Beliefs, and Persuasion. (3) I and II. Mr. Ballachey

Lectures and laboratory. Prerequisite: course 1A, 1B, 5 and 100D or 140.
Nature and measurement of attitudes and beliefs, theory of attitude change, experiments or field studies concerning attitudes and attitude change.

143. Group Structure and Process. (3) I and II. Mr. Sampson, Mr. Coffey

Lectures and laboratory. Prerequisite: course 1A, 1B, 5 and 100D or 140.
Psychological nature of social groups with emphasis on processes in small groups.

144. Language and Cognition. (3) II.

Mr. Slobin
Lectures and laboratory. Prerequisite: course 1A, 1B, 5 and either 100D, 140, 130A or 130B or a background in linguistics.
Introduction to psycholinguistics, emphasizing the relevance of language structure for cognitive processes, the psychological analysis of meaning, the development of language as an aspect of cognitive development in children.

145. Personality in Society and Culture. (3) II.

Mr. Slobin
(Formerly numbered 141.)
Prerequisite: course 1A and 100D or 140.
Social and cultural determinants of personality.

146A. Differential Psychology. (3) I.

Mr. McClearn
Prerequisite: course 1A, 5 or equivalent, and one other course in psychology, or consent of instructor.
Hereditary and environmental bases of individual differences in intelligence and personality. Family, sex, class, and race differences.

146B. General Traits and Types of Individuals. (3) II.

Prerequisite: course 1A, 5 or equivalent. (Course 146A may be omitted as prerequisite to 146B with consent of instructor.)
Introduction to cluster and factor analysis of individual and group differences; methods and findings.

147. Behavioral Genetics. (3) II.

Mr. McClearn
Lectures and laboratory.
Prerequisite: upper division status, course 5 or equivalent, and one of the following four courses or equivalent (may be taken concurrently): Genetics 10, 100, Zoology 114, 115.
Intensive survey of the evidence regarding the inheritance of behavioral characteristics in animals and man, with emphasis on animal research; implications of behavioral genetics for psychological theory and research design.

148A–148B. Personality. (3–3) Yr.

Mr. Lenrow
Prerequisite: course 1A and either 1B or 33; 162 or 134 or 136 and senior or graduate standing.
Theory and research in the field of personality, with emphasis on dynamic and genetic problems.

149. Personality Assessment. (3) II.

(Formerly numbered 140.)
Lectures and laboratory. Prerequisite: course 1A, 1B, 5.
Analysis of concepts and methods used in assessing personality.
150A. Comparative Psychology. (3) II.
Prerequisite: consent of instructor.
Determinants of animal behavior at the various phyletic levels. Analysis of the role of stimulation and neural integration, instincts and habits.

150B. Animal Learning and Problem-Solving. (3) I.
Prerequisite: course 100B or consent of instructor.
Conditions under which habits are acquired or lost or old habits integrated in the solution of new problems in higher animals.

151. Experiments in Animal Psychology. (3) I.
Lectures and laboratory. Prerequisite: consent of instructor.
The major emphasis is on the study of contemporary psychobiological problems by laboratory research methods.

160. Mental Deficiency. (3) I and II.
Prerequisite: course 1A and upper division standing.
Mental deficiency and abnormality in children.

161. Personality Development. (3) I.
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.
Biosocial factors in the dynamics of normal personality development.

162. Clinical Psychology. (3) I.
Prerequisite: course 1A, 1B, 5 or 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, clinical methods and problems.

165A–165B. Introduction to Clinical Methods. (3-3) Yr.
Mr. Tuddenham
Lectures and laboratory. Prerequisite: course is primarily for psychology majors. Required course 1A, 1B, 5 and 186. Course 104 or 107 or 146B may be substituted for course 186 with the consent of instructor. 165B may be taken without 165A.
Theory and evaluation of the principal tests of ability and personality. Psychological test methods, with special reference to clinical diagnosis. Historical development of psychometrics. 165A is concerned with abilities and aptitudes; 165B, with personality.

168. Behavior Disorders. (3) I and II.
Mr. Sarbin
Prerequisite: course 1A.
Psychology of the psychoneuroses and psychoses; appearance of abnormal traits in incipient stages of mental disturbance.

185. Personnel and Industrial Psychology. (3) I and II.
Mr. Gilmer
Prerequisite: course 1A.
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: course 1A, 1B, 5.
Scaling of psychological measurement, reliability and validity of tests, dimensions of psychological traits.

187. Social Psychology of Industry. (3) I and II.
Mr. Porter,
Discussion of social and psychological problems encountered in industry; emphasis on perception, motivation, small groups, morale, leadership, communication, use of incentives, and status and role.

* Not to be given, 1964–1965.
188. Psychological Problems in Organizations. (3) I.
Prerequisite: course 1A, 1B, 5.
Perceptual and attitudinal organization in industrial situations, role perceptions in labor and management relations, genesis of attitudes, morale surveys.

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
Restricted to senior honor students with adequate preparation in psychology.

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 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.
Prerequisite: graduate standing.
An intensive consideration of major areas and problems in psychology.

202A-202B. Proseminar in Clinical Psychology. (3-3) Yr.
Mr. Langer, Mr. Mendelsohn
Prerequisite: graduate standing. Required of graduate students in the clinical training program. Can be taken concurrently with 201A-201B.
Basic theoretical and methodological issues in clinical psychology.

203A-203B. Proseminar in Social Psychology. (3-3) Yr.
Mr. Sampson, Mr. Mendelsohn
Prerequisite: graduate standing. Can be taken concurrently with 201A-201B.
Critical analysis and discussion of assigned readings in the research and theoretical literature. The fall semester deals with the more individually oriented aspects of social psychology; the spring semester with group aspects. Graduate students planning to specialize in social psychology are recommended to enroll in their first year.

204A-204B. Proseminar in Physiological Psychology. (3-3) Yr.
Mr. Rosenzweig
Prerequisite: graduate standing. Can be taken concurrently with 201A-201B.
Current theories and research on relations between biological processes and behavior.

205A-205B. Proseminar in Learning. (3-3) Mr. Peterson, Mr. Postman
Prerequisite: 130A-130B or any equivalent course. Can be taken concurrently with 201A-201B.
Current theories and research in conditioning, discrimination learning, transfer of training, verbal learning, memory and problem solving.

206A-206B. Proseminar in Industrial Psychology. (3) Yr.
Prerequisite: graduate status in psychology. Mr. Haire, Mr. Porter, Mr. Gilmer
Theory of personnel measurement, concepts of work and fatigue, worker attitudes and motivation, organization theory.

*207. Quantitative Methods in Psychology. (3) II.
Quantitative research methods in psychology. Rational and empirical equations, statistical testing of hypotheses.

* Not to be given, 1964-1965.
217A–217B. Appraisal of the School-Age Child. (3–3) Yr. Mr. Tuddenham
Prerequisite: course 165A or consent of instructor.
Laboratory and individual supervision. Six hours of field work per week to be arranged.
Appraisal of the child, integrating the methods of observation, mental-testing, and interview.
Primarily for first-year graduate students in clinical, developmental, and differential psychology.

*228. The Conceptual Framework of Psychology. (3) II.
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 instructor.
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 points of view. The status of theory in modern psychology; description
versus explanation, idiographic versus statistical versus nomothetic approach.

231. Electrical Models in Research and Theory Construction. (3) II.
Lectures and laboratory. Prerequisite: graduate standing.
The use of electrical models in the formulation of psychological theory, with particular
applications in physiological psychology. Actual models will be constructed.

249. Experimental Psychodynamics. (3) II.
Two hours of lecture and four hours of laboratory work per week to be arranged.
Psychodynamics of behavior, emphasis upon the experimental literature.

(2–2–2–2) Yr. Mr. Cowan, Mr. Gough, Mr. Lenrow, Mr. Stein
Lectures and laboratory. Prerequisite: course 202A and 202B, and/or consent of the
instructor. All sections required of graduate students in the clinical program.
261A. Assessment of capacity and intellectual functioning, I, Mr. Cowan.
261B. Assessment of personality by means of structured tests. II, Mr. Gough.
261C. Assessment of personality by means of free response and unstructured tests. II,
Mr. Stein.
261D. Assessment of personality by means of the clinical interview. I, Mr. Lenrow.

262A–262B–262C. Case Conference Research Methods. (2–2–2) I and II.
Mr. Coffey, Mr. Cowan, Mr. Korchin, Mr. Lenrow, Mr. Stein
Lectures and laboratory. Prerequisite: course 202A–202B, and 261A–261B–261C–261D
or equivalent. All sections required of graduate students in the clinical program.
Clinical research involving subjects in the clinic and in cooperating agencies.
Experience in clinical agencies. Weekly conference on case material.
262A. Evaluation and diagnosis. I, Mr. Cowan, Mr. Korchin; II, Mr. Cowan.
262B. Individual psychotherapy. I, Mr. Stein; II, Mr. Stein.
262C. Group psychotherapy. I, Mr. Coffey, Mr. Lenrow; II, Mr. Lenrow.

290. Seminar. (2) I and II.
Advanced Seminar in the areas of modern psychology: (a) Measurement, I, Lee; II,
Meredith; (b) Learning, I, Postman; II, Peterson; (c) Physiological, I, Rosenzweig; II,
French; (d) Individual Differences, ——— ———; (e) Constitutional, ———; (f) Developmental,
I, Langer; (g) Perception, I, Cornsweet; (h) Psychological Change, I, Coffey; (i) Attitudes,
Beliefs and Persuasions, ———; (j) Personality Assessment, I, Gough; (k) Socialization:
The Individual in Society and Culture, ———; (l) Behavior Disorders, II,
Sarbin; (m) Language, Cognition and Communication, I, Slobin; II, Langer; (n) Perception
and personality, ———; (o) Group Structure and Processes, I, Sampson; (p) Personality,
II, Korchin; (q) Dynamic Psychology ———; (r) Animal, ———; (s) Medical,
————; (t) Clinical Research, ———; (u) Industrial, I, Gilmer; (v) Human Relations, II,
Porter; (w) Theories of Therapy, II, Mendelsohn; (x) Differential and Animal Social Psychology,
I, McClearn; (y), Thinking, I, Sarbin; II, Howe.

* Not to be given, 1964–1965.
298. Research Methods. (3) I and II.

Mr. Merdith, Mr. Lee, Mr. Cornsweet, Mr. Keppel, Mr. Ritchie
Prerequisite: this course required of all first-year graduate students, unless specifically excused.
Experimental design and analysis considered in relation to individual research projects.

299. Research. (1–6) I and II.

Laboratory, library, or field work as the problem requires.

*300. Seminar in the Presentation of Psychological Material. (2) I.

Sec. 1: Sec. 2:
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)

Sanford S. Elberg, Ph.D., Professor of Immunology and Bacteriology.
William Griffiths, Ph.D., Professor of Public Health.
Warren J. Kaufman, Sc.D., Professor of Sanitary and Radiological Engineering and Professor of Sanitary Engineering.
Percy H. McCauhey, M.S., Professor of Public Health Engineering and Professor of Sanitary Engineering, and Director of the Sanitary Engineering Research Laboratory.
Stewart H. Madin, Ph.D., D.V.M., Professor of Public Health, and Director, Naval Biological Laboratory
Sven Nissen-Meyer, M.D., Ph.D., Professor of Biostatistics.
William C. Reeves, Ph.D., M.P.H., Professor of Epidemiology.
Beryl Roberts, M.Ed., Dr.P.H., Professor of Public Health.
Edward S. Rogers, A.B., M.D., M.P.H., Professor of Public Health and Medical Administration.
Charles Edward Smith, A.B., M.D., D.P.H., Professor of Public Health (Chairman of the Department).
Reuel A. Stallones, M.D., M.P.H., Professor of Public Health.
William W. Stiles, B.S., M.D., M.P.H., Professor of Public Health.
Irving R. Tabershaw, B.S., M.D., Professor of Occupational Medicine.
Keith O. Taylor, Ph.B., M.B.A., Professor of Hospital Administration.
William F. Taylor, Ph.D., Professor of Biostatistics.
Bernard D. Tebbens, Sc.D., Professor of Industrial Hygiene Engineering.
Helen M. Wallace, A.B., M.D., M.P.H., Professor of Public Health.
†Jacob Yerushalmy, Ph.D., Professor of Biostatistics.
Margaret Beattie, M.A., Gr.P.H., Professor of Public Health, Emeritus.
Jessie M. Bierman, M.D., M.S.P.H., Professor of Maternal and Child Health, Emeritus.

* Not to be given, 1964–1965.
Edith M. Lindsay, Ed.D., Professor of Public Health, Emeritus.
Walter S. Mangold, B.S., 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.
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.
William J. Oswald, Ph.D., Associate Professor of Public Health.
Demosthenes Pappagianis, Ph.D., M.D., Associate Professor of Public Health.
John V. Slater, Ph.D., Associate Professor of Public Health.
Alan Burkhalter, Ph.D., Assistant Professor of Toxicology.
Robert C. Cooper, Ph.D., Assistant Professor of Public Health.
Judith B. Davis, Ph.D., Assistant Professor of Demography.
Jerome Grossman, Ph.D., M.P.H., Assistant Professor of Public Health.

Mary F. Arnold, Dr.P.H., Lecturer in Public Health.
Will H. Aufranc, B.S., M.D., M.P.H., Lecturer in Public Health.
Rodney R. Beard, M.D., M.P.H., Lecturer in Public Health.
Albert R. Behnke, Jr., A.B., M.D., Lecturer in Public Health.
John E. Bell, E.D., Lecturer in Public Health.
Mortimer A. Benioff, M.D., Lecturer in Public Health.
Barbara Blackwell, M.S., M.P.H., Lecturer in Public Health.
Henrik L. Blum, M.D., M.P.H., Clinical Professor of Public Health Administration.
Howard L. Bodily, Ph.D., Lecturer in Public Health.
Edna J. Brandt, M.S., Lecturer in Public Health.
Lester Breslow, M.D., Lecturer in Public Health.
Adolph F. Brewer, M.D., Lecturer in Public Health.
George M. Briggs, Ph.D., Lecturer in Public Health and Professor of Nutrition.
Henry B. Bruyn, Jr., M.D., Lecturer in Public Health.
Sylvia C. Bryson, M.A., Lecturer in Public Health.
Robert G. Carpenter, M.A., Visiting Associate Professor of Biostatistics.
Alfred W. Childs, A.B., M.D., M.P.H., 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.
Martin B. Covitz, M.P.H., Lecturer in Public Health.
Hugh T. Croley, Ph.D., M.P.H., Lecturer in Public Health.
Ronald Dillehay, Ph.D., Lecturer in Public Health.
Samuel W. Dooley, B.S., M.D., Clinical Professor of Maternal and Child 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.
Victor Eisner, M.D., M.P.H., Lecturer in Public Health.
Cecil Enteman, Ph.D., Lecturer in Public Health.
Seymour M. Farber, M.D., Lecturer in Public Health.
Anita E. Faverman, M.D., M.P.H., 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.
Lloyd A. Frost, M.P.H., Lecturer in Public Health.
Charles R. Gardipee, M.D., M.P.H., Lecturer in Public Health.
Michael Granich, B.S., Associate in Public Health.
Harold C. Gustafson, Dr.P.H., Lecturer in Public Health.
Floyd W. Hartmann, Sc.D., Lecturer in Public Health.
John M. Heslep, Ph.D., Lecturer in Radiological Science.
John M. Hess, Ph.D., Acting Assistant Professor of Public Health.
Frank E. Hesse, B.S., M.D., M.P.H., Lecturer in Public Health.
Charles H. Hine, Ph.D., M.D., Lecturer in Public Health.
Harold H. Hixon, Lecturer in 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.
Harald N. Johnson, M.A., M.D., Lecturer in Public Health.
George M. Keranen, M.D., M.P.H., Lecturer in Public Health.
Andie L. Knutson, Ph.D., Lecturer in Public Health.
Marian E. Leach, Ph.D., M.P.H., Lecturer in Public Health.
Edwin H. Lennette, M.D., Ph.D., Lecturer in Virology.
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 P. Long, M.D., Dr.P.H., Lecturer in Public Health.
Richard N. Lyness, M.P.H., Associate in Public Health.
Christine Mackenzie, M.A., Lecturer in Public Health.
George A. McKray, LL.M., M.P.H., Lecturer in Public Health and Medical Administration.
Alfred E. Maffly, B.S., Lecturer in Public Health.
Ben H. Mathews, B.S., Associate in Public Health.
Malcolm H. Merrill, M.S., M.D., M.P.H., Lecturer in Public Health.
Howard W. Mitchell, M.D., M.P.H., Lecturer in Public Health.
Theodore A. Montgomery, M.D., M.P.H., Lecturer in Public Health.
Barbara B. Moore, M.A., Associate in Public Health.
M. Mary Murai, Dr.P.H., Lecturer in Public Health.
Alberta Parker (Alberta Parker Horn), M.D., M.P.H., Lecturer in Public Health.
Beulah Parker (Beulah Parker Vaughn), M.D., Lecturer in Public Health.
George N. Parlette, M.P.H., Lecturer in Public Health.
David W. Phelps, M.S., M.P.H., Associate in Public Health.
Catherine Prato, M.S., Lecturer in Public Health.
Octavio I. Romano V., Ph.D., Lecturer in Public Health.
Helen S. Ross, M.P.H., Lecturer in Public Health.
Arthur Roth, B.S., M.D., Lecturer in Public Health.
Edith P. Sappington, M.A., M.D., Dr.P.H., Lecturer in Public Health.
Leona R. Shapiro, M.S., Lecturer in Public Health.
Jeanette J. Simmons, M.P.H., Lecturer in Public Health.
George D. Smith, B.S., Associate in Public Health.
James M. Smith, Jr., M.E., Lecturer in Radiological Engineering.
Esther C. Spencer, M.S.S., Lecturer in Public Health.
William W. Stadel, A.B., M.D., Lecturer in Hospital Administration.
Ruth C. Steinkamp, M.S., M.D., Lecturer in Public Health Nutrition and Human Nutrition.
John M. Switzer, M.P.H., Lecturer in Public Health.
Sherman L. Syme, Ph.D., Lecturer in Public Health.
Richard M. Taylor, M.D., Dr.P.H., Lecturer in Public Health.
Constantine H. Tempelis, Ph.D., 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.
Alvin D. Wiggins, Ph.D., Lecturer in Biostatistics.
George W. Wood, Ph.C., Lecturer in Hospital Administration.
David Yaukey, Ph.D., Lecturer in Public Health.

Letters and Science List. Courses 5A–5B, 106, 160A, 160B, 163 are included in the Letters and Science List of Courses. For regulations governing this list, see page 91.
Lower Division Courses

5A. Individual and Community Health. (3) I and II. Mr. Stiles
A survey of the field of 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) II. Mr. Stiles
Prerequisite: course 5A.
Continuation of 5A.

*35. Personal Health Problems. (3) I and II.
Factors which determine physical, mental, and emotional health and influence the prevention of disease.

Upper Division Courses

100. Introduction to Public Health. (3) I.
Prerequisite: course 5A. Miss A. Parker, Mr. Leonard, Miss Arnold
Organization and programs of official and voluntary health agencies.

Prerequisite: consent of instructor. Miss Arnold
Introduction to principles and theory of administrative practice in public health. Intended for students not majoring in administration.

106. Introduction to Human Ecology and Health. (3) I. Mr. Rogers
Current theory and methods of study of social, economic, and other environmental factors affecting health status and the receipt of medical care.

107. Introduction to Medical Care Administration. (2) I. Mr. Rogers

108. Medical Care Problems and Programs. (1) II. Mr. Rogers

110. Environmental Health Sciences. (2) I and II. Mr. Oswald

111. Environmental Sanitation. (2) I and II. Mr. Bliss
Prerequisite: consent of instructor.
Environmental sanitation for rural and international health.

*112. Control of Vector and Reservoir Animals Affecting the Public Health. (3) I.

113. Sanitary Control of Foods. (3) II. Mr. Hartmann
Food production, processing, and distribution.

115. Radiological Aspects of Public Health Engineering. (2) I and II. Mr. Kaufman
Radiation detection, shielding design, monitoring procedures, low-level assaying of food and water, waste disposal, water decontamination, regulation of radiation sources.

117. Sanitary Microbiology of Water and Sewage. (4) I. Mr. Cooper

118. Sanitary Microbiology of Foods and Beverages. (4) II. Mr. Cooper

* Not to be given, 1964–1965.
131. Health Education Laboratory. (1) I and II.  
Teaching health to adults through various media.  
Miss Roberts

132. Group Study in Health Instruction. (2) I and II.  
Health instruction of community groups.  
Mr. Griffiths

133. Introduction to Group Process. (2) II.  
Dynamics of interpersonal relationships.  
Mr. Griffiths

134. Community Health Education. (3) II.  
Miss Roberts, Mr. Griffiths  

135. Individual Health. (3) I.  
Research in personal health problems.  
Mr. Grossman

136. Health Programs for the School-Age Child. (2) II.  

138A–138B. Selected Topics in Health Education. (1–1) Yr.  
Mr. Griffiths, Miss Roberts

145. Introduction to Epidemiology. (3) I and II.  
Mr. Reeves, Mr. Smith, Mr. Stallones, Mr. Reynolds

150A. Quantitation in Clinical Chemistry and Hematology. (8) I.  
Prerequisite: Chemistry 5 and 8.  
Miss Hollinger

150B. Public Health Microbiology. (8) II.  
Prerequisite: Bacteriology 101.  
Miss Hollinger

Miss Hollinger

160A. Introduction to Probability and Statistics in Biology and Public Health. (3) I  
Descriptive statistics, probability, probability distributions, point and interval estimation, hypothesis testing, applications.  
Mr. Chiang

160B. Introduction to Probability and Statistics in Biology and Public Health. (3) II.  
Prerequisite: course 160A and Mathematics 3A, or consent of instructor. Bivariate distributions, regression, correlation, analysis of variance.  
Mr. Chiang

161A–161B. Introduction to Biostatistics. (3–3) Yr.  
Measurement of mortality, morbidity, natality.  
Mrs. Davis, Mr. W. Taylor  
Vital statistics, rate adjustment, life tables, record systems.

162A. Introduction to Public Health Statistics. (3) I and II.  
Mr. Nissen-Meyer, Mr. Chiang, Mr. W. Taylor  
Tabulation and graphics, collection and analysis of vital data, rate adjustment, descriptive statistics, statistical inference.

162B. Introduction to Public Health Statistics. (2) II.  
Mr. W. Taylor  
Prerequisite: course 162A or equivalent.

* Not to be given, 1964–1965.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>163</td>
<td>Demography.</td>
<td>(3) II</td>
<td>Mrs. Davis</td>
</tr>
<tr>
<td>164</td>
<td>Biostatistical Methods in Biology and Medicine.</td>
<td>(2) I</td>
<td>Mr. Wiggins</td>
</tr>
<tr>
<td>165</td>
<td>Principles of Evaluation in Medicine and Public Health.</td>
<td>(2) II</td>
<td>Mr. Yerushalmy</td>
</tr>
<tr>
<td>168A-168B</td>
<td>Selected Topics in Demography and Biostatistics.</td>
<td>(2-1) Yr</td>
<td>Mrs. Davis</td>
</tr>
<tr>
<td>170</td>
<td>Introduction to Occupational Health and Industrial Hygiene.</td>
<td>(3) I</td>
<td>Mr. Tebbens, Mr. Tabershaw</td>
</tr>
<tr>
<td>171</td>
<td>Industrial Environment Control: Sanitary Air Analysis.</td>
<td>(2) II</td>
<td>Mr. Tebbens</td>
</tr>
<tr>
<td>172</td>
<td>Industrial Toxicology.</td>
<td>(2) II</td>
<td>Mr. Burkhalter</td>
</tr>
<tr>
<td>175A-175B</td>
<td>Introduction to Behavioral Sciences in Public Health.</td>
<td>(1-1) Yr</td>
<td>Mr. Romano</td>
</tr>
<tr>
<td>178A-178B</td>
<td>Research Methods in the Behavioral Sciences.</td>
<td>(2-2) Yr</td>
<td>Mr. Dillehay</td>
</tr>
<tr>
<td>180</td>
<td>The Hospital in Contemporary Society.</td>
<td>(3) II</td>
<td>Mrs. Inghram, Mr. Hess</td>
</tr>
<tr>
<td>183A-183B</td>
<td>Elements of Hospital Administration.</td>
<td>(3-3) Yr</td>
<td>Mr. K. Taylor, Mrs. Inghram</td>
</tr>
<tr>
<td>184</td>
<td>Hospital Problems and Programs.</td>
<td>(1) I</td>
<td>Mr. K. Taylor</td>
</tr>
<tr>
<td>187</td>
<td>Nutrition in Public Health.</td>
<td>(1) II</td>
<td>Miss Huenemann, Miss Murai</td>
</tr>
</tbody>
</table>

*Not to be given, 1964–1965.*
191. Social, Medical and Public Health Aspects of Venereal Disease Control. (2) II.  
Mr. Koch

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 165)

200A–200B. Public Health Organization and Administration. (3–2) Yr.  
Mr. Rogers, Miss Arnold

Importance and uses of demographic data, history, current organization and programs; principles of administration; trends and relationships in the local, national and international setting; case studies in current problems and patterns of public health practice.

201. Group Study in Dental Health Administration. (2) II.  
Mr. Nevitt, Mr. Weiss, Mr. Richards

202. Advanced Theory in Health Administration. (2) II.  
Prerequisite: consent of instructor.  
Miss Arnold, Mr. Rogers

Survey of current approaches to the theories of administration and of complex organizations, especially as they relate to health administration.

204A–204B. Proseminar in Public Health Administration. (1–2) Yr.  
Mr. Leonard, Mr. Blum, Mr. Porterfield, Miss Arnold

207. Group Study in Medical Care. (3) II.  
Mr. Rogers

211. Environmental Health Administration. (2) I and II.  
Mr. Bliss

214A–214B. Group Study in Environmental Health and Safety. (2–2) Yr.  
Prerequisite: consent of instructor.  
Mr. Bliss

215. Ecological Aspects of Radiation Control. (2) II.  
Mr. Kaufman

Prerequisite: course of 115 or Medical Physics 128A.  
Concerned with the origin, management, and dispersal of radionuclides in the environment. Considers transport of nuclides in food chains, in aquatic systems, and in the earth.

217. Group Study in Waste Water Biology. (1) II.  
Mr. Cooper

Prerequisite: course 117 or consent of instructor.  
Group study of the biology of waste waters designed for graduate students in sanitary engineering and environmental health.

218. Sanitary Microbiology. (2) II.  
Mr. Cooper

Six hours of laboratory per week.  
Prerequisite: consent of instructor.  
A laboratory course in sanitary microbiology designed primarily for graduate students in environmental health.

220A–220B. Public Health Nursing Administration. (2–2) Yr.  
Miss Mackenzie
224. Proseminar in Public Health Nursing Administration. (2) II.
May be repeated for credit. Miss Mackenzie

225. Problems in Maternal and Child Health. (1) II. Miss Wallace
Principal problems in the U.S. and other parts of the world; trends in program development.

226. Proseminar in Mental Health. (1) II. Miss B. Parker
Emotional growth and development in the life cycle. Organization and administration of community mental health services.

227. School Health Administration. (2) II. Mr. Foord
Organization, administration, supervision and evaluation of school health services.

229A–229B. Proseminar in Maternal and Child Health. (1–1) Yr.
Miss Wallace, Mr. Dooley, Mr. Eisner, Mrs. Gorman
Presentation and discussion of health and social needs of mothers and children, and the organization, administration, and evaluation of community health and social services for mothers and children, including recent developments and present day standards.

231. Communications Research Applicable to Public Health Education. (1) I and II. Miss Roberts, Mr. Knutson

233. Group Work Procedures in Health Education. (2) I and II.
Mr. Griffiths, Miss Roberts, Mrs. Ross
One lecture and two hours of laboratory per week.
Social and psychological factors which determine the effectiveness of group work in promoting public health activities.

239A–239B. Community Organization as an Educational Approach. (1–2) Yr.
Mr. Griffiths, Mr. Grossman

245A. Advanced Epidemiology. (3) I. Mr. Reeves, Mr. Smith, Mr. Stallones
Prerequisite: a doctoral degree in a medical science or consent of instructor for those with adequate background in allied medical sciences. To be taken concurrently with course 160A or 162A.

245B. Advanced Epidemiology Laboratory. (3) II.
Mr. Reeves, Mr. Stallones, Mr. Reynolds
Prerequisite: course 245A and 162A or equivalent or consent of instructor.
The analysis and interpretation of epidemiological data and communication of findings by written reports.

246. Epidemiology of Noninfectious Diseases. (1) I and II. Mr. Stallones
Prerequisite: consent of instructor.
Analysis and discussion of developments in the theory and practice of applications of epidemiological methods to noninfectious diseases.
May be repeated for credit.

247A–247B. Epidemiology of the Zoonoses and Arthropod-borne Diseases. (1–1) Yr. Mr. Reeves, Mr. R. Taylor
Prerequisite: a prior doctoral degree in medical allied sciences or consent of instructor.
Group discussion of the epidemiologic cycles and methods of laboratory and field investigations unique and pertinent to an understanding of these two groups of infectious diseases.
249. Group Study in Epidemiology. (1) I and II. Mr. Reeves, Mr. Stallones
Course may be repeated for credit.

Two hours of lecture and three hours of laboratory per week.
Prerequisite: course 164 or equivalent.
Probability models for the study of epidemics, medical diagnosis, accident proneness, other stochastic processes.

261A–261B. Advanced Biostatistics. (3–3) Yr.
Mr. Yerushalmy, Mr. W. Taylor, Mr. Nissen-Meyer
Two hours of lecture and three hours of laboratory per week.
Prerequisite: course 161B and 164 or equivalent.
Epidemetric investigations; evaluation of therapy; advanced life table methods, program evaluation, design of surveys in human populations.

262. Selected Topics in Biostatistics. (3) II.
Mr. Nissen-Meyer
Two hours of lecture and three hours of laboratory per week.
Prerequisite: course 261A.
Advances in biostatistics methodology and its applications.

269A–269B. Proseminar in Biostatistics. (1–1) Yr.
Mr. Nissen-Meyer

274A–274B. Group Study in Occupational Health. (1–1) Yr.
Mr. Tebbens, Mr. Tabershaw

Mr. Knutson, Mr. Dillehay, Mr. Romanó
Current developments in the methods, theories, concepts, and findings of the behavioral sciences as they relate to the solution of public health problems.

280A–280B. Theory and Research in Hospital Administration. (1–2) Yr.
Prerequisite: consent of instructor. Mr. Hess, Mr. K. Taylor
The analysis and application of administrative theory to hospital problems.

284A–284B. Organizational Trends in Hospital Administration. (2–2) Yr.
Prerequisite: consent of instructor. Mr. K. Taylor, Mrs. Inghram

Prerequisite: biochemistry, biology, advanced nutrition. Mr. Harper
Designed for graduate students with background in nutrition or medicine. Purpose is to bring students up to date in their understanding of the metabolic aspects of nutrition. Clinical application, particularly to diseases of current interest to Public Health, is emphasized.

Miss Huenemann, Miss Shapiro, Miss Walsh
Prerequisite: course work in advanced nutrition.
Study of current problems in public health nutrition, including methods of assessing nutrition needs in a community and possible ways of meeting them. Field work with public health agencies. Course required of all Public Health Nutrition majors.

290. Advanced Graduate Study.
Prerequisite: consent of instructor.
Advanced study in various areas of public health; topics may vary from year to year and may be repeated for credit.
290A. Public Health Administration. (1) I and II.  
(Formerly numbered 203A–203B.) Mr. Rogers, Mr. Leonard, Mrs. A. Parker

290B. Administrative Medicine. (2) I and II.  
Mr. Rogers, Mr. K. Taylor  
(Formerly numbered 208.)

290C. Environmental Health. (2) I and II.  
(Formerly numbered 213.)  
Mr. Bliss, Mr. Oswald, Mr. Cooper

290D. Public Health Nursing Administration. (1) I and II.  
(Formerly numbered 223A–223B.)  
Miss Mackenzie

290E. Maternal and Child Health. (1) I.  
(Formerly numbered 228A.)  
Miss Wallace

290F. Maternal and Child Health. (3) II.  
(Formerly numbered 228B.)  
Miss Wallace

290G. Health Education. (1) I and II.  
(Formerly numbered 238.)  
Mr. Griffiths, Miss Roberts

290H. Public Health Laboratory. (2) I.  
(Formerly numbered 253A.)  
Miss Hollinger

290I. Public Health Laboratory. (4) II.  
(Formerly numbered 253B.)  
Miss Hollinger

290J. Biostatistics. (2) I.  
(Formerly numbered 268A.)  
Mr. Carpenter

290K. Biostatistics. (3) II.  
(Formerly numbered 268B.)  
Mr. Carpenter

290L. Occupational Health. (1) I.  
(Formerly numbered 273A.)  
Mr. Tebbens, Mr. Tabershaw

290M. Occupational Health. (2) II.  
(Formerly numbered 273C.)  
Mr. Tebbens, Mr. Tabershaw

290N. Behavioral Sciences in Public Health. (2) I and II.  
Mr. Knutson  
(Formerly numbered 278.)

290O. Hospital Administration. (1) I and II. Mr. K. Taylor, Mrs. Inghram  
(Formerly numbered 283.)

290P. Public Health Nutrition. (1) I and II.  
(Formerly numbered 288.)  
Miss Huenemann

291. Clinical Problems in Public Health. (1–4) II. Mr. Smith, Mr. Stallones  
Clinical subjects of major public health importance with recent advances in diagnosis,  
treatment and prevention.

295. Seminar. (1–4) I and II.  
Mr. Smith (in charge)  
Topics vary from year to year. (a) Research in Health Administration, Miss Arnold;  
(b) Ecology and Health Organization, Rogers; (c) Environmental Health Sciences, Mc­Gauhey; (d) Public Health Nursing Administration, Miss Mackenzie; (e) Maternal and  
Child Health, Miss Wallace; (g) Public Health Education, Griffiths; (h) Microbiology,  
Madin; (k) Biostatistics, W. Taylor; (m) Occupational Health, Tabershaw, Tebbens; (p)  
Behavioral Sciences in Public Health, Knutson; (q) Hospital Administration, K. Taylor;  
r) Public Health Nutrition, Miss Huenemann; (s) Public Health Social Work, Mrs.  
Gorman; (t) Epidemiology, Reeves.

296. Research. (1–6) I and II.  
Mr. Smith (in charge)
RANGE MANAGEMENT

(Office, 145 Walter Mulford Hall)

Committee in charge:
Harold H. Biswell, Ph.D., Professor of Forestry.
Harold F. Heady, 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).
William C. Weir, Ph.D., Professor of Animal Husbandry, Davis.

Major Adviser: Mr. Heady.

The Major in Range Management: To obtain a B.S. degree in this major, the following five items must be satisfied and part of the work must be taken at Davis: (1) General University requirements. (2) College of Agriculture requirements (see page 65.) (3) Range Management Curriculum requirements: (a) General—Botany, 16 units. Chemistry, 8 units. Economics, 3 units. Engineering, 3 units. English and/or speech, 6 units. Physics, 6 units. Zoology, 8 units. (b) Agriculture—Agronomy and range management, 12 units. Animal husbandry, 10 units. Soil science and/or geology, 6 units. Summer field practice course, 0 units,† (c) Electives (restricted)—Genetics, statistical methods; or additional units in botany, chemistry, geology, and zoology, 6 units. Anthropology, art, foreign language, geography, history, music, philosophy, political science, psychology, sociology; or additional units in economics, English, and speech, 9 units. (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 units. (5) Certain courses are required for the major and, where applicable, may be used in partial satisfaction of above requirements. For details, see the ANNOUNCEMENT OF THE COLLEGE OF AGRICULTURE, BERKELEY, available without charge. Instruction in range management is not organized as a single administrative unit in the College of Agriculture. The required courses in range management are offered by a number of departments at Berkeley and at Davis.

Honors. Information concerning honors may be obtained from the Dean's Office, College of Agriculture.

Upper Division Courses

101. Introduction to Range Management. (3) I. Mr. Biswell
Principles and development in the United States; relations to agriculture and wildland management.
† Curriculum in process of revision to include 4 units.
102. Advanced Range Management. (3) II.  Mr. Heady
Lecture, laboratory, field trips. Prerequisite: Engineering 21 or the equivalent; a course in plant ecology. Recommended: Botany 120.
Procedure in determination of range adequacy and quality.

105. Summer Field Course. (4)  Mr. Heady
Lectures and laboratory. Prerequisite: Botany 140 (or 142) or equivalent; Soil Science 100 or equivalent, and consent of instructor.
Four weeks devoted to field studies of range condition and methods of utilization in various parts of the state. Required of all students with a major in range management.

*123. Range Forage Utilization. (3) I.  Mr. Biswell
Lecture, laboratory, field trips. Prerequisite: course 49 or 101.
Principles of range forage utilization; forage preference of animals; control means to obtain proper utilization.

*133. Grassland Ecology. (3) II.  Mr. Heady
Prerequisite: Forestry 103.
Composition, structure, development, habitat factors, and management of the native North American grasslands.

199. Special Study for Advanced Undergraduates. (1-5) I and II.
Prerequisite: senior standing and consent of instructor.  Mr. Heady, Mr. Biswell

Graduate Courses

(Concerning conditions for admission to graduate courses, see page 165)

201A-201B. Seminar in Range Management. (2-2) Yr.  Mr. Heady, Mr. Biswell
201A. Mr. Biswell; 201B. Mr. Heady.

299. Research in Range Management. (1-9) I and II.  Mr. Heady, Mr. Biswell

ROMANCE PHILOLOGY

Francis J. Carmody, Ph.D., Professor of French.
Diego Catálan, Doctor en Filosofía y Letras, Professor of Spanish.
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, Professor of Italian.
Ruggero Stefani, Dottore in Lettere, Assistant 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 spread of Latin over the Western Mediterranean area, and its gradual 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.

* Not to be given, 1964-1965.
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 ques­
tions of cultural origins and influences.

204. Humanistic Literature in Latin. (2) II. Mr. Scaglione
Prerequisite: a working knowledge of Latin and consent of 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 linguistic atlases 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 instructor.
Interpretation of original texts in Latin, Old French, and Old Spanish, and the cultural
problems involved in their transmission.

207. Peninsular Spanish Dialectology. (2) II. Mr. Catálan
Prerequisite: graduate standing and consent of instructor.
Problems and methods in the study of the Spanish linguistic areas, in diachronic and
synchronic projection.

208. Romance Etymology. (2) I. Mr. Malkiel
Prerequisite: graduate standing and consent of instructor.
Assumptions and techniques in the study of Romance etymology.

209. The Ancient Languages of the Northern Mediterranean. (2) II. Mr. Stefanini
Reconstruction of archaic Mediterranean cultures through the analysis of linguistic
substrata, with special attention to Romance-speaking areas.

210. Romance Derivation and Composition. (2) I. Mr. Malkiel
Prerequisite: graduate standing and consent of instructor.
Methods and assumptions in the study of Romance word formations, with special atten­
tion to derivational suffixes and to compositional patterns.

299. Special Advanced Study. (1–4) I and II.
Mr. Carmody, Mr. Catálan, Mr. Malkiel, Mr. Stefanini,
Mr. Sandmann, Mr. Scaglione, Mr. Walpole

Related Courses in Other Departments
The Age of Chaucer (English 155).
The Medieval Mind (English 220).
Historical Grammar (French 201A–201B).
Reading and Interpretation of Typical Old French Texts (French 206A–
206B).
Gothic (German 265).

* Not to be given, 1964–1965.
Dante’s *Divina Commedia* (Italian 109A–109B).
Elementary Phonology and Grammar (Linguistics 100).
Phonetics and Phonemics (Linguistics 130).
Introduction to Indo-European Comparative Grammar (Linguistics 150).
A History of the Spanish Lexicon (Spanish 131).
The Ballad (Spanish 208A–208B).
Old Spanish (Spanish 212A–212B).

**SANSKRIT**

For courses in the Sanskrit language and literature, see Department of Classics.

**SCANDINAVIAN**

(Department Office, 1202 Dwinelle Hall)

Haakon Hamre, C.phil., *Professor of Scandinavian* (*Chairman of the Department*).
Assar Götrik Janzén, Ph.D., *Professor of Scandinavian*.
Eric Johannesson, Ph.D., *Associate Professor of Scandinavian*.
Børge Gedso Madsen, Ph.D., *Associate Professor of Scandinavian*.

Madison S. Beeler, Ph.D., *Professor of German and Linguistics*.

*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 91.

*Departmental Major Adviser*: Mr. Madsen.

*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, 151A–151B. Six of the 24 units may be in related work in other departments.

*Honors Program*. 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.

*Duplication of Credit*. A student will not be allowed credit for that part of the first 12 units in a foreign language (elementary and intermediate courses) which duplicate courses previously completed in high school or at another institution of collegiate grade. The first two years of work in a foreign language in high school is considered to be equivalent to one semester in college (4 units); each successive year in a foreign language in high school is equal to one additional semester in college (4 units).
Lower Division Courses

IA–IB. Elementary Swedish. (4–4) Yr. Mr. Johannesson (in charge)
1A. Elementary grammar, reading of easy prose.
1B. Elementary grammar, reading, conversation, composition.

3A–3B. Elementary Norwegian. (4–4) Yr. Mr. Nybo (in charge)
3A. Elementary grammar, reading of easy prose.
3B. Elementary grammar, reading, conversation, composition.

4A–4B. Elementary Danish. (4–4) Yr. Mr. Madsen (in charge)
4A. Elementary grammar, reading of easy prose.
4B. Elementary grammar, reading, conversation, composition.

11A–11B. Intermediate Swedish. (4–4) Yr. Mr. Janzen (in charge)
Prerequisite: course IA–IB or the equivalent.
Intermediate grammar, extensive reading, conversation, composition.

13A–13B. Intermediate Norwegian. (4–4) Yr. Mr. Nybo (in charge)
Prerequisite: course 3A–3B or the equivalent.
Intermediate grammar, extensive reading, conversation, composition.

14A–14B. Intermediate Danish. (4–4) Yr. Mr. Madsen (in charge)
Prerequisite: course 4A–4B or the equivalent.
Intermediate grammar, extensive reading, conversation, composition.

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.

151A–151B. Modern Swedish Prose. (3–3) Yr. Mr. Johannesson
Prerequisite: 16 units of lower division Swedish courses or the equivalent.
Intensive reading of selected texts.

H195. Special Study for Honors Candidates. (1–3) I and II. The Staff

198. Directed Group Study for Advanced Undergraduates. (1–3) I and II. The Staff (Mr. Madsen 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.
Restricted to senior honor students. 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. Nybo
Prerequisite: junior standing or, with consent of instructor, sophomore standing.
Survey course: reading of selected works of Danish, Norwegian, and Swedish literature in translation; lectures.
   100A. From 1300 to 1800. (3) I. ——
   100B. From 1800 to 1890. (3) II. Mr. Nybo
   100C. From 1890 to the present. (3) I. Mr. Nybo

106. History of Scandinavian Drama up to 1900. (2) I. Mr. Madsen
Reading of Danish, Norwegian, and Swedish plays in translation; discussions; lectures on the development of the drama.

107. The Plays of Ibsen. (3) I.
Reading and discussion of Ibsen’s most important plays; lectures.

108. Strindberg and His Writings. (3) II.
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. Madsen
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) II.
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) I. Mr. Johannesson
Prerequisite: good background in literature or philosophy.
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 165)

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. Janzén
Phonology, historical grammar, texts.

* Not to be given, 1964–1965.
203. Old Icelandic. (3) I. Mr. Janzén
Descriptive and historical phonology and grammar; texts. Some attention is given to Old Norwegian.

206. Readings of Old Icelandic Sagas. (2) II. Mr. Hamre
One of the longer or two of the shorter Old Icelandic sagas will normally be read in this course. May be repeated with consent of instructor.

208. The Poems of the Poetic Edda. (3) I. 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. Janzén, Mr. Hamre
Conference work on chosen or assigned topics; at least one shorter paper a semester is normally required.

B. Literature Courses

230. Eighteenth-Century Scandinavian Literature. (2) II.
Reading and analysis of representative works; lectures. Mr. Johannesson

*231. Romanticism in Scandinavia. (2) I. Mr. Madsen
Reading and analysis of representative works; lectures.

*233. Scandinavian Literature of the Twentieth Century (2) I.
Reading and analysis of representative works; lectures. Mr. Johannesson

251. Seminar in Scandinavian Literature. (2) I and II.
Mr. Johannesson, Mr. Madsen
Prerequisite: course 100B, 100C and at least one of the following courses: 106, 109, 125.

298. Special Study for Graduate Students. (1–4) I and II.
The Staff (Mr. Johannesson in charge)

Related Courses in Another Department

The Symbolist Movement in European Literature (Comparative Literature 201A–201B).
Romanticism in Western Europe (Comparative Literature 221).
Dramatic Literature of Western Civilization (Dramatic Art 125D–125E).
British and American Drama from 1850 to the Present (English 114C).
The Novel in Western Civilization (English 125B).
Early German Romanticism, 1795–1810 (German 228).
German Realism, 1850–1900 (German 238).
Germanic Linguistics (German 260).
Gothic (German 265).
Elementary Phonology and Grammar (Linguistics 100).
Introduction to Indo-European Comparative Grammar (Linguistics 150).

* Not to be given, 1964–1965.
SLAVIC LANGUAGES AND LITERATURES

(Department Office, 5416 Dwinelle Hall)

Oleg A. Maslenikov, Ph.D., Professor of Slavic Languages and Literatures.
Czeslaw Milosz, Mag. Jur., Professor of Slavic Languages and Literatures.
Gleb Struve, A.B., Professor of Slavic Languages and Literatures.
*Francis J. Whitfield, Ph.D., Professor of Slavic Languages and Literatures.
Waclaw Lednicki, Ph.D., LL.D., Professor of Slavic Languages and Literatures, Emeritus.
Lawrence L. Thomas, Ph.D., Associate Professor of Slavic Languages and Literatures (Chairman of the Department.)
Jadwiga Maurer, Ph.D., Assistant Professor of Slavic Languages and Literatures.

Kathryn B. Feuer, M.A., Lecturer in Slavic Languages and Literatures.
Robert P. Hughes, M.A., Associate in Russian.
Andrew O. Jászi, Ph.D., Associate Professor of German.
Simon Karlinsky, M.A., Acting Assistant Professor of Slavic Languages and Literatures.
Serge Kassatkin, M.A., Lecturer in Russian.
Milica D. Kirkoff, M.A., Lecturer in Serbo-Croatian.
Emil Kovtun, M.A., Lecturer in Slavic Languages and Literatures.
Ninon A. Leader, Ph.D., Lecturer in Hungarian.
Ludmilla A. Patrick, M.A., Lecturer in Russian.
Michael K. Pawlikowski, LL.M., Lecturer in Slavic Languages and Literatures.
Helen S. Schulak, M.A., Associate in Russian.
Vsevolod Setchkarev, Ph.D., Visiting Professor of Slavic Languages and Literatures for the fall semester.
Olga Sorokin, M.A., Acting Instructor 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 91.

Departmental Major Advisers: Mr. Kovtun, Mr. Kassatkin.

The Major. Required: courses 1, 2, 130A, 130B, 140 and 198; in addition, 8 units in upper division language courses and 5 units in upper division lecture courses in Slavic literatures, and the passing of a comprehensive examination.

Honors Program. 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 and 3 units of advanced, independent study (course H195) of the literature of specialization. Honors candidates will be required to answer special questions on the comprehensive examination.

**Lower Division Courses**

_Duplication of Credit._ A student will not be allowed unit credit for that part of the first 12 units in a foreign language (elementary and intermediate courses) which duplicate courses previously completed in high school or at another institution of collegiate grade. (Conversation courses are not considered to duplicate previous credit.) The first two years of work in a foreign language in high school is considered to be equivalent to one semester in college (4 units); each successive year in a foreign language in high school is equal to one additional semester in college (4 units).

1. **Elementary Russian. Beginners’ Course.** (4) I and II. Mr. Hughes
   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. (in charge)
   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. Mrs. Schulak (in charge)
   Two lectures and three recitation hours per week. Prerequisite: course 2. The conversation course of corresponding level is 19A.

4. **Intermediate Russian.** (3) II. Mrs. Sorokin, Mr. Kassatkin, Mr. Maslenikov
   (Formerly numbered 102.)
   Prerequisite: course 3.
   The conversation course of corresponding level is 19B.

*5A–5B. Elementary Ukrainian. (3-3) Yr. Mr. Thomas

*6A–6B. Elementary Polish. (3-3) Yr.

*10A–10B. Elementary Serbo-Croatian. (3-3) Yr.

*12A–12B. Elementary Bulgarian. (3-3) Yr. Mr. Whitfield

*14A–14B. Elementary Czech. (3-3) Yr.

18A. **Elementary Russian Conversation.** (2) I and II. Miss Raevsky
   Open only to students who are taking course 1. Not acceptable for the foreign language requirement of the College of Letters and Science.

18B. **Elementary Russian Conversation.** (2) I and II. Miss Raevsky
   Open only to students who are taking course 2. Not acceptable for the foreign language requirement of the College of Letters and Science.

19A. **Intermediate Russian Conversation.** (2) I and II. Mrs. Schulak
   (Formerly numbered 19.)
   Open only to students who are taking course 3. Not acceptable for the foreign language requirement of the College of Letters and Science.

* Not to be given, 1964–1965.
19B. Intermediate Russian Conversation. (2) II. Mr. Kassatkin, Mrs. Sorokin
(Formerly numbered 119.)
Open only to students who are taking course 4. Not acceptable for the foreign language
requirement of the College of Letters and Science.

Classes meet ten hours per week.
Mr. Kassatkin

22. Intermediate Russian. Intensive Course. (8) II.
Prerequisite: course 2 or 21.
Classes meet ten hours per week.
Mr. Kassatkin

Classes meet ten hours per week.
Mrs. Maurer

24. Intermediate Polish. (3) II.
Prerequisite: course 6B or 23.
Emphasis on the spoken language.
Mrs. Maurer

Classes meet ten hours per week.
Mrs. Kirkoff

26. Intermediate Serbo-Croatian. (3) II.
Prerequisite course: 10B or 25.
Emphasis on the spoken language.
Mrs. Kirkoff

Classes meet ten hours per week.
Mr. Kovtun

30. Intermediate Czech. (3) II.
Prerequisite: course 14B or 29.
Emphasis on the spoken language.
Mr. Kovtun

39. Great Writers of Russian Literature. (3) I.
No knowledge of Russian is required.
Mr. Maslenikov

40. Specialized Russian Reading. (3) I and II.
(Formerly numbered 100.)
Prerequisite: course 3 or consent of instructor.

Upper Division Courses

103A–103B. Advanced Russian. (3–3) Yr. Mr. Maslenikov, Mrs. Sorokin
Prerequisite: course 4.
The conversation course of corresponding level is 120.

104. Russian Composition. (3) I. Mr. Struve, Mr. Karlinsky
Prerequisite: course 103B.

107. Polish Reading, Grammar, and Composition. (3) II. Mrs. Maurer
Prerequisite: course 6B or 23.

108. Advanced Studies in Polish Grammar. (3) I. Mrs. Maurer
Prerequisite: course 107.

111. Serbo-Croatian Reading, Grammar, and Composition. (3) II.
Prerequisite: course 10B or 25.
Mrs. Kirkoff
112. Advanced Studies in Serbo-Croatian Grammar. (3) I.  
Prerequisite: course 111.  
Mrs. Kirkoff

115. Czech Reading, Grammar, and Composition. (3) II.  
(Formerly numbered 115A–115B.)  
Prerequisite: course 14B.  
Mr. Kevtun

Prerequisite: course 115.  
Mr. Kevtun

120. Advanced Russian Conversation (continuation of 119). (2) I.  
Open only to students who are taking course 103A.  
Mr. Kassatkin

124. Advanced Russian Composition. (3) II.  
Prerequisite: course 104.  
Mr. Struve

198. Group Conference and Assigned Reading. (2) I and II.  
Intended as preparation for the comprehensive examination.  
The Staff (Mr. Thomas in charge)

199. Special Study for Advanced Undergraduates. (1–5) I and II.  
Restricted to senior honor students.  
The Staff (Mr. Thomas in charge)

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 instructor, to properly qualified sophomores.

130A–130B. Survey of Russian Literature and Intellectual Trends. (3–3) Yr.  
(Formerly numbered 130.)  
Either half of course may be taken independently.  
Mr. Setchkarev, Mr. Struve

131. Russian Literature (1880–1917). (3) II.  
Mr. Maslenikov

132. Russian Literature since 1917. (3) II.  
Mr. Struve

133A. The Russian Novel to 1850 and its Relations to West European Literatures. (3) I.  
Mrs. Feuer

133B. The Russian Novel 1850–1880 and its Relations to West European Literatures. (3) II.  
Prerequisite: course 133A or 130A or consent of the instructor.  
Mrs. Feuer

133C. Dostoevsky. (3) I.  
Mr. Maslenikov

133D. Tolstoy. (3) II.  
Mrs. Feuer

133F. Chekhov. (2) II.  
Mr. Karlinsky

134. Russian Folklore. (2) I.  

135. The Russian Drama from the Seventeenth Century to the Twentieth. (2) I.  

* Not to be given, 1964–1965.
140. Survey of Western and Southern Slavic Literatures. (3) II. Mr. Kovtun
143. Introduction to Modern Slavic Literary Theory. (2) II. Mr. Kovtun
*151. The Reformation and Counter-Reformation in Polish Literature. (2) II. Mr. Milosz

*153. The Polish Novel. (2) I. Mr. Milosz
*154. Polish and Russian Romanticism. (2) II. Mr. Milosz
155. Mickiewicz. (2) II. Mr. Milosz
*156. The Polish Theater. (2) II. Mr. Milosz

158. Polish Philosophical Writers of the Twentieth Century. (2) I. Mr. Milosz

*159. Contemporary Polish Poetry and Fiction. (2) II. Mr. Milosz

160. Survey of Czech and Slovak Literatures. (2) I.
Reading knowledge of Czech or Slovak required.

161. Czech and Slovak Literatures of the Nineteenth Century. (2) II. Mr. Kovtun

170A–170B. Survey of Serbian and Croatian Literatures. (2–2) Yr. Mrs. Kirkoff
Prerequisite: reading knowledge of Serbo-Croatian required. Course 170A is not prerequisite to 170B.

*180A. Survey of Russian Culture to 1800. (2) I. Mr. Struve

*180B. Survey of Russian Culture from 1800 to the Present. (2) II. Mr. Struve

187. Russian Poetry. (2–2) Yr. Mr. Milosz
Prerequisite: course 103A or consent of instructor.
Lecture course given in Russian.

*188. The Slavic-Speaking World. (3) I. Mr. Kovtun

H195. Special Study for Honors Candidates. (1–3) I and II. The Staff

Graduate Courses

210. Old Church Slavic. (2) I. Mr. Thomas

220. Comparative Slavic Linguistics. (2) II. Mrs. Maurer
Prerequisite: course 210.

226. Historical Russian Grammar. (2) II. Mr. Thomas
Prerequisite: course 210.

* Not to be given, 1964–1965.
SLAVIC LANGUAGES AND LITERATURES, SOCIAL SCIENCE

285. Russian Prose. (2) I and II. Mr. Setchkarev, Mr. Maslenikov
Lecture course given in Russian.

290. Seminar. (2) I and II. The Staff
Advanced study in Slavic languages and literatures. Topics will vary from year to year and will be announced at the beginning of each semester.

298. Special Study for Graduate Students. (1-4) I and II. The Staff (Mr. Thomas in charge)

1G. Scientific Russian for Graduate Students. Beginning Course. (No credit) I. Mr. Kovtun

2G. Scientific Russian for Graduate Students. Advanced Course. (No credit) II.
Prerequisite: first course.

Hungarian Language and Culture Courses
The following courses on Hungarian language and culture are offered under the auspices of this department. Course 185 is given in English and requires no knowledge of any other language.

27. Elementary Hungarian. Intensive Course. (6) I. Mrs. Leader
Classes meet eight hours per week.

28. Intermediate Hungarian. (3) II. Mrs. Leader
Prerequisite: course 27.
Emphasis on the spoken language.

117. Hungarian Reading, Grammar, and Composition. (3) II. Mrs. Leader
Prerequisite: course 27.

185. Survey of Hungarian Culture. (2) I. Mrs. Leader

SOCIAL SCIENCE
(Office, 220 Wheeler Hall)

†Lewis S. Feuer, Ph.D., Professor of Philosophy and of Social Science.
Nathan Glazer, Ph.D., Professor of Sociology and of Social Science.
Benjamin N. Ward, Ph.D., Associate Professor of Economics and of 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 92.

1A–1B. Introduction to Social Science. (3–3) Yr. The Staff (Mr. Glazer 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, 120 Haviland Hall)

Milton Chernin, Ph.D., Professor of Social Welfare (Chairman of the Department).
Ernest Greenwood, 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.
Sheldon Margen, M.D., Professor of Human Nutrition and Professor of Social Welfare.
Walter Friedlander, Ph.D., Professor of Social Welfare, Emeritus.
Gertrude Wilson, M.A., Professor of Social Welfare, Emeritus.
Ruth Cooper, D.S.W., Associate Professor of Social Welfare.
George A. DeVos, Ph.D., Associate Professor of Social Welfare.
§Lydia Rapoport, M.S.S., 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.
Andrew Billingsley, Ph.D., Assistant Professor of Social Welfare.
Joseph S. Briar, D.S.W., Assistant Professor of Social Welfare.
†James R. W. Leiby, Ph.D., Assistant Professor of Social Welfare.
Henry Miller, D.S.W., Assistant Professor of Social Welfare.
Irving M. Piliavin, D.S.W., Assistant Professor of Social Welfare.

Irving P. Babow, Ph.D., Lecturer in Social Welfare.
Sally Dewees, M.S., Lecturer in Social Welfare.
Beryl Godfrey, M.S.W., Lecturer in Social Welfare and Field Work Consultant.
Margaret S. Gordon, Ph.D., Lecturer in Social Welfare.
Joanna F. Gorman, M.S.S.W., Lecturer in Social Welfare and in Public Health.
Ralph M. Kramer, M.S.W., Lecturer in Social Welfare.
Anna Maenchen, Ph.D., Lecturer in Social Welfare.
Mary D. Monte, M.S.W., Lecturer in Social Welfare.
Charles O'Shea, M.S.W., Field Work Consultant and Lecturer in Social Welfare.
Genevieve Oxley, M.S., Lecturer in Social Welfare.

1 In residence fall semester only, 1964–1965.
Elizabeth E. Pfeiffer, M.S.W., Field Work Consultant and Lecturer in Social Welfare.
Ralph H. Potter, Jr., M.D., Lecturer in Social Welfare.
Mary A. Sarvis, M.D., Lecturer in Social Welfare.
Alexander Simon, M.D., Professor of Psychiatry and Lecturer in Social Welfare.
William T. Smelser, Ph.D., Lecturer in Social Welfare.
Esther Spencer, M.S.S., Lecturer in Social Welfare.
Hasseltine Byrd Taylor, J.D., Ph.D., Lecturer in Social Welfare.
Robert E. Westfall, M.D., Lecturer in Social Welfare.
Kent Zimmerman, M.D., Lecturer in Social Welfare.

Mary E. Anderson, M.S.W., Field Work Supervisor in Social Welfare.
Alice Barber, M.S.W., Field Work Supervisor in Social Welfare.
Virginia C. Berkman, M.S.W., Field Work Supervisor in Social Welfare.
Elizabeth Cole, M.S.W., Field Work Supervisor in Social Welfare.
Alice Dailey, M.S.W., Field Work Consultant in Social Welfare.
Mark Ealey, M.S.W., Field Work Supervisor in Social Welfare.
Dorothy Gibson, M.S.S., Field Work Consultant in Social Welfare.
Mary Jeffress, M.S.W., Field Work Supervisor in Social Welfare.
James Jennings, M.S.W., Field Work Supervisor in Social Welfare.
Irene C. Macdonald, M.S.W., Field Work Supervisor in Social Welfare.
Mary K. Miles, M.S.W., Field Work Supervisor in Social Welfare.
Charlotte Mounts, M.S.W., Field Work Supervisor in Social Welfare.
Ida Oswald, M.S.W., Field Work Consultant in Social Welfare.
Dorothy Pettes, M.A., Field Work Consultant and Coordinator of Field Work in Social Welfare.
Diane Simpson, M.S.W., Field Work Supervisor in Social Welfare.
Theodosia B. Stewart, M.S.W., Field Work Consultant in Social Welfare.
Robert A. Wasser, M.S.W., Field Work Consultant in Social Welfare.
Marguerite Wilson, M.S.W., Field Work Supervisor in Social Welfare.

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.
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 on page 133.

Letters and Science List, Courses 100, 110A, 110B, H197A, and H197B are included in the Letters and Science List of Courses. For regulations governing this list, see page 91.

Upper Division Courses

100. The Field of Social Welfare. (3) I and II. Mr. Chernin
Survey of social welfare problems, programs, and issues. Designed to acquaint non-majors with the field of social welfare.
Not open to students who have completed or are taking course 110A–110B.

102. Methods in Social Work. (3) I and II. Mr. O'Shea
Prerequisite: social welfare majors, senior standing; others, course 110A (may be taken concurrently) or 100, and consent of instructor.
Introduction to social work methods, including social casework, social group work, and community organization. Observational visits to agencies and institutions.

106. Community. (2) II.
Concept of community; major institutions; community surveys; sociological background of community organization for social welfare.

110A–110B. The Social Services. (3–3) Yr. Mr. Leiby, Mr. Piliavin
Historical survey of social services and their social-philosophical base: economic security; child welfare; family service programs; health services; corrections; school social services; civil rights programs; community organization.

H197A–H197B. Senior Honors Course. (3–3) Yr. Mr. Chernin
Problems in social welfare and social work. Preparation of a senior essay.

198. Group Study for Advanced Undergraduates. (1–3) I and II.

199. Special Study for Advanced Undergraduates. (1–3) I and II.
The Staff (Mr. Chernin in charge)

Graduate and Professional Courses


201. Law and Social Welfare. (1) I. Mrs. Taylor
Legal information for social workers, with emphasis on family law.

* Not to be given, 1964–1965.
202A–202B. Social Casework. (2–2) Yr.

Mr. Briar, Miss Cooper, Miss Godfrey, Miss Pfeiffer, Mrs. Schubert

203. Community Organization. (2) I and II. Mr. Kramer, Mr. Leibowitz

Community organization as a basic process in social work.

205A–205B. Growth and Change of the Individual. (2–2) Yr.

Mr. Maas (in charge), Mr. DeVos, Mr. Margen, Mr. Potter, Mr. Smelser

Physiological, psychological, social development and adaptations of the individual, as related to social welfare.

207A–207B. Social Welfare Policies and Programs. (2–2) Yr. Beginning each semester.

Miss McKeany (in charge), Mrs. Taylor

Analysis of major issues in social welfare.

207A. Related to public assistance, social insurance, and health, including mental health.

207B. Related to family and child welfare, corrections, vocational rehabilitation, and recreation.

208A–208B. Social Organization and Social Welfare. (2–2) Yr.

Mr. Piliavin (in charge), Mr. Briar,

Structure and dynamics of communities, organizations, groups, and families as related to social work and social welfare.

211. Rural Welfare Problems. (2) II.

252. Social Welfare Administration. (2) II.

Administrative process and problems in social welfare organizations.


(1) II.

257A–257B. Social Welfare and the Offender. (2–2) Yr.

Role of social welfare programs and personnel in prevention and treatment of delinquency and crime.

258A–258B. Advanced Social Casework. (2–2) Yr.

Mr. Billingsley, Miss Cooper, Mr. Miller, Mrs. Oxley, Miss Rapoport,

Generic and specific components of advanced social casework in different areas of practice.

259. Supervision in Social Work. (2) II.

262A–262B. Psychiatry and Social Work. (1–1) I.

Miss Sarvis, Mr. Simon, Mr. Westfall

262A. Psychiatric symptomatology and psychopathology and their social implications. (I)

262B. Psychodynamic impact of biological, psychological, and sociological events on the human organism. (I)

265. Social Welfare Research: Fields and Techniques. (2) I and II.

Mr. Greenwood, Mr. McEntire, Mr. Piliavin,

* Not to be given, 1964–1965.
266. Psychoanalysis and Social Work. (2) II.  
Mrs. Maenchen, Miss Sarvis, Mr. Westfall

The contribution of psychoanalytic theory to social work.

270A–270B. Community Organization Practice in Social Welfare. (2–2) Yr.  
Mr. Kramer

Theory and principles of community problem-solving; methods of planning and coordinating social welfare services.

280. Group Methods in Social Welfare. (2) I and II.  
Concepts, principles, and techniques of work with groups in all areas of practice.

281A–281B. Social Group Work. (2–2) Yr.  
Mrs. Alexander

282A–282B. Advanced Social Group Work. (2–2) Yr.  
Mrs. Monte

282A. Advanced analysis of theory and practice; practice in secondary settings.
282B. Administrative aspects.

*283. Group Process in Professional Practice. (2) I.  
Prerequisite: for social welfare students, course 280.
Theory of group process; development of competence to participate in professional groups.

*290A–290B. Seminar in Social Work Theory. (2–2) Yr.  
Mr. Briar, Mr. Wiltse

Analysis of concepts and theories of social work; emphasis on behavioral science formulations related to development of diagnostic and treatment typologies and principles of social work methods.

*291. Comparative Welfare Institutions and Practice. (2) II. Mr. McEntire
Comparative analysis of welfare policies and methods in selected countries in cultural and ideological context. Problems of welfare policy in underdeveloped countries. Theory and practice of community development, with case studies. Place of social welfare in technical assistance programs.

*292. Sociocultural Patterns and Social Welfare Problems. (2) II.

*293. Seminar in Social Security. (2) I.

294A–*294B. Seminar in Social Welfare Policy and Administration. (2–2) Yr.  
Mr. McEntire

Selected problems in social welfare policy and administration; interrelations of policy and administration.

295A–295B. Seminar in Social Research. (2–2) Yr.  
Mr. Greenwood

Advanced study of 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. Mrs. Gorman
Limited to graduate social welfare students admitted to the intern year and to social workers employed in public health.

(2–2) Yr.  
Mr. Leiby

* Not to be given, 1964–1965.
298. Special Study for Graduate Students. (1-6) I and II.
The Staff (Mr. Chernin in charge), Mr. Maas, Mr. O'Shea

299. Special Research. (2) I and II.
Mr. Babow, Mr. DeVos, Mr. Greenwood, Mr. Kramer,
Mr. Leiby, Mr. Miller, Mr. Schubert

Group research on selected problems in social welfare.

401. Field Work. (2-12) I and II.
Miss Pettes (in charge), Miss Alexander, Mr. Briar, Miss Cooper,
Miss Dailey, Miss Gibson, Miss Godfrey, Mr. O'Shea, Mrs. Oswald,
Miss Pfeiffer, Mrs. Schubert, Mrs. Stewart

Supervised practice in social agencies. First year: two days a week, minimum 400 hours
over two semesters for 8 units credit. Second year: three days a week in selected area of
practice, minimum 600 hours for 12 units credit. Special arrangements for hours and
credits may be made.

404. Internship in Social Work Practice in Public Health. (6-10) I and II.
Mrs. Gorman (in charge), Miss Boggs

Supervised social work practice in public health departments four to five days a week
during an eleven-month period.

*405. Internship in Research in Community Welfare Planning. (4-12) II.
Mr. Greenwood

Supervised internship in research in community welfare planning two to five days a week.

*410A–410B. Program Media in Social Group Work. (1–1) Yr.

Diagnostic use of program media in social group work practice.

**SOCIOLOGY**

(Department Office, 410 Barrows Hall)

1Reinhard Bendix, Ph.D., Professor of Sociology.
Herbert Blumer, Ph.D., Professor of Sociology and Director, Institute of Social
Sciences.
John A. Clausen, Ph.D., Professor of Sociology and Director, Institute of Hu­
man Development.

2Kingsley Davis, Ph.D., Professor of Sociology.
Wolfram Eberhard, Ph.D., Professor of Sociology.
Nathan Glazer, Ph.D., Professor of Sociology and of Social Science.
Charles Y. Glock, Ph.D., Professor of Sociology and Director, Survey Research
Center.

Erving Goffman, Ph.D., Professor of Sociology.
William A. Kornhauser, Ph.D., Professor of Sociology.

3Seymour M. Lipset, Professor of Sociology and Director, Institute of Inter­
national Studies.

* Not to be given, 1964–1965.
1 Absent on leave, 1964–1965.
2 In residence spring semester only, 1964–1965.
Kathleen Archibald, Ph.D., Lecturer in Sociology.
Kathleen E. Gales, M.A., Visiting Assistant Professor of Sociology.
René König, Ph.D., Visiting Professor of Sociology for the fall semester.

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 91.

Departmental Major Advisers: Mr. Carlin, Mr. Elder.

The Major. Required: Sociology 1 or 108, 30 or 178, 40, 105 or 133, 109, 141, and 15 units from other upper division sociology courses within the department. A student who takes Sociology 20 may have it counted as part of his major program if he has also chosen to take 108 instead of 1, or 178 instead of 30. Candidates’ programs must be submitted to a departmental adviser for approval. Students who fail to maintain a scholarship average of at least C in the major in courses taken in the department at Berkeley may be dismissed from the major at any time. Recommended lower division electives include: 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.

2 In residence spring semester only, 1964–1965.
Lower Division Courses

1. Introduction to Sociology. (3) I and II.
   Mr. Blauner, Mr. Leggett, Mr. Lyman, Mr. Lowenthal, Mr. Skolnick
   I: Mr. Blauner, Mr. Lyman, Mr. Skolnick; II: Mr. Blauner, Mr. Leggett, Mr. Lowenthal,
   Two lectures and two weekly discussion sections to be arranged.

20. Population Problems. (3) I.
   An elementary course in population, descriptive rather than technical. Includes the
   "population explosion," the "baby boom," and growing cities and suburbs.

30. Society and Personality. (3) II.
   Mr. Clausen, Mr. Elder
   Two lectures and one weekly discussion section to be arranged.
   First course in social psychology. Consequences of participation in group life; the social
   organization of perspective and personality, and the social control of conduct.

40. Introductory Statistics in Sociology. (3) I and II.
   Miss Gales
   Prerequisite: Two years of high school algebra or equivalent. Two lectures and one
   three-hour laboratory per week.
   An introduction to the statistical analysis of social data.

Upper Division Courses

(Concerning conditions for admission to upper division courses, see page 164.)

100. Social Evolution. (3) I.
    Mr. Bock
    Major views of social development: cultural cycles, progress, social and cultural
    evolution.

101. Historical Sociology. (3) II.
    Mr. Bock
    Social and cultural processes of change and persistence in Marx, Toynbee, Kroeber,
    Spengler, Tegart, Sorokin, Weber, and others.

105. Introduction to Methods of Sociological Study. (3) I and II.
    Mr. Somers, Mr. Morrison
    Prerequisite: course 40 and 6 additional units in sociology, or equivalent.
    Methodological problems and technical procedures in defining problems to investigate
    and in selecting, describing, classifying, and analyzing data.

107. Deviance and Social Control. (3) II.
    Mr. Carlin
    A consideration of forms, causes, and controls of deviant behavior.

108. Principles of Sociology. (3) I and II.
    Mr. Holloway, Miss Archibald
    Not open to students who have taken course 1.
    An advanced, comprehensive survey of sociological fundamentals.

109. Sociology and Social Thought. (3) II.
    Mr. Smelser
    History of social thought as a source of present-day problems and hypotheses.

110. Race and Ethnic Relations. (3) I and II.
    Mr. Holloway, Mr. Leggett
    Prerequisite: course 1 or consent of instructor.
    Significance of identification, multi-ethnic status systems, minority groups and movements, inter-ethnic tensions, race ideology and public policy.

115. Major Social Problems. (3) I and II.
    Mr. Leggett
    The diagnosis and treatment of problems related to race relations, crime, old age,
    industrial conflict, political disorder.

* Not to be given, 1964–1965.
117. American Society: a Comparative Analysis. (3) II. Mr. Kornhauser
Various aspects of American values and behavior patterns over time; sources of differences from other developed nations.

118. Introductory Political Sociology. (3) I. Mr. Kornhauser
Political processes in organized groups, the social bases of power. The role of social classes, occupational groups, and religious groups, and the influence of cultural values.

119. Sociology of Law. (3) I. Mr. Carlin
Selected legal rules, principles, and institutions treated from a sociological perspective. Influence of culture and social organization on law; role of law in social change; social aspects of the administration of justice; social knowledge and the law.

120. Organizations and Institutions. (3) II. Mr. Holloway
Administrative organizations and voluntary associations; major social institutions in industry, government, religion, and education.

123. Population Theories. (3) II. Mr. Davis
Prerequisite: course 20 or consent of instructor.
A critical review of theories of population growth, structure, and distribution, from before Malthus to the present, analyzed in relation both to the history of social thought and to social, economic, and demographic trends.

124. Sociology of Education. (3) I. Mr. Trow
The role of formal education in modern societies. Educational systems in relation to the religious, cultural, economic and political forces shaping their character.

125. Sociology of Intellectual Life. (3) II.
The status of the intellectual, knowledge and action in social thought as analyzed by major social theorists.

129. Industrial and Occupational Sociology. (3) II. Mr. Wilensky
The labor force; social control within and of occupations and professions (professionalization, professional associations vs. labor unions, codes of ethics, legal controls); social structure of the workplace, work experience of the participants, relation of both to community and society.

130. Sociology of the Family. (3) I. Mr. König
Systematic and comparative analysis of family structure and change: marriage, reproduction, child-rearing, marital dissolution.

132. Social Stratification. (3) I. Mr. Leggett
Recent trends in occupational stratification; social classes in local communities and the nation as related to interest organizations.

133. Methods and Documents in Population Analysis. (3) II. Mr. Morrison
Prerequisite: course 20 or course 40 or consent of instructor.
Review of sources of demographic and similar data, their uses and limitations, and how the data are statistically analyzed. Fertility, mortality, population composition and distribution, are included.

134. Sociology of War and Conflict. (3) I. Miss Archibald
Violent and peaceful procedures in the pursuit of national objectives; analysis of attempts to specify the causes of war.

135. Social Change in Underdeveloped Countries. (3) I. Mr. Eberhard
The problem of progress; factors influencing social change, especially in the modern West and Asia.

* Not to be given, 1964–1965.
140. Social Change. (3) I and II.
Major sources of change in societies; prediction of future changes.

141. Social Organization of Modern Western Societies. (3) I.
Mr. Schurmann

142. Comparative Institutions. (3) I.
Comparison of selected social institutions; their relation to ideas and social change.

146. Sociology of Religion. (3) I.
A systematic survey including sociological theory and organizational structure of religion, the character of religious authority and leadership, the individual's religion, and the interplay with other spheres of social life.

147. Religious Doctrines and Social Conduct. (3) II.
Mr. Lowenthal
Comparable elements in various religious doctrines; their direct and indirect effects on human behavior.

148. Elementary Collective Behavior. (3) I.
Mr. Elder
Social contagion and crowd behavior, psychic epidemics, popular arts and interests, fashions, mass behavior, formation and manipulation of public opinion.

149. Social Movements and Public Action. (3) I.
Mr. Blauner
Social movements, the formation and play of public opinion, and the behavior of interest groups.

150. Urban Sociology and Ecology. (3) I.
Mr. Glazer
The nature, causes, and consequences of world urbanization; metropolitan areas; location and types of cities; social and demographic characteristics of urban populations.

156. Agricultural Oriental Societies. (3) I.
Mr. Eberhard
Main characteristics of medieval China, Japan, India as compared with the West. Research methods.

167. Modern Social Structure in the Near East. (3) II.
Mr. Eberhard
Social organization of contemporary Near East. Contacts of nomads with settled groups. Processes of modernization in both groups.

174. Sociology of Literature. (3) I.
Mr. Lowenthal
The relation of literature to the social order and to systems of social control. Analysis of the social role of the writer.

175. Communication and Social Contact. (3) I.
Mr. Goffman
Recommended: course 1 or 30.
The establishment of communication channels by differential contact and association; the emergence of consensus in primary and secondary groups; the organization and modification of perspectives in mass societies.

178. Social Interaction and Personal Organization. (3) I.
Mr. Blumer
A critical analysis of dominant theories and schemes of research in social psychology.

184. Social Structure of Communist Societies. (3) II.
Mr. Schurmann
Various aspects of the class system, economic life, nationality groups, the family, education, demographic factors; comparison of communist social structure with American.

* Not to be given, 1964–1965.
H194. Senior Honors Seminar. (3) I.
Mr. Petersen
Two lectures and three discussion sections weekly. Open only to seniors who are seeking an A.B. degree with honors. Intensive study of individual topic to provide background for honors thesis.

H195. Honors Thesis. (3) II.
Mr. Petersen
One lecture and six section meetings weekly. Prerequisite: course 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. Smelser in charge)
Restricted to senior honor students.

Graduate Courses

(Concerning conditions for admission to graduate courses, see page 165)

201. Methods of Sociological Research. (3) I.
Mr. Glock, Mr. Morrison
Prerequisite: course 40 (may be taken concurrently) or equivalent. Design of theoretically oriented research; collection, codification and processing of qualitative and quantitative data including field methods; uses of documents and punched card techniques. Problems of inference, causality, and measurement. An introduction to analysis.

202. Analysis of Sociological Data. (3) II.
Mr. Glock, Mr. Somers
Prerequisite: course 201 or equivalent. Analysis of qualitative and quantitative data; the construction of independent and dependent variables; detection and measurement of error and bias; statistical significance; contextual, sociometric, and panel analysis; the interplay between theory and research.

*204. Social Contacts. (3) I.
Mr. Coffman
Social units and dynamics of face-to-face interaction in natural settings; communication aspects of public order.

*206. Socialization and Personality. (3) I.
Mr. Clausen
Goals and process of socialization; the self; organized social roles as mediated through the norms and patterned interactions of family, peer group and school.

*207. Analysis of Social Action. (3) II.
Mr. Blumer
Advanced social psychology, particularly from the viewpoint of George H. Mead; the nature of the social situation, social roles, the self, socialization, the social act.

212. Deviance and Social Control. (3) II.
Mr. Goffman
Deviance and social system analysis; ethnography of deviant communities.

214. Advanced Quantitative Methods. (3) II.
Mr. Somers
Prerequisite: course 40 or equivalent. Analysis of variance and its application to sociological problems; multiple and partial correlation and regression; sampling procedures; introduction to scaling theory and factor analysis.

217. History of Social Thought Since the Enlightenment. (3) I
Mr. Lowenthal, Mr. König

218. Modern Sociological Theory. (3) II.
Mr. Smelser

* Not to be given, 1964–1965.
219. Sociology of Law. (3) 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.

222. Sociology of Education. (3) I.
Mr. Trow
The study of educational systems and processes, with special emphasis on the relations of education to other social institutions.

224. Social Change. (3) I.
Stresses the rise and spread of industrialism to underdeveloped countries.

229. Sociology of Work. (3) I.
The organization of work and varieties of work experience. Topics: occupational roles and career patterns; the interplay of machine, man, colleague group, and complex organization; worker participation in management; social aspects of industrial conflict; labor, industry, and society.

230. Population. (3) II.
Mr. Davis
Prerequisite: a course in population or consent of instructor.
Problems in the theory of population; institutional and motivational aspects of demographic behavior.

231. Sociology of Marriage, Family, and Kinship. (3) I.
Mr. Petersen
Family structure and behavior, including kinship, marriage, divorce, reproduction, and parental relations; interrelations between family and stratification, economy, law, religion.

232. Social Stratification. (3) II.
Mr. Blauner
Theoretical and methodological problems in the field, with special emphasis on comparative materials.

241. Organizations and Institutions. (3) I.
Mr. Selznick, Mr. Holloway

242. Comparative Social Structure. (3) II.
Mr. Eberhard

246. Sociology of Religion. (3) II.
Mr. Glock
Prerequisite: course 146, or consent of instructor.
Interplay between theory and research; the interrelation of religious ideas and institutions with the economic, political, and social order.

248. Collective Behavior. (3) II.
Mr. Blumer
Studies in mass behavior, social movements, and political action.

253. Sociology of Culture. (3) I.
Mr. Selznick
Theories of elite and popular cultures, particularly in modern mass society: sociology of knowledge, the arts, popular culture, and education.

254. Sociology of Health and Medicine. (3) I.
A general orientation to sociological theory and research bearing upon the phenomena of health and disease and the organization and functioning of societal efforts to cope with disease.

255. Sociology of Mental Health. (3) I.
Mr. Clausen
Social and cultural aspects of mental illness: etiology, symptomatology, and duration; social and organizational responses.

260. Political Sociology. (3) I.
Mr. Kornhauser
Contributions of sociology to theory and research in politics. Analysis of structure and ideology of organized groups.

* Not to be given, 1964–1965.
262. Urbanization. (3) II.  
Urbanization in the world and in particular countries. Causes and consequences of organization, theory of city location; patterns of city growth, problems of measurement.

290. Seminar. (2) I and II.  
Mr. Blumer, Mr. Bock, Mr. Eberhard, Mr. Glazer, Mr. Kornhauser, Mr. Morrison, Mr. Selznick, Mr. Wilensky; I: Mr. Blumer, Mr. Eberhard, Mr. Morrison, Mr. Selznick; II: Mr. Bock, Mr. Glazer, Mr. Keckemeti, Mr. Kornhauser, Mr. Wilensky.  
Advanced study in modern sociology. The specific topics will be announced at the beginning of each semester.

299. Individual Study and Research. (1–6) I and II.  
The Staff (Mr. Smelser in charge)  
Primarily for students engaged in writing a Master's thesis or Ph.D. dissertation. May not be substituted for available graduate lecture courses or course 290.

Related Courses in Other Departments

Introduction to Social Science (Social Science 1A–1B)  
Rural Sociology (Agricultural Economics 112A–112B)  
The Etiology of Crime: Sociological (Criminology 102)  
Theory of Historical Inquiry (Philosophy 147)  
Speech and Society (Speech 121A–121B)  
The Metropolitan Region (City and Regional Planning 226)

**SOILS AND PLANT NUTRITION**

(Department Office, 108 Hilgard Hall)

Theodore C. Broyer, B.S., Professor of Plant Physiology (Vice-Chairman of the Department).  
Paul R. Day, Ph.D., Professor of Soil Physics.  
Louis Jacobson, Ph.D., Professor of Plant Physiology.  
A. Douglas McLaren, Ph.D., Professor of Soil Biochemistry.  
Roy Overstreet, Ph.D., Professor of Soil Chemistry.  
James P. Bennett, Ph.D., Professor of Plant Physiology, Emeritus.  
Geoffrey B. Bodman, Ph.D., Professor of Soil Physics, 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 Soil Technology, Emeritus.  
Kenneth L. Babcock, Ph.D., Associate Professor of Soil Chemistry.  
Peter W. Birkeland, Ph.D., Assistant Professor of Soil Morphology.  
Lawrence J. Waldron, Ph.D., Assistant Professor of Soil Physics.

Rodney J. Arkley, Ph.D., Lecturer in Soils and Plant Nutrition.  
Daniel I. Amon, Ph.D., Professor of Cell Physiology.
I SOILS AND PLANT NUTRITION

Isaac Barshad, Ph.D., Lecturer in Soils and Plant Nutrition.
A. Herbert Gold, Ph.D., Associate Professor of Plant Pathology.
Frank F. Harradine, Ph.D., Professor of Soil Morphology, Davis.
Gordon Mackinney, Ph.D., Professor of Food Technology.
Edward C. Stone, Ph.D., Professor of Forestry.
Perry R. Stout, Ph.D., Professor of Soil Science, (Chairman of the Department), Davis.
Albert Ulrich, Ph.D., Lecturer in Soils and Plant Nutrition.
Frederick R. Whatley, Ph.D., Lecturer in Cell Physiology.
D. Emerton Williams, Ph.D., Lecturer in Soils and Plant Nutrition.
Paul J. Zinke, Ph.D., Associate Professor of Forestry.

Letters and Science List. 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 91.

Departmental Major Adviser: Mr. Waldron.

Majors: General Soil Science; Plant Nutrition and Soil Fertility; Pedology and Soil Survey; Soil Management and Conservation. The B.S. degree in Soil Science is granted upon the completion of one of these majors. The following five items must be satisfied: (1) General University requirements. (2) College of Agriculture requirements (see page 65). (3) Soil Science Curriculum requirements: (a) General—Bacteriology, 4 units. Botany (including plant physiology), 9 units. Chemistry, 16 units. English and/or speech, 6 units. Geology, 3 units. Physics, 8 units. (b) Agriculture—Crop science (i.e., agronomy, horticulture, pomology, vegetable crops, viticulture) or plant ecology, 3 units. Soil science courses required for major, 20 to 27 units. (c) Electives (restricted)—At least 18 units selected from major requirements listed under 5 and with approval of major adviser, 24 to 18 units. Anthropology, art, classics, decorative art, dramatic art, economics, English, foreign languages, geography, history, * music, philosophy, political science, * psychology, sociology or speech, 6 units. (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 units. (5) Certain courses are required and, where applicable, may be used in partial satisfaction of 3 above. For details, see the ANNOUNCEMENT OF THE COLLEGE OF AGRICULTURE, BERKELEY, available without charge.

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.

Honors. Information concerning honors may be obtained from the Dean’s Office, College of Agriculture.

* In addition to University requirements.
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.
For students who desire a general knowledge of soils.

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. (3) I. Mr. Day
Lectures, laboratory, and field trips. Prerequisite: Chemistry 1A, 1B or 8; Physics 2A-2B; Geology 5 or 10.
Introduction to physical, chemical, and biological properties of soil.

101. Development and Morphology of Soils. (3) II. Mr. Jenny
Prerequisite: Geology 10, Chemistry 1A. Recommended: course 100.
Climate, vegetation, geology, topography, and time as factors in development and chemistry of great world soil groups.

101F. Development and Morphology of Soils. (1) II. Mr. Arkley, Mr. Birkeland
Field trips. Prerequisite: course 101 should be taken concurrently.
Saturday excursions in connection with course 101.

102. Soil Physics. (2) II. Mr. Waldron
Prerequisite: course 100, calculus (Mathematics 3A–3B, or 16A–16B). Recommended: physical chemistry. Course 102L should be taken concurrently.

102L. Soil Physics. (2) II. Mr. Waldron
Laboratory. Prerequisite: course 102 (may be taken concurrently).

103. Soils of California and the Western United States. (3) I. Mr. Arkley, Mr. Birkeland
Lectures and laboratory. Two field trips during the semester to be arranged.
Prerequisite: Geology 5, 10, or 15; Chemistry 1A.
Characterization and geography of agricultural, grazing, and forest soils of the western United States, with emphasis on soils of arid regions; their identification, classification and use rating.

105. Summer Field Course. (5) Mr. Harradine, Mr. Arkley
Six weeks, daily. Prerequisite: course 100, 101, or 103, and consent of instructor.
Field studies of soil morphology, genesis, and classification in relation to agricultural, grazing, forest, and multiple land use.

110. The Soil as a Medium for Plant Growth. (4) I. Mr. Babcock
Lectures and one conference. Prerequisite: Chemistry 1A-1B and 5. Recommended: Geology 10.
Chemistry of plant soil and microbial interrelationships under acid, alkaline, and saline regimes; nutritional factors in productivity, reclamation and conservation.
111. Soil Microbiology and Soil Biochemistry. (3) II. Mr. McLaren
Lectures and laboratory. Prerequisite: Chemistry 5 and 8, Bacteriology 1 or 2, and 4 or consent of instructor.
Activities of microorganisms related to soil organic matter, soil properties, and the rhizosphere.

112. Soil Chemistry in Relation to Plant Growth. (2) II. Mr. Babcock
Lectures. Prerequisite: course 110 and Chemistry 5.
Properties of the physical chemical environment influencing plant growth.

113. Soil Chemistry in Relation to Plant Growth. (2) II. Mr. Overstreet Laboratory. Prerequisite: Chemistry 5, course 112 (usually taken concurrently).
Liquid, solid, and gaseous phases of soils; cation exchange, solubility, buffering, salinity, reaction; chemistry of macronutrients and micronutrients.

*114. Properties of Colloidal Particles and Systems. (2) I. Mr. McLaren
Lecture and discussion. Prerequisite: a course in physical chemistry. Offered in odd-numbered years.
Properties of colloidal systems of importance in agriculture and biology.

116. Soil Management. (2) I. Mr. Ulrich, Mr. Arkley, Mr. Jenny
Lectures and demonstrations. Prerequisite: senior standing in soil science.
Estimation of soil fertility by soil and tissue analysis and plant growth methods; use of fertilizers; soil physical properties related to management problems.

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 161.)

201A–201B. Research in Soil Science. (1–9; 1–9) Yr. The Staff

203. Soil Resource Evaluation. (3) I. Mr. Arkley, Mr. Birkeland
Prerequisite: training in any of the following fields: soil science, forestry, range management, irrigation, land economics, geography.
Survey data interpretations for appropriate land uses; cultivation, grazing, timber, watershed, and multiple use; tax and economic appraisals.

205. Soil Stratigraphy. (3) I. Mr. Birkeland
Lecture, laboratory, and field trips.
Prerequisite: Geology 5, course 101 or 105, or consent of instructor. Open to graduates and qualified seniors.
Pedologic and geologic techniques are used to solve problems of soil genesis, the dating and correlation of alluvial deposits, and the interpretation of Quaternary history.

211. Advanced Soil Biochemistry and Soil Biology. (2) I. Mr. McLaren
Lecture and seminar. Prerequisite: course 111 or equivalent.
Microbial activity at surfaces and in the rhizosphere; mineral nutrition of soil microorganisms and the fate of agricultural chemicals in soil. Origin, nature, and properties of soil organic matter. Offered in even-numbered years.

212. Advanced Soil Chemistry. (3) I. Mr. Babcock
Prerequisite: course 110; Chemistry 110A–110B, or Chemistry 109 and consent of instructor. Open to graduates and qualified seniors.
Applications of thermodynamics to soil systems.

* Not to be given, 1964–1965.
213. Pedochemistry and Mineralogy of Soils. (2) I. Mr. Barshad
Prerequisite: graduate standing in soil science or consent of instructor.
Crystal structure and colloid chemistry of soil clay minerals; application of principles of mineralogy and chemistry to a quantitative evaluation of soil formation.

213L. Pedochemistry and Mineralogy of Soils. (1–4) I. Mr. Barshad
Laboratory. Prerequisite: course 211 or 213; may be taken concurrently.
Chemical and mineralogical analyses for evaluating soil profile formation and chemistry of soil organic matter. Laboratory exercises adapted to individual interest of the student.

220. Soil Physics. (3) I. Mr. Day
Prerequisite: course 102, 102L; Mathematics 14A–14B; and consent of instructor.
An advanced course dealing with the dynamics of soil water and soil deformation theory, with applications to irrigation, drainage, and tillage.

235. Seminar. (1) I. The Staff
Prerequisite: graduate standing in soil science, plant physiology, or related subjects.
Staff Seminar in Soil Science. (No credit) Yr.

PLANT NUTRITION

Upper Division Courses

115. The Nutrition of Green Plants. (2) I. Mr. Broyer, Mr. Whatley
Prerequisite: Botany 140.
Evolution of modern concepts of plant nutrition, including functional aspects of inorganic nutrients, photosynthesis, nitrogen metabolism.

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 student's major adviser.

Graduate Courses

(Concerning conditions for admission to graduate courses, see page 165)

201A–201B. Research. (1–9; 1–9) Yr. The Staff
Prerequisite: graduate standing and consent of instructor.
Research on problems of plant nutrition and plant physiology.

206. Seminar in Plant Physiology. (1) I and II.
Mr. Broyer (in charge), Mr. Babcock, Mr. Gold, Mr. Jacobson, Mr. Joslyn, Mr. Mackinney, Mr. Overstreet, Mr. Stone, Mr. Whatley
Prerequisite: qualified graduate students, with consent of staff member in charge.
Problems of plant physiology in the fields of botany, food science, forestry, plant nutrition, and soil science.

*222. Unifying Concepts of Photosynthesis. (2) I. Mr. Arnon
Prerequisite: consent of instructor.
Carbon assimilation, structure of photosynthetic apparatus, light and dark reactions, with special emphasis on energy conversion, photosynthetic phosphorylation, and photosynthesis in subcellular systems.

* Not to be given, 1964–1965.
*280. Advanced Plant Nutrition. (2) I.
Prerequisite: Biochemistry 102 and course 117.
Recent advances in knowledge of mechanisms of plant growth; methods of research.

Staff Seminar in Plant Nutrition. (No credit) Yr.  
The Staff

**SOUTH ASIAN LANGUAGE AND AREA PROGRAM**

For courses in South Asian languages, see under Department of Classics, and Department of Near Eastern Languages.

For South Asian area courses, see under the departments of Anthropology, Art, Education, Geography, History, Linguistics, Near Eastern Languages, Political Science, and Sociology.

**SPANISH AND PORTUGUESE**
(Department Office, 4321 Dwinelle Hall)

'R. Fernando Alegria, Ph.D., Professor of Spanish.
Diego Catalán, Doctor en Filosofía y Letras, Professor of Spanish.
Yakov Malkiel, Ph.D., Professor of Romance Philology.
Luis Monguíó, Licenciado en Derecho, LL.D., Professor of Spanish.
José F. Montesinos, Licenciado en Filosofía y Letras, Professor of Spanish.
'Edwin S. Morby, Ph.D., Professor of Spanish.
Arturo Torres-Riosco, Ph.D., Professor of Latin-American Literature (Chairman of the Department).

Dorothy C. Shadi, Ph.D., Professor of Spanish.
Erasmo Buceta, Doctor en Derecho, Professor of Spanish, Emeritus.
Charles E. Kany, Ph.D., 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.
G. Arnold Chapman, Ph.D., Associate Professor of Spanish.
*John H. R. Polt, Ph.D., Associate Professor of Spanish.
Benjamin M. Woodbridge, Jr., Ph.D., Associate Professor of Portuguese.
Arthur L. Askins, Ph.D., Assistant Professor of Spanish.
Raúl A. Del Piero, Doctor en Filosofía y Letras, Ph.D., Assistant Professor of Spanish.

Louis A. Murillo, Ph.D., Assistant Professor of Spanish.

Emanuel S. Georges, M.A., Acting Assistant Professor of Spanish.
Marian F. Place, M.A., Lecturer in Spanish.
Michael J. Ruggerio, M.A., Acting Assistant Professor of Spanish.
George A. Shipley, Jr., M.A., Acting Assistant Professor of Spanish.

* In residence fall semester only, 1964–1965.
Letters and Science List. All undergraduate courses are included in the Letters and Science List of Courses. For regulations governing this list, see page 91.

Departmental Major Advisers: Mr. Kany, Mr. Alegría, Mr. Ruggerio.

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.

Twenty-seven 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.

Honors Program. To be admitted to the honors program in Spanish, students shall have completed at least two semesters of work on this campus with a general average of at least 3.0 and a departmental average of at least 3.0, and have the approval of the major adviser in consultation with other members of the department.

Students admitted to the honors program shall complete, prior to the beginning of the senior year, courses 103A, 104A-104B and 107A-107B, or give evidence of equivalent preparation by special examination. The prerequisite of senior standing for 107A-107B will be waived for students in the honors program. Students passing an examination in lieu of any of the required courses will be deemed to have satisfied the corresponding requirement for the major, though without obtaining unit credit.

Students shall qualify for honors at graduation by completing with a grade of at least B the special senior honors course or a two-semester graduate course. The special honors course (H198A-H198B) shall be given each semester. This course shall consist of independent study and the writing of a thesis under the direction of an appropriate member of the department. Each student shall choose his own area of study, subject to the approval of his adviser and of the faculty member who is to direct the study.

Seniors in the honors program may enroll in one graduate course related to
their area of study, provided they obtain the approval of their adviser and of the faculty member teaching the course.

Students failing to maintain a general average of 3.0 and an average of 3.0 in the upper division courses in Spanish shall not be allowed to continue in the honors program.

Higher Degrees. See the Announcement of the Graduate Division, at Berkeley.

SPANISH

Lower Division Courses

Duplication of Credit. A student will not be allowed unit credit for that part of Spanish 1, 2, or 3 which duplicates courses previously completed in high school or at another institution of collegiate grade. The first two years of work in a foreign language in high school is considered to be equivalent to one semester in college (4 units); each successive year in a foreign language in high school is equal to one additional semester in college (4 units).

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 met five hours per week.

2. Elementary Spanish (continuation of 1). (4) I and II. Mr. Askins in charge
Sections meet five hours per week. Prerequisite: course 1 or a satisfactory score on the placement test.

3. Intermediate Spanish (continuation of 2). (4) I and II. Mr. Shipley in charge
Sections meet five hours per week. Prerequisite: course 2 or a satisfactory score on the placement test.

4. Intermediate Spanish. (4) I and II. Mr. Ruggerio in charge
Prerequisite: course 3 or a satisfactory score on the placement test.
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.
Prerequisite: course 4C, 4L, 25A, 25B or 25, or a satisfactory score on the placement test.
Reading, discussion, and oral interpretation of modern Spanish and Spanish-American plays.

25A–25B. Advanced Spanish. (3–3) Yr. Beginning each semester. Mr. Murillo in charge
Prerequisite: course 3 (with a grade of A) or course 4C or course 4L (the latter with a grade of A or B), or equivalent. Recommended: sophomore standing. Required of majors.
25. Advanced Spanish. (5) II. Mr. Murillo in charge
Prerequisite: same as for 25A.
Alternative course to 25A-25B, designed for students entering in midyear 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 neces­
sary.
39A. Spain: Medieval Period, Renaissance, and Golden Age. (2) I. Mr. Ruggerio, Mr. Shipley.
39B. Spain: Neo-Classical Period to Present Day. (2) Mr. Shipley, Mr. Ruggerio.
39C. Spanish America: To the End of the Nineteenth Century. (2) I. Mr. Chapman,
Mr. Askins.
39D. Spanish America: Modernism and the Contemporary Period. (2) II. Mr. Chapman,
Mr. Askins.

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.

103A. History of Spanish Literature (1680-1900). (3) I.
Required of majors. Mr. Montesinos, Mrs. Shadi

103B. Study of a Prose Genre of the Nineteenth Century. (3) II.
1965: The Novel. Mr. Montesinos

104A–104B. Spanish-American Literature. (3–3) Beginning each semester.
Required of majors. Mr. Torres-Rioseco, Mr. Chapman, Mr. Monguió

105. Modern Peninsular Drama: From the Romantic Movement to the
Present. (3) I. Mrs. Shadi

*106. Spanish Literature of the Eighteenth Century. (3) II. Mr. Polt

107A–107B. History of Spanish Literature to 1680. (3–3) Yr.
Prerequisite: 9 units of upper-division literature courses in Spanish. Required of majors.

*108A–108B. Introduction to the Ballad. (2–2) Yr.

109A–109B. The Spanish Drama of the Sixteenth and Seventeenth
Centuries. (2–2) Yr. Mr. Ruggerio

110A–110B. Twentieth-Century Peninsular Prose. (2–2) Yr. Mr. Catalán

111A–111B. Cervantes. (3–3) Yr. Mr. Montesinos

* Not to be given, 1964–1965.
112A–112B. A Survey of Spanish Culture. (2–2) Yr.

113A–113B. A Survey of Latin-American Culture. (2–2) Yr.

Mr. Torres-Rioseco


Prerequisite: course 104A–104B.

Mr. Alegria

115. A Survey of Spanish Lyric Poetry. (3) II.

Mrs. Shadi


Mr. Kany, Mr. Georges, Mr. Murillo, Mr. Del Piero

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. Kany

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.

H198A–H198B. Spanish Honors Course. (2–2) I and II.

The Staff

199. Special Study for Advanced Undergraduates. (1–3) I and II.

Mr. Torres-Rioseco 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 165)

In the requirements for the master’s degree this department follows Plan II.

200A–200B. Early Spanish Literature. (2–2) Yr.

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.

Mr. Del Piero

201A–201B. History of Hispanic Poetry. (2–2) Yr.

Mr. Mongüí

Studies of a period, movement, or type of Spanish language poetry. When appropriate the study will include both Spanish and Spanish-American poetry.

Fall term, 1964: Spanish Romanticism.


*203A–203B. Techniques of Literary Scholarship. (2–2) Yr.

*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.

Mr. Montesinos

* Not to be given, 1964–1965.
212A–212B. Old Spanish. (2-2) Yr. Mr. Malkiel
Required for candidates for the master's degree.

*213A–213B. The Spanish Novel in the Nineteenth Century. (2-2) Yr. Mr. Montesinos

*214A–214B. Modernism in Hispano-America. (2-2) Yr. Mr. Torres-Rioseco

*215A–215B. Moralists and Satirists of the Sixteenth and Seventeenth Centuries. (2-2) Yr. Mr. Montesinos

216. Spanish Versification. (1) II. Mrs. Shadi

226. Critical and Stylistic Studies of a Single Author or Genre. (2) II. The Staff

*228A–228B. The Literature of a Single Spanish-American Country. (2-2) Yr. Mr. Chapman

299. Special Advanced Study. (1-4) I and II. Mr. Morby, Mr. Monguió
Restricted to candidates for higher degrees, by previous arrangement with members of the departmental staff.

1G. Beginning Spanish for Graduate Students. (No credit) I and II. Mr. Georges
Preparation for the graduate reading examinations.

PORTUGUESE

Lower Division Courses

1. Elementary Portuguese. (4) I. Mr. Askins
Sections meet five hours per week.

2. Elementary Portuguese. (4) II. Mr. Askins
Sections meet five hours per week. Prerequisite: course 1 or 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 equivalent.
Reading and translation.

22. Oral Portuguese. (1) I. Mr. Askins
Prerequisite: course 21A, which may be taken concurrently.
Reading, discussion, and oral interpretation of modern texts.

39C–39D. Brazilian Literature in English Translation. (2-2) Yr. Mr. Woodbridge
Open to students in all departments of the University. No knowledge of Portuguese necessary.

Upper Division Courses

Portuguese 120, 122, and 123 are open to upper division and graduate students in Romance languages with no previous knowledge of Portuguese.

* Not to be given, 1964–1965.
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.

123. Brazilian Literature. (3) II.  
Mr. Woodbridge  
Survey of the literature of Brazil.

*150. Problems of Portuguese Linguistics. (2) I.  
Mr. Malkiel  
Prerequisite: consent of instructor.  
Analysis of selected problems of the Portuguese language, in an effort to contrast it more sharply with Spanish and with other varieties of Romance speech.

199. Special Study for Advanced Undergraduates. (1–3) I and II.  
Mr. Malkiel, Mr. Woodbridge, Mr. Askins  
Restricted to senior honor students.

Graduate Courses

201. The Brazilian Novel. (2) II.  
Mr. Woodbridge

*226. Critical and Stylistic Studies of a Single Author or Genre. (2) II.  
Mr. Woodbridge  
1964: Eça de Queiroz.

299. Special Advanced Study. (1–4) I and II.  
Mr. Malkiel, Mr. Woodbridge  
Restricted to candidates for higher degrees.

* SPEECH

(Department Office, 3125 Dwinelle Hall)

*Edward N. Barnhart, Ph.D., Professor of Speech and Lecturer in Psychology.  
Robert L. Beloof, Ph.D., Professor of Speech (Acting Chairman of the Department).

*Don Geiger, Ph.D., Professor of Speech (Chairman of the Department).  
*Richard Hagopian, M.F.A., Professor of Speech.

Gerald E. Marsh, M.A., Professor of Speech.  
Garff B. Wilson, Ph.D., Professor of Speech and Professor of Dramatic Art.

Edward Z. Rowell, Ph.D., Associate Professor of Speech, Emeritus.

Ethel M. Albert, Ph.D., Associate Professor of Speech.

Seymour B. Chatman, Ph.D., Associate Professor of Speech.

*Susan M. Ervin, Ph.D., Associate Professor of Speech.

Anthony Ostroff, M.S., Associate Professor of Speech.

*Arnold Perstein, Ph.M., Associate Professor of Speech.

William F. Shepard, Ph.D., Associate Professor of Speech.

* Not to be given, 1964–1965.

* In residence fall semester only, 1964–1965.


‡ In residence spring semester only, 1964–1965.
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—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 91.

Departmental Major Advisers: Mr. Beloof, Mr. Bendich, Mr. Matson, Mr. Nathan.

The Major. Speech 1A–1B and 2A–2B or their equivalent.

Departmental upper division courses are classified into five categories as follows:

(1) Theory: 118, 160A–160B, 162A–162B; (2) Public Address: 135, 136,
137, 138, 139; (3) Interpretation: 111A–111B–111C; (4) Rhetoric: 121A–
121B, 123, 141A–141B, 144A–144B, 145, 147, 149; (5) Argumentation:

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.

Honors Program. Students accepted in the honors program will enroll in
Speech H195A–H195B, complete a long paper, and take a comprehensive
examination.

Lower Division Courses

1A–1B. First-Year Reading, Writing and Speaking. (3–3) Yr.
Beginning each semester.
Prerequisite: a passing grade in Subject A. In each semester there are sections of 1A
and 1B intended primarily for prelegal students.
Written and oral composition, based upon readings and discussions of major works of
literature, philosophy, and science.

Beginning each semester.
Mr. Anderson, Mr. Beloof, Mr. Hagopian, Mr. benAvram, Mr. Wilson
Oral reading of prose and poetry; practice in speaking and reading with training in the
principles of effective delivery.

10A–10B. The Logic of Argument. (3–3) Yr. Beginning each semester.
Mr. Bendich, Mr. Blease

10A. Principles of argument, with emphasis on the problems of meaning, inference, and
evidence.
10B. Construction and criticism of arguments, chiefly social issues.

*12. Psychology of Argument. (3) II.
The function of communication in inducing belief and directing behavior; techniques
of political propaganda and other forms of persuasion.

*15A–15B. Masterpieces of Rhetoric. (3–3) Yr.
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.
Mr. Chatman, Miss Ervin, Mr. Oswalt
Required of foreign students whose grades on the diagnostic examination indicate need
for training in basic English for University work.

Mr. Chatman, Miss Ervin, Mr. Oswalt
Required of foreign students whose grades on the diagnostic examination indicate need
for further instruction in English for University work.

40. Advanced Oral English for Foreign Students. (3) I and II.
Mr. Chatman, Miss Ervin, Mr. Oswalt, Mrs. Russell
Elective course for foreign students with advanced ability in English.

* Not to be given, 1964–1965.
45. Public Speaking. (3) I and II. Mr. Marsh, Mr. Stripp, Mr. Tabler
Designed for sophomores, but open to students in the upper division.
Intensive work, in conjunction with study of significant contemporary political and social issues, in the essentials of public speaking and the forms of public address. Platform theory and practice, principles of oral style.

Upper Division Courses

100A–100B. Contrastive Language Analysis: English as a Second Language. (3–3) Yr. Mr. Chatman, Mr. Oswalt
Prerequisite: An elementary course in linguistics and one in psychology; preparation in anthropology will be useful, but not mandatory. A native command of English or its equivalent is necessary.
100A. Phonological, grammatical and semantic problems in learning English; language learning theory.
100B. Construction and validation of materials; evaluation of competence; cross-cultural and cross-linguistic comparisons.

103. General Phonetics. (3) II. Mr. Oswalt
Physical, anatomical, and physiological factors in speech; classical articulatory phonetic theory; modern acoustic phonetics.

106. Oral Reading of Poetry and Prose. (3) I and II. Mr. Anderson, 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.
Poetry and prose from the point of view of oral interpretation; principles of effective oral reading of literature; practice in platform reading.

107A–107B. Argumentative Discourse: Oral and Written. (3–3) Yr. Mr. Bendich, Mr. Blease
Beginning each semester.
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
Principles of and intensive practice in oral argumentation, in group discussion and in cross-examination. Of special value to those intending to teach speech.

111A–111B. The Reading of Prose and Poetry. (3–3) Yr. Beginning each semester. Mr. Beloof, Mr. Hagopian, Mr. benAvram, Mr. Wilson
Prerequisite: course 2A–2B.
111A. The essay and the short story.
111B. The ballad, the lyric, the ode, etc.

111C. The Reading of Drama. (3) I and II. Mr. Beloof, Mr. Hagopian, Mr. Ostroff, Mr. Wilson
Prerequisite: course 2A–2B.
Oral interpretation of poetic and prose drama.

118. Symbolism: Expressive Functioning of Signs. (3) II. Mr. Beloof
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
Research techniques in communication, with special emphasis on content analysis and audience response; supervised individual and group research.

121A–121B. Speech and Society. (3–3) Yr. Mr. Matson
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; the reciprocal influence of social institutions and speech.

123. Freedom of Speech. (3) II. Mr. Bendich
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. Willy

*136. Latin-American Spokesmen. (3) I.
Critical analysis of outstanding speeches, in translation, with special attention to major movements, controversies, issues, and problems.

137. American Public Address during the Eighteenth and Nineteenth Centuries. (3) I. Mr. Wraze

138. Modern Public Address. (3) II. Mr. Wraze
Critical analysis of speeches of Wilson, Roosevelt, Churchill, and other leaders from 1914 to the present time.

139. Modern Spokesmen. (3) II. Mr. Scott
Writings and speeches of leading spokesmen for major contemporary movements—political, social, and religious problems of ideology and ideological conflict, objectivity and evaluation, and the rationalization of conflict.

141A–141B. Classical Rhetoric. (3–3) Yr. Mr. Willy
(Formerly numbered 132A–132B.)
Works of Isocrates, Plato, Aristotle, Cicero, Quintilian, and other classics of antiquity, on criticism, aesthetic theory, and speech.

144A–144B. Medieval and Renaissance Rhetoric. (3–3) Yr. Miss Richardson
Rhetorical theory and practice 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.
Rhetorical theory and practice in the period of the Enlightenment and the beginnings of the Industrial Revolution.

147. Modern Rhetoric. (3) I. Mr. Black
(Formerly numbered 133.)
Contemporary rhetorical theory, with analysis of selected literature.

149. Comparative Discourse. (3) II. Mrs. Albert
Rhetorical patterns of persuasion, reasoning and the expression of beliefs and values of selected contemporary societies, civilized and primitive.

* Not to be given, 1964–1965.
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.

160A–160B. Meaning and Communication. (3–3) Yr. Mrs. Albert
   Theories of meaning, with special attention to spoken communication; communication
   and information theory; verbal and nonverbal components of the communication situation;
   misunderstanding as a special problem in communication.

162A–162B. Theory of Interpretation. (3–3) Yr. Mrs. Albert, Mr. Chatman
   162A. Interpretation of literary texts, especially as they concern the oral interpreter.
   162B. Interpretation of scientific and descriptive texts.

190. Senior Proseminar. (3) II. Mr. Matson
   Prerequisite: required for and limited to seniors in communication and public policy
   major.
   Intensive reading, discussion and individual research on topics relating to the field of
   the major.

H195A–H195B. Honors Course. (3–3) Yr. Mr. Geiger
   Prerequisite: speech majors, senior standing, and on the honors list.
   A special program extending through the senior year. May be substituted for 6 units of
   the major requirement with the approval of the major adviser.

H197A–H197B. Honors Course, Communication and Public Policy Major.
   (3–3) Yr. Mr. Barnhart (in charge)
   Prerequisite: communication and public policy majors, senior standing, and on the
   honors list.
   Special studies in the field of the major with emphasis on sociological aspects.

198. Directed Group Studies for Upper Division Students. (1–5) I and II.
    The Staff (Mr. Geiger in charge)

199. Special Study for Advanced Undergraduates. (1–5) I and II.
    The Staff (Mr. Geiger in charge)

Statistics

(Department Office, 501 Campbell Hall)

Edward W. Barankin, Ph.D., Professor of Statistics.
David Blackwell, Ph.D., Professor of Statistics.
Evelyn A. Fix, Ph.D., Professor of Statistics.
†Joseph L. Hodges, Jr., Ph.D., Professor of Statistics.
George M. Kuznets, Ph.D., Professor of Agricultural Economics, of Statistics,
   and of Economics.
Lucien LeCam, Ph.D., Professor of Statistics.
Erich L. Lehmann, Ph.D., Professor of Statistics.
Michel Loève, Docteur ès Sciences, Professor of Statistics and of Mathematics.
Roy Radner, Ph.D., Professor of Economics and of Statistics.

* Not to be given, 1964–1965.
Letters and Science List. All undergraduate courses in statistics are included in the Letters and Science List of Courses. For regulations governing this list, see page 91.

Departmental Major Adviser: Mr. Barankin.

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 Statistics 1 or 2.

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, 125A, 125B, 135A, 135B, 185 and at least one course from Statistics 120B, 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 and 2 do not belong to the basic cycles. Course 1 is a purely general education course. Course 2 is intended as a prerequisite to applicational courses in other departments.

§ Professor Emeritus, recalled to active service.
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.

Attention of the student is drawn to the possibility of an individual major in statistics combined with an empirical science.

_Honors Program._ Honor students may apply for enrollment in the honors program. The program will consist of courses 120B and 120D, and course H195, reading in a special topic and the writing of a thesis.

_Engineering Science._ The College of Engineering with the cooperation of the Department of Statistics offers a curriculum in engineering mathematical statistics leading to the degree of Bachelor of Science. Major Adviser: Mr. LeCam. (See section on Program of Study in Engineering Science, page 76.)

_Higher Degrees._ See the ANNOUNCEMENT OF THE GRADUATE DIVISION, AT BERKELEY.

**Lower Division Courses**

1. _Introduction to Probability and Statistics._ (3) I and II.
   

2. _Introduction to Statistical Methods._ (3) I and II.
   
   Mr. Blackwell, Mr. Elashoff
   

12. _Elements of Probability and Statistics._ (3) I and II.
   
   Prerequisite: Mathematics course 1A or 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 and II.
   
   Mr. Dubins, Mr. Bararkin
   
   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 and II.
   
   Mr. Dubins, Mr. Bararkin (in charge)
   
   May be taken only in conjunction with 112. Illustrative examples in probability theory and applications in various fields.

113. _Introduction to Theory of Statistics._ (3) II.
   
   Prerequisite: course 112 or 134. It is recommended that 113L be taken concurrently. Tests of statistical hypotheses. Introduction to continuous probability. Point and interval estimation. Introduction to theory of optimum tests and estimates.
113L. Laboratory Course in Introduction to Theory of Statistics. (1) II.

May be taken in conjunction with 113.

Illustrative examples in statistics and applications to various fields.

120A–120B. Theory of Statistics. (3–3) Yr. Mr. Scheffé

Prerequisite: course 113 and Mathematics 111 or 113B. Also Mathematics 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. Scheffé in charge

May be taken only 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; 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. 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.

131. Statistical Inference for Social Scientists. (3) I and II.

Prerequisite: Mathematics 16A, 111 or 190A. Mr. Kuznets

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. Kuznets, in charge

Prerequisite: may be taken only concurrently with course 131.

132. Second Course in Statistical Inference for Social Scientists. (3) II.

Prerequisite: course 131. Recommended: Mathematics 190B.

Further study of topics in theoretical probability and statistics basic to social science applications.

132L. Laboratory for Second Course in Statistical Inference for Social Scientists. (1) II.

Prerequisite: may be taken only in conjunction with course 132.

134. Methods of Probability Theory. (3) I and II.

Mr. Thomasian, Mr. Dubins, Mr. Karush

Prerequisite: Mathematics 14A–14B or consent of instructor.

A systematic development of the concepts and facts of probability theory needed for the technical treatment of engineering and operations research problems. Laws of large numbers, Markov chains, characteristic functions, central limit theorem, continuous time stochastic processes.
135. Methods of Statistics. (3) I and II. Mr. Karush, Mr. Bickel
Prerequisite: course 134 or equivalent.
Presents the principal inference methods used in engineering and operations research. Sampling distributions. Estimation and hypothesis testing. Regression and linear hypotheses. Experimental designs and analysis of variance. Sequential and nonparametric methods briefly treated.

152. Elementary Stochastic Processes. (3) I. Mr. Bickel
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. Barankin
Prerequisite: course 112 and Mathematics 104.

166. Sampling Surveys. (3) I. Miss Fix
Prerequisite: course 12 or 112 or 130A or consent of instructor. Recommended: course 113.

166L. Laboratory Course in Sampling Surveys. (1) I. Miss Fix in charge
Prerequisite: May be taken only concurrently with course 166.
Study of sampling materials and of representative designs in urban and agricultural sampling.

168. Game Theory. (3) II. Mr. Blackwell
Prerequisite: Mathematics 2B or consent of instructor.

169. Dynamic Programming. (3) I. Mr. Radner
Prerequisite: course 112, Mathematics 104.

H195. Special Study for Honors Candidates. (1-5) I and II. The Staff
Investigation of special problems under the direction of members of the department.

199. Special Study for Advanced Undergraduates. (1-5) I and II. The Staff
Investigation of special problems under the direction of members of the department.

Numerical Analysis (Mathematics 128A). (3) I and II.
Numerical Analysis (Mathematics 128B). (3) II.

Linear Programming (Industrial Engineering 160). (3) I.

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, 261, and 272 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.


Miss Scott, Mr. Bickel

Prerequisite: 12 units of upper division mathematics. Designed as a unique statistical prerequisite for course 260A–260B. An advanced treatment of the material covered in courses 112, 113, 120A–120B. It is recommended that course 202C–202D be taken concurrently.


(1–1) Yr.

Miss Scott, Mr. Bickel in charge

It is recommended that course 202A–202B be taken concurrently. Course 202C is not prerequisite to 202D.

252. Special Stochastic Processes. (3) I.

Mr. Barankin

Prerequisite: consent of instructor.

Material covered will include branching processes, point processes and birth and death processes. Equations satisfied by these processes, orthogonal polynomial solutions. First passage times. Absorption probabilities.

253. Topics in the Theory of Second Order Processes. (3) II.

Mr. LeCam

Prerequisite: consent of instructor.


Mr. Freedman, Mr. Karush

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. Freedman, Mr. Karush in charge

Prerequisite: Mathematics 105 and 185. May be taken only concurrently with 255A–255B.

256. Nonparametric Inference. (3) I.

Mr. Lehmann

Prerequisite: course 260A.


*258. Theory of Statistical Decision Functions. (3) II.

Prerequisite: course 260A–260B.


* Not to be given, 1964–1965.
259A. Probability Models in Biology and Problems of Health. (3) I.
Prerequisite: 260A–260B, or 280A–280B, or consent of instructor. Mr. Neyman

259B. Statistical Problems in Modern Research in Astronomy. (3) II.
Prerequisite: familiarity with concepts of probability and consent of instructor. Mr. Neyman

260A–260B. Advanced Topics in Statistics. (3–3) Yr. Mr. Lehmann
Prerequisite: course 120A–120B, Mathematics 111 (or 113B), 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 only 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 instructor.

262. Information Theory. (3) II. Mr. Thomasian
Prerequisite: course 255A–255B.

263A–263B. Advanced Probability. (3–3) Yr. Mr. Loève
Prerequisite: course 255A–255B or consent of the instructor.
Recent developments in the theory of probability: Random functions and processes; martingales, decomposable processes, Markov processes.

267. Large Sample Theory. (3) I. Mr. LeCam
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.

272. Multivariate Analysis. (3) II. Mr. Elashoff
Prerequisite: course 280A and knowledge of matrix algebra, or consent of instructor.
Multivariate normal distribution; component and factor analysis; systems of stochastic equations; multivariate analysis of variance; classification and discriminant analysis; estimation, testing and distribution problems for certain vectors and matrices. Applications will be adjusted to audience using available IBM 7090 programs.

280A. Advanced Statistical Inference. (3) I. Mr. Scheffé, Mr. Elashoff
Prerequisite: Mathematics 111 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. Miss Fix, Miss Scott
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.
Mr. Scheffé, Mr. Elashoff, Miss Fix, Miss Scott, ——— in charge
May be taken only 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.

289. Current Topics in Probability and Statistics. (3) I and II.
Prerequisite: consent of instructor.
Recent developments and topics of current interest in Probability Theory and Mathematical Statistics.

289A. Dynamic Programming. (3) I. Mr. Blackwell
289B. Topics in Nonparametric Inference. (3) II. Mr. Lehmann
289C. Recent Developments in Estimation and Testing. (3) I. Mr. Barankin
289D. Sequential Analysis. (3) II. Mr. Schwartz

290. Seminar. (2–6) I and II.
The Staff

295S. Individual Research Leading to Higher Degrees. (2–6) I and II.
The Staff

The Statistical Laboratory

When founded in 1939, the Statistical Laboratory was a unit of the Mathematics Department and combined research with an extensive instruction program in mathematical statistics. This instruction program led to B.A., M.A., and Ph.D. degrees in statistics. In 1955, the instruction activities in statistics were taken over by the newly established Department of Statistics. Since that time the Laboratory has been functioning as a research unit.

Research activity of the Statistical Laboratory includes work on the theory of statistics and its various applications: to astronomy (cosmology), to biology (population dynamics, competition of species), to communication theory, to problems of health (theory of diagnostic tests, bio-assay, apparent associations between diseases, carcinogenesis), to experimentation, to meteorology (experiments on weather control), etc.

Some of the above research is conducted in cooperation with other units of the University and with individuals and institutions outside the University. For example, work on astronomy is conducted in cooperation with astronomers at Lick Observatory.

Essentially, every faculty member of the Department of Statistics can use the facilities of the Statistical Laboratory. Its paid personnel consists of a substantial number of research assistants and secretarial help, mostly paid from project funds.
SUBJECT A: ENGLISH COMPOSITION

(Subject A Office, 216 Dwinelle Hall Annex)

Committee in charge:
Larzer Ziff, Ph.D., Associate Professor of English.
William S. Anderson, Ph.D., Associate Professor of Latin.
Alvin A. Eustis, Jr., Ph.D., Professor of French.

Helene R. DiBona, M.A., Supervisor of Subject A.

Subject A. (No credit) I and II. Mrs. DiBona and Associates
Three hours weekly. Required of all students who do not pass the examination in Subject A. Fee, $35. For regulations governing this requirement see page 51.
Training in the principles of composition, sentence structure, grammar, punctuation, and spelling. Weekly compositions and frequent exercises. Sections limited to thirty students.

ZOOOLOGY

(Department Office, 4079 Life Sciences Building)

Max Alfert, Ph.D., Professor of Zoology.
William Balamuth, Ph.D., Professor of Zoology.
William E. Berg, 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.
Cadet Hand, Ph.D., Professor of Zoology and Director, Bodega Marine Laboratory.
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 (Chairman of the Department).
Ralph I. Smith, Ph.D., Professor of Zoology.
Robert C. Stebbins, Ph.D., Professor of Zoology and Curator in Herpetology, Museum of Vertebrate Zoology.

‡ In residence spring semester only, 1964–1965.
Curt Stern, Ph.D., D.Sc., Professor of Zoology.

§ Seth B. Benson, Ph.D., Associate Professor of Zoology and Curator of Mammals, Museum of Vertebrate Zoology.

* Peter Marler, Ph.D., Associate Professor of Zoology.

† Wilbur B. Quay, Ph.D., Associate Professor of Zoology.

Richard C. Strohm, Ph.D., Associate Professor of Zoology.

Carl W. Birky, Jr., Ph.D., Assistant Professor of Zoology.

Ned K. Johnson, Ph.D., Assistant Professor of Zoology and Assistant Curator of Birds, Museum of Vertebrate Zoology.

William Z. Lidicker, Jr., Ph.D., Assistant Professor of Zoology and Assistant Curator of Mammals, Museum of Vertebrate Zoology.

Paul Licht, Ph.D., Assistant Professor of Zoology.

Satyabrata Nandi, Ph.D., Assistant Professor of Zoology.

Oscar H. Paris, Ph.D., Assistant Professor of Zoology.

Donald M. Wilson, Ph.D., Assistant Professor of Zoology.

Letters and Science List. All undergraduate courses in zoology except courses 109, 119A–119B, 120, 145 and 146 are included in the Letters and Science List of Courses. For regulations governing this list, see page 91.

Departmental Major Advisers: Mr. Smith, Mr. Birky, Mr. Eakin, Mr. Leopold, Mr. Lidicker, Mr. Strohm.

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, or Genetics 100, (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, biometry, botany, entomology, genetics, organic chemistry, paleontology, parasitology, physical chemistry, physical anthropology, physics, physiological psychology, physiology, and virology. (3) Seniors with a B average or better in zoology courses are encouraged to seek faculty sponsorship in order to pursue independent study and research under course 199, and to enroll for the proseminar, course 198.

Honors Program. Honor students may apply for admission to the honors program at the beginning of the senior year. Students accepted in the honors program will complete Zoology 198 (Proseminar) and Zoology H196 (Thesis course).

Credit Allowance for Lower Division Courses. (1) Biology 11A–11B. Three units of credit only if either Zoology 1A or Zoology 10 or Botany 1 or Botany 10 have already been completed, such credit to be withheld until the entire year course has been completed, and then assigned to whichever half is taken in sequence. No credit at all if any two of the preceding courses in any combination have been completed. Zoology 1A and/or Botany 1 may be taken for credit by students who have completed all or part of Biology 11A–11B. (2) Zoology 1A and Botany 1. Either or both of these courses may be taken for credit regardless of any other lower division courses in Zoology or Botany already completed. (3) Zoology 10 and Botany 10. No credit for Zoology 10 if Zoology 1A has been completed. No credit for Botany 10 if Botany 1 has been completed. No credit for either course if all or part of Biology 11A–11B has been completed.

GENERAL BIOLOGY

Mr. Laetsch (in charge fall semester),
Mr. Strohman (in charge spring semester)

Lectures and laboratory. To receive credit toward the natural science requirement of the College of Letters and Science, students must take both semesters. See above for credit allowance in relation to other lower division courses.

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.

Biology 150. General Ecology. (3) I.
Mr. Lidicker, Mr. McMillan

Prerequisite: Biology 11A–11B; or an introductory course in each of botany and zoology.

An introduction to the principles of ecology, stressing the structure and dynamics of natural communities on both regional and local bases, and the historical and contemporary influences of man.

ZOOLOGY

Lower Division Courses

1A. General Zoology. (4) I and II.
Mr. Paris, ---
Lectures and laboratory. Prerequisite: Chemistry 1A. See above for credit allowance in relation to other lower division courses.

An introduction to the principles of biology, with special reference to structure, physiology, heredity, and evolution of animals.

1B. Introduction to Vertebrate Zoology. (4) II.
Mr. Wilson, Mr. Bern
Lectures and laboratory. Prerequisite: course 1A or Biology 11A–11B.
10. Animal Biology. (3) I and II. Mr. Birky, ———, Mr. Eakin, ———
   I: Mr. Birky, ———; II: ———.
   Lectures and demonstrations. Open without prerequisite to all students, but designed for those not specializing in zoology. See above for credit allowance in relation to other lower division courses.
   An outline of the main facts and principles of biology, with special reference to the bearing of biology upon human life.

Upper Division Courses

100. Vertebrate Embryology. (4) I.
   Lectures and laboratory. Prerequisite: course 1B.

101. Introduction to Physicochemical Biology. (3) I.
   Mr. Stroman
   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 instructor with less complete preparation.
   The living cell as an integrated molecular system; its structural organization, growth, reproduction and work output.

102. Laboratory in Physicochemical Biology. (3) II.
   Mr. Strohman
   Laboratory with lecture or conference. Prerequisite: course 101 and consent of 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
   Prerequisite: course 100.

103C. Experimental Embryology Laboratory. (2) II.
   Mr. Berg
   Prerequisite: course 103 (may be taken concurrently). Enrollment limited to ten students.
   Experimental embryology of 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) II.
   Mr. Marler
   Prerequisite: course 104 and consent of instructor.
   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.
   Lectures and laboratory. Prerequisite: course 1B or equivalent.

107. Cytology. (2) I.
   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.

* Not to be given, 1964–1965.
107C. Cytology Laboratory. (2) I.
Mr. Albert
Prerequisite: course 107 (may be taken concurrently). Recommended: course 117, working knowledge of microtechnique.

108. Invertebrate Zoology. (4) II.
Mr. Smith
Lectures, laboratory, and field trips. Prerequisite: course 1A or Biology 11A-11B.

*109. Zoological and Histochemical Microtechnique. (3) I.
Mr. Quay
Lecture and laboratory. Prerequisite: upper division or graduate standing in a biological science.

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.
Comparative aspects of morphology, physiology, and natural habitats. Emphasis in the laboratory upon experimental treatment, 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.
General principles of parasitology, based upon protozoa, helminths, and other invertebrates, excepting higher arthropods. Emphasis upon 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.

113. Natural History of the Vertebrates. (4) II.
Mr. Stebbins, Mr. Benson, Mr. Johnson
Lectures, field trips, and laboratory. Prerequisite: course 1B.
Vertebrates, exclusive of fishes.

*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.

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.
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. Wildlife Biology and Management. (3) I.
Mr. Leopold
Lectures and laboratory. Prerequisite: upper division standing.
Ecologic mechanisms that determine wildlife populations. Distribution, life histories, and management of important species.

*117. Comparative Histology. (4) I.
Mr. Quay
Lectures and laboratory. Prerequisite: course 1B or equivalent. Recommended: a course in comparative or mammalian gross anatomy.

118A. Comparative Endocrinology. (3) I.
Mr. Bern
(Formerly numbered 118.)
Prerequisite: course 1B and Chemistry 8.
Lectures on the biology of hormonal mechanisms in vertebrates and invertebrates.

* Not to be given, 1964–1965.
118B. Comparative Endocrinology Laboratory. (3) II. Mr. Bern, Mr. Nandi
(Formerly numbered 118C)
Prerequisite: course 118A or equivalent.
Lectures, 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.
119B. The theory and advanced techniques 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 instructor.

*123. Physiological Embryology. (2) I. Mr. Berg
Prerequisite: course 100. Recommended: course 103.
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.
Comparative physiology of the invertebrates, with individual problems on nutrition, respiration, excretion, coordination, and other functions.

125. Animal Ecology. (2) II. Mr. Paris
Prerequisite: two semesters of upper division work in biology, or graduate status in a related field.
Structure and dynamics of natural populations of animals; community relations, stressing terrestrial habitats.

126. Animal Evolution. (2) II. Mr. Miller
Prerequisite: course 10B. Recommended: Course work in taxonomy and elementary genetics.

127. Developmental Genetics. (2) II. Mr. Birky
Prerequisite: course 103, and course 114 or Genetics 100. Recommended: course 101 or Genetics 104.
The role of heritable factors in the control of embryonic development; genic mechanisms of cell differentiation.

128. Vertebrate Reproduction. (3) II. Mr. Lidicker
Lectures and laboratory. Prerequisite: course 100 or 106.
Reproductive biology of vertebrate animals, with a consideration of the factors influencing reproduction in natural populations.

134. Fisheries Biology and Conservation. (3) I. Mr. Needham
Prerequisite: upper division standing.
Identification, distribution and ecology of fishes. Limnological and biological factors influencing fish populations. Studies on conservation problems resulting from conflicts in water uses.

*135. Systematic Mammalogy. (2) I. Mr. Benson
Lectures and laboratory. Prerequisite: course 106 and 113.

136. Advanced Ornithology. (2) I. Mr. Miller
Lectures and laboratory. Prerequisite: course 113. Enrollment limited to ten students.
Classification, anatomy and function in birds.

* Not to be given, 1964–1965.
137. Herpetology. (2) II.  
Lectures and laboratory. Prerequisite: course 113.  
Advanced study of amphibians and reptiles.  
Mr. Stebbins

138. Ichthyology. (4) II.  
Lectures and laboratory. Prerequisites: course 1B and two semesters of upper division work in zoology. Recommended: course 106 and 134.  
Mr. Needham

142. Invertebrate Neurophysiology. (4) I.  
Lectures and laboratory. Prerequisite: an upper division course in physiology or animal behavior. Recommended: course 108.  
Structure and function of single sensory, nervous, and muscular cells, integration in multicellular systems, and coordination in whole animals. Enrollment limited.  
Mr. Wilson

145. Wildlife Populations. (3) II.  
Prerequisite: course 116 or 125 or equivalent.  
Dynamics of game birds and mammal populations; mechanisms regulating natality, mortality, and population density; research techniques.  
Mr. Leopold

146. Field Course in Wildlife and Fisheries. (4). Mr. Needham, Mr. Leopold  
Lectures, laboratory and field work. Given in Summer Session 1 at Sagehen Creek Experiment Station, California. Prerequisite: course 1B or equivalent and consent of instructor.

151. Comparative Population Ecology. (2) I.  
Mr. Pitelka  
Prerequisite: an upper division course in animal ecology (course 125 or 145, Biology 150, or Entomology 127 or an equivalent), or graduate status.  
A comparative review of population and life cycle characteristics; types of population organization evolved among higher animals, especially vertebrates.

H196. Thesis Course. (2) I and II.  
The Staff (Mr. DeOme in charge)  
Prerequisite: senior standing with an over-all B average, and at least a B average in the major. Restricted to candidates for honors with the A.B. degree.  
Individual study and research on a special problem to be chosen in consultation with a member of the staff; preparation of a thesis on broader aspects of this work.

197. Extra Session Work. (1-4)  
The Staff (———-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 staff member.

198. Proseminar in Zoology. (1) I and II.  
Mr. Nandi, Mr. Birky  
I: Mr. Nandi; II: Mr. Birky.  
Prerequisite: upper division standing with an over-all B average, and at least a B average in the major.  
Reporting and group discussion on selected topics. Although organized by designated faculty member, others will participate.

199. Special Study for Advanced Undergraduates. (1-4) I and II.  
The Staff (Mr. Pitelka in charge)  
Prerequisite: background courses in chosen subjects. Restricted to senior honor students.

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.

* Not to be given, 1964–1965.
201. Seminar in Physicochemical Biology. (2) II. Mr. Mazia, Mr. Strohman
Prerequisite: course 101 and 102 or consent of instructor. Seminar discussion of recent literature.

202. Chordate Neurology. (2) II. Mr. Quay
Lectures, demonstrations and discussions. The organization and regulatory mechanisms of chordate nervous systems.

204. Seminar in Animal Behavior. (2) II. Mr. Marler
Prerequisite: course 104 or Psychology 150A and consent of 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. (2) I and II.
Topics will vary from year to year. Mr. Hand, Mr. Smith, Mr. Wilson

209. Biology of Tumors. (2) I. Mr. DeOme, Mr. Nandi
Recommended courses: 117, 118, 217, Virology 100A, or equivalent experience.
Lectures and discussions on biological aspects of neoplasia.

210. Seminar on the Biology of Tumors. (2) II.
Mr. DeOme, Mr. Nandi, Mr. Bern, Mr. Weiss
Recommended courses: 209 or equivalent experience.
Critical discussions on basic problems and recent literature in biology of neoplasia.

212. Advanced Marine Invertebrate Natural History. (4)
Given at the seashore in Summer Session I. Prerequisite: course 108 or 112.
Semi-independent investigations of marine invertebrates.

213. Advanced Invertebrate Zoology. (4) II. Mr. Hand
Lectures and laboratory. Prerequisite: course 108 or 112.
The biology of major invertebrate groups.

217. Comparative Histopathology. (3) I. Mr. DeOme, Mr. Madin
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.

218A. Special Topics in Endocrinology and Neuroendocrinology. (2) I.
Prerequisite: course 118, Physiology 104 or equivalent. Mr. Bern
Lectures and discussion of current research and concepts.

218B. Seminar in Endocrinology and Neuroendocrinology. (2) II.
Mr. Bern, Mr. Nandi, Mr. Smith
Prerequisite: course 218A or consent of instructor.
Presentations and discussion of current topics. Subject matter will vary from year to year. Topic for 1965: Invertebrate Endocrinology.

219. Seminar in Animal Ecology. (2) I. Mr. Pitelka, Mr. Paris
Review of special topics, with emphasis on current literature.

* Not to be given, 1964–1965.
220. Seminar on Speciation in Vertebrates. (2) I. Mr. Johnson
Prerequisite: course 113.
Problems of speciation and isolating mechanisms in vertebrates.

221. Seminar in Optics and Metrology. (2) II. Mr. Gullberg
Prerequisite: course 119A and 119B.
Recent advances in instrumentation in biological research fields.

222. Seminar in Wildlife Ecology and Population Dynamics. (2) II. Mr. Leopold

223. Seminar in Fisheries Management. (2) I. Mr. Needham
Prerequisite: course 116 and 138.
Analysis of fish population problems, including review of recent research.

225. Analytical Field Ecology. (3) II. Mr. Paris, Mr. Pitelka
(Formerly numbered 125C.)
Prerequisite: course 108 or 113, 125 (may be taken concurrently), and one course in statistics. Enrollment limited and requires consent of instructor.
Analytical methods for the investigation of animal populations and natural communities; study of population and community structure and dynamics; survey of major communities in California.

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, ______
Review of current literature on ecology and evolution of higher vertebrates.

244. Genetics Review. (2) I and II. Mr. Stern
Prerequisite: one course in genetics.
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.

296. Research. (1–12) I and II. The Staff (Mr. Pitelka in charge)
Credit awarded according to work accomplished.

299. Special Study for Graduate Students. (1–4) I and II. The Staff (Mr. Pitelka in charge)
Reading or other advanced study by arrangement with a staff member.

Zoology Seminar. (No credit) I and II. Mr. Leopold, Mr. Stern
I: Mr. Leopold; II: Mr. Stern.
Meetings for the presentation of original work by the faculty, visiting lecturers, and graduate students.

Cancer Research Genetics Laboratory
The Cancer Research Genetics Laboratory was established in 1950 within the Department of Zoology. The laboratory carries on a research, teaching, and service program designed to foster faculty and graduate student participation in cancer research. The research program is designed to investigate the

* Not to be given, 1964–1965.
factors involved in the neoplastic change, and is carried out by the laboratory staff and in cooperation with other faculty members. The laboratory staff participates directly in the regular teaching program of the Department of Zoology. In addition, the laboratory houses, supports, and supervises several graduate students.

**Sagehen Creek Wildlife and Fisheries Station**

Located at an elevation of 6,500 feet, 12 miles north of Truckee, California, on Sagehen Creek, this station was developed primarily for year-round, basic field research on fish and game problems by both faculty members and graduate students. The main problems under attack are concerned with cycles in game animals, birds, and fishes, with special effort being directed toward the study of the causes of winter mortality in fishes. The work is supported in part by grants (Max C. Fleischmann Foundation), by the California Department of Fish and Game, and by regular appropriations in the University budget.
Index
factors involved in the migratory behavior, and is carried out by the laboratory staff in cooperation with other faculty members. The laboratory staff participates directly in the regular teaching program of the Department of Zoology. In addition, the laboratory provides support and supervises several graduate assistants.

Index Creek Wildlife and Fisheries Station
Located in an elevation of 8,500 feet, 12 miles north of Truckee, California, the Index Creek Station was developed primarily for year-round, blackbear research on fish and game problems by both faculty members and graduate students. The main problems under attack are concerned with cyclic game and fish abundance, habitat, and habitat, with special efforts being directed toward the study of the causes of winter mortality in fishes. The work is supported in part by grants (Max C. Fleischmann Foundation), by the California Department of Fish and Game, and by regular appropriations to the University budget.
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Supplementary Announcements

to the Schedule and Directory and the General Catalogue

Fall, 1964
SUPPLEMENTARY ANNOUNCEMENTS

UNIVERSITY OF CALIFORNIA, BERKELEY

Supplementary Announcements

to the Schedule and Directory and the
General Catalogue

September, 1964

ANTHROPOLOGY

106, not to be given 1964-1965.
115, to be given I by Mrs. Diaz.
191, to be given II.
217A, to be given I.

ARCHITECTURE

107, Sec. 5 (new section) to be given by Mr. Van der Ryn W 9-12 in 140 Barrows. No Examination group.
198A, Sec. 1 not to be given.
202, unit value changed to (3).
203, unit value changed to (1).

ART

1B, to be given I and II.
1C, not to be given I.
1D, to be given I.
129B, to be given I MWF 10-12 in 255, 265 Kroeber.
163, not to be given I.
172, not to be given I.
183A, not to be given I.
183B to be given I.
183D, not to be given I.
260, not to be given I.
283A, not to be given I.

BUSINESS ADMINISTRATION

Departmental Office changed to 350 Barrows.

106, to be given I.
135, to be given II.
136, to be given I by Mr. Cowee.
162 (change in title) Retailing. (3) I and II.
163 (change in prerequisite and description) Prerequisite: course 160 or consent of instructor.

Functions of advertising in the economic and marketing systems. Management problems in planning and measuring the effectiveness of advertising. Applications of theories and research methods from economics and the behavioral sciences.
165 (change in title and description) Marketing Management. (3) I and II. Mr. Bucklin
Planning the Marketing program: product, channels of distribution, pricing, and promotion policies: organizing marketing activities; control systems.
169, to be given I and II by Mr. Preston, Mr. Revzan.
170A, time and room changed to TuTh 8-9:30 in 129 Barrows.
Examination group is 23.
198A, Sec. 1 time and room changed to Tu 3-5 in 174 Barrows.
Examination group is 18.
198A, Sec. 2 time and room changed to W 3-5 in 136 Barrows.
230, not to be given 1964-1965.
232, to be given I and II by Mr. Michaelson.
252B (new course) Seminar in Labor Economics. (3) II.
(Formerly numbered 259.) Mr. Galenson, Mr. Kerr, Mr. Ross, Mr. Ulman
Prerequisite: Economics 252A.
Wage Policies and wage behavior.
269A-269B (add) prerequisite: graduate standing. Open to M.B.A. candidates with a minimum of 12 semester hours of an approved program in marketing; or to other M.B.A. candidates with the express consent of instructor.

CITY AND REGIONAL PLANNING

110, not to be given 1964-1965.
111, not to be given 1964-1965.
121, room changed to 200 W.
200 (new course) The Evolution of Cities. (3) I.
The role of cities in civilization. The historical origins of their institutions and physical forms. The structure and functions of cities in developed and developing countries.
200, time changed to Tu 10-12 in 200 W.
201 (new course) Introduction to City Planning. (3) I.
Origins and evolution of city planning, influences of urban growth, legal and institutional framework, and scientific and philosophical premises. Major principles of current practice: roles of analysis, projection, design, and public and private policy. Alternative approaches.
201, room changed to 155 Kroeber.
202 (new course) Studio: Community General Plan and Development Studies (4) I.
Introductory laboratory experience in analysis, policy-advising and general-plan preparation for a small urban community; emphasis is on planning for the physical development of new communities.
203 (new course) Planning and Governmental Decision-Making (3) I.
204 (new course) The Use of Urban Data. (3) I.
Prerequisite: introductory statistics or consent of instructor.
Data systems relevant for city planning. Methodological considerations in the selection, assembly, analysis and interpretation of empirical data. The use of computers in city planning analysis. Laboratory problems.
204, time and room changed to MW 8 in 104 W.

208 (new course) Studio: Urban District and Physical System Plans. (5) II.

Preparation of detailed physical development plans for major city districts, e.g., a central district, or physical systems. Determination of the design of vital components; development policies, timing; implementation devices. Introduction to survey and analysis techniques for physical design.

210 (new course) Orientation to Design. (3) II.

An introduction to the physical environmental components, and the logic of their interrelationship with the operational requirements of activities. Criteria of evaluation. Perception and communication of form.

226, not to be given 1964–1965.

227 (new course) The Future of Urbanism and Cities. (2) I.

Consequences of increasing societal scale. Multiple conceptions of "community"; implications of declining localism. Problems of prediction. Review of speculations on future social and technological changes and their urban and city influences. Implications for public policy and for strategies of planning.

250, withdrawn.

251, withdrawn.

253, withdrawn.

254, not to be given 1964–1965.

255, not to be given 1964–1965.

258, withdrawn.

259, withdrawn.

CLASSICS

Departmental Office changed to 5303 Dw.

134, time and room changed to Th 2–4 in 209 Dw. Examination group is 15.

236, not to be given 1964–1965.

245, room changed to 115 L.

COMPARATIVE LITERATURE

1B, Sec. 1 final examination group changed to 10.

100, Sec. 1 not to be given.

151A–151B, not to be given 1964–1965.

190A, final examination group changed to 15.

190C, to be given II.

205, to be given I.

221, not to be given 1964–1965.

CRIMINOLOGY

102, to be given by Mr. Morris. Time and room changed to TuTh 11–12:30 in 4505 LSB. Examination group is 10.

115A, room changed to 120 W.

117, to be given II by Mr. Adler.

DECORATIVE ART

14CC, to be given I.

141C (new course) Advanced Design: Glass. (2) I and II. Mr. Lipofsky

Prerequisite: course 140C which may be taken concurrently. 141A and 141B are not prerequisite to 141C.

An exploration of basic problems in the design and fabrication of forms in glass.
DRAMATIC ART

181, to be given I and II.
239, not to be given 1964–1965.

ECONOMICS

2, Sec. 3 (new section) to be given TuTh 11–12:30 in 175 Barrows. Examination group is 10.
201A, time and room changed to W 3–5 in 205 W. Examination group is 5.
250A, to be given by Mr. Galenson, Mr. Gordon, Mr. Ulman Tu 10–12 in 207 Cal.
Examination group is 8.
252A (change in existing course) Seminar in Labor Economics. (3) I.
(Formerly numbered 252A–252B.) Mr. Galenson, Mr. Kerr, Mr. Ulman
Wage Policies and wage behavior.

EDUCATION

242A, to be given I and II.
299 (new course) Special Study for Graduate Students. (1–3) I and II.
The Staff
Prerequisite: consent of instructor and graduate adviser.
Open to qualified graduate students who wish to pursue special studies and research under the direction of a member of the staff.

ENGINEERING

11, withdrawn.
17, Sec. 3 (new section) to be given by Mr. Gans TuTh 9:30–11 in 205 Eng.
Examination group is 8.
Sec. 4 (new section) to be given by Mr. White TuTh 2–3:30 in 241 Cory.
Examination group is 15.
120 (change in prerequisite and description) Prerequisite: Upper division status in the College of Engineering.
Economic analyses for decision making relative to costs and capital investment in engineering and business projects. Criteria for investment decisions. Relationship of risk, uncertainty, and sensitivity to rates of return. Linear programming and computer techniques are introduced and utilized.
140 (change in prerequisite) Physics 4C, Electrical Engineering 100.
180 (new course) Biological and Economic Feedback Systems. (2) I.
Prerequisite: Mathematics 4.
Mr. Smith
Unilateral and bilateral networks, feedback loops, stability, nonlinearities, statistical signals, state variables, phase plane methods. Examples in biology, economics, traffic, government, and business. The use of computers.
180, Organizational meeting to be held Tu. September 22, 12m in 297 Cory.

Civil Engineering

101 (change in prerequisite) course 100.
102 (change in prerequisite) course 100.
105 (change in prerequisite) course 100.
110 (change in existing course) Properties of Structural Materials. (2) I and II.
Mr. Pirtz, Mr. Taylor
Prerequisite: Engineering 45, course 130 (may be taken concurrently).
Determination of properties of structural materials. Experiments for evaluating behavior under simple conditions.
130 (change in prerequisite) Engineering 36.
131 (change in existing course) Introduction to Structural Analysis. (3) I and II.
Prerequisite: course 130. Mr. Eberhart, Mr. Scordelis
Analytical and graphical methods for determinate structures; influence lines; procedures for determining displacements; force and displacement methods for indeterminate structures; matrix formulation of structural analysis.
132 (change in prerequisite) Engineering 36; open only to students in electrical engineering and to non-engineering majors.
Prerequisite: course 130.
134 (new course) Advanced Structural Analysis. (2) II.
Prerequisite: course 131, 133. (Intended for students terminating with B.S. degree).
Extension of linear analysis to complex structures, analysis of structures with large deflections and non-linear stress-strain law, stability analysis of plane structures, elementary membrane theory of shells and introduction to structural dynamics.
135 (change in existing course) Reinforced and Prestressed Concrete Design. (2) I.
Prerequisite: course 131, 133.
Advanced topics in the design of reinforced concrete, prestressed concrete, and composite materials.
136, withdrawn.
137 (change in existing course) Synthesis and Design of Structural Systems. (3) II.
Prerequisite: course 131 and 133.
Planning and design aspects of structural systems; sources of stress and strain; design criteria; layout of structural systems; optimization, formal and informal methods of analysis.
167 (change in prerequisite) course 140.
170 (change in prerequisite) Engineering 10, Engineering 45.
170, Sec. 1 room changed to 141 Earth Sci. 170, Sec. 2 canceled.

Electrical Engineering

100 (change in prerequisite) Mathematics 2B, Engineering 17 (may be taken concurrently). Not for students in Electrical Engineering.
103A-103B. (change in existing course) Particle Accelerators. (2-2) Yr.
Prerequisite: course 100 or 106 or 105 or Physics 110B or 121 (may be taken concurrently). Course 103A is normally prerequisite to 103B. Qualified students may enroll in course 103B without 103A with consent of instructor.
Theory, design, and applications of modern electro-nuclear machines such as d-c accelerators, betatrons, r-f linear accelerators, cyclotrons, synchrotrons, and strong-focusing machines; recent developments; ion sources and vacuum systems.
111A-111B (change in prerequisite) course 105, Mechanical Engineering 100 and course 117A (may be taken concurrently).
111A, to be given by Mr. Robertson, room changed to 297 Cory. Examination group is 8.
112A–112B (change in existing course) Engineering of Electrical Systems. (4-4) Yr.
Prerequisite: course 119.
Specifications; analytic and experimental procedures for determining system equations; analytic and simulation methods for testing system against specifications, optimization methods, component and system reliability. Term project.
Laboratory experiments on components and systems.

117A, Sec. 5 (new section) to be given by Mr. Susskind MWF 3 in 285 Cory. Examination group is 24.

123, Sec. 2 canceled.

205 (change in prerequisite and description) Prerequisite: course 117A or Physics 110A.

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 crossed-field tubes, cathode-ray and storage tubes, electron microscopes, and other electron-beam devices.

216 (change in prerequisite) course 210A.

217 (change in prerequisite and description). Prerequisite: course 210A (may be taken concurrently).

A study of the application of network theory, including the general theorems, the methods of analysis, and the measurement techniques of microwave guides, cavity resonators, coupling systems and networks of these components.

217, not to be given I.

252A–252B (change in existing course) Programming Systems for Digital Computers (2–2) Yr. Mr. Huskey

Analysis and synthesis of programming systems (software) for digital computers.

260 (change in prerequisite) course 119 or 124, or consent of instructor; Statistics 134 or 202A.

290E, withdrawn.

290K, unit value changed to (3).

290L, withdrawn.

290P (new course) Topics in Solid-State Electronics. (2) I and II.  Mr. English, Mr. Muller, Mr. Oldham, Mr. Wang, Mr. White

Prerequisite: course 130: 230 or 231, or consent of instructor.

290Q (new course) Quantum and Optical Electronics. (3) I. Mr. Whinnery

Prerequisite: Physics 115; course 117A or Physics 110; preferably also course 117B; or consent of instructor.

290R (new course) Advanced Topics in Automata: Theory and Algebraic Linguistics. (2) I.

Prerequisite; permission of instructor.

Industrial Engineering

299, unit value changed to (1–6).

Mechanical Engineering

102 (change in prerequisite) Statistics, Mathematics 4B, Physics 4A. Not open to students who have had Engineering 36.

104 (new course) Engineering Mechanics II. (3) I and II.

Prerequisite: Engineering 36.

The Staff (Mr. Leitmann in charge)

Principles of statics and dynamics; applications with emphasis on three-dimensional engineering problems. Virtual work, stability, and space frames. Kinematics and particles and rigid bodies. Dynamics of particles, systems of particles, and rigid bodies, using vector methods. Euler's equations.

111 (change in prerequisite) Mathematics 2B.

118 (change in prerequisite and description) Prerequisite: course 105B, Electrical Engineering 100.
Systems for the conversion of chemical, thermal, and radiant 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.

123 (change in prerequisite) course 105B, Mathematics 2B.
131A–131B (change in prerequisite) course 105B, Engineering 103, Electrical Engineering 100.
163 (change in prerequisite) course 105A, Engineering 103, Mathematics 2B.
170 (change in prerequisite) course 102 or 104, Mathematics 2B.
172 (change in title and prerequisite) An Introduction to Elasticity and Stress Analysis. (3) I.
Prerequisite: course 102 or 104, Civil Engineering 130, Mathematics 2B.

175 (change in existing course) Intermediate Dynamics. (3) I and II.
Prerequisite: course 100, or 102, or 104.
Mr. Hsu, Mr. Rosenberg

290W (new course) Thermodynamics of High Temperature Gases. (3) I.
Prerequisite: course 154 or Physics 112.
Mr. Greif, Mr. Tien

Mineral Technology


290E (new course) Solid State Phase Transformations. (2) I.
Mr. Zackay
Prerequisite: course 103, 122.

290E, to be given by Mr. Zackay at a time to be arranged.

Mineral Engineering

120, withdrawn.

121 (change in prerequisite and description) Prerequisite: Geology 5.
Geological aspects of design and construction of large civil works. Laboratory and field testing of rock strength, deformability, and permeability.

220 (change in existing course) Rock Mechanics. (2) II.
Prerequisite: Civil Engineering 130 or equivalent.
Mr. Lang, Mr. Goodman

221 (change in existing course) Geological Engineering for Tunnels and Dams. (2) I.
(Formerly numbered 221A.)
Prerequisite: Geology 5 and Civil Engineering 121 or equivalents.

222 (change in prerequisite) course 121 or 221.
To be given alternate years, not to be given 1964–1965.

223 (change in existing course) Advanced Geological Engineering. (2) II.
(Formerly numbered 221B.)
Mr. Goodman, Mr. Witherspoon
Prerequisite: course 121 or 221.

Aspects of general geology from the standpoint of engineering applications: engineering classification and properties and aerial photo study of rocks and soils;
rock weathering; rock defects; engineering seismology; permafrost; coastal process; hydrogeology; advanced topics.

**Nuclear Engineering**

3 (new course) Applications of Nuclear Energy. (3) I and II.
Prerequisite: High school algebra.

290C (new course) Integral Transform Methods in Neutron Transport Theory. (3)
Prerequisite: Mathematics 185 or equivalent.
Theory and application of single and multiple integral transforms in Neutron Transport Theory.

290C, to be given by Mr. Chambre at a time to be arranged.

**ENGLISH**

46A, Sec. 2 canceled.

46A, Sec. 18 time and room changed to TuTh 11-12:30 in 185 Barrows.

151MT (new course) Mark Twain. (3) I. Mr. Smith
151MT, to be given by Mr. Smith Tu 7-10 p.m. in 114 L. No final examination.

200, Sec. 1 time and room changed to W 7-10 p.m. in 104 W.

203ER (change in title) Readings in Fifteenth-Century and Early Renaissance Literature. (3) I.
Mr. Fish

213, Sec. 5 room changed to 156 Barrows.

235, not to be given I.

258, time and room changed to Th 2-5 in 140 Barrows.

266, to be given M 7-10 p.m. in 29 Dw. No final examination.

**ENTOMOLOGY AND PARASITOLOGY**

290G, room changed to 14 Haviland.

**FORESTRY**

104, Lab. time changed to M 2-5.

128, not to be given I.

242 (new course) Seminar in Physical Properties of Wood. (2) I. Mr. Resch
Prerequisite: course 114, 115A, 115B.

243 (new course) Seminar in Mechanical Properties of Wood. (2) II.
Prerequisite: course 114, 115A, 115B.

**FRENCH**

112A-112B, to be given by Mr. Gadoffre.
115A, not to be given I.

118A-118B, to be given by Mr. Meylan.

204A-204B, to be given by Miss Dufrenoy.

207A-207B, not to be given 1964-1965.

209A-209B (new course) Studies on Modern Authors. (2-2) Yr. Mr. Gadoffre
Prerequisite: consent of instructor.
(Approved for one offering only, 1964-1965.)

216A-216B, to be given by Mr. Gadoffre.

298 (change in existing course) Special Study for Graduate Students. (1) I and II.
The Staff (Mr. Eustis in charge)
Primarily for students engaged in preliminary exploration of a restricted field, involving research and the writing of a report. May not be substituted for available seminars.

GENETICS

206 (new course) Developmental Genetics. (2) II.
Prerequisite: course 104.
Gene action and development.

GEOGRAPHY

122B, to be given I.

GEOLOGY AND GEOPHYSICS

Geology

220, unit value changed to (1-8).

Geophysics

122A–122B (change in prerequisite) Geology 5 or 15, Physics 4A–4B, course 104A–104B (may be taken concurrently).
290, unit value changed to (1-8).

GERMAN

1, Sec. 16 room changed to 2320 Tolman.
112B, to be given II by Mr. Reichart.
125, not to be given 1964–1965.
214, not to be given 1964–1965.
241, not to be given 1964–1965.
249 (change in topic) Seminar in German Literature. (2 or 3) I and II.
I. Sec. 1. Tragedy from Lessing to Brecht: Theory and Practice. (2) Mr. Stern.
   I. Sec. 2. Stifter. (2) Mr. Schwarz.
   II. Sec. 1. Hauptmann. (2) Mr. Reichart.
   II. Sec. 2. Hofmannsthal. (2) Mr. Politzer.

Yiddish

1, not to be given 1964–1965.
2, not to be given 1964–1965.

HISTORY

17A–17B (change in existing course) The United States. (2–2) Yr.
Prerequisite: sophomore standing.
Mr. Litwack

17C–17D (change in existing course) The United States. (3–3) Yr.
Prerequisite: sophomore standing.
Mr. Litwack

The lectures of 17A–17B supplemented with an extra hour of discussion. Intended especially for sophomores and History majors.
H102, Sec. 1 room changed to 286 Dw.
103B, Sec. 1 room changed to 192 Barrows.
103D, Sec. 2, canceled.
103E, to be given I by Mr. Goslinga at a time to be arranged.
§119A–119B (new course) Africa South of Sahara. (3–3) Yr.  Mr. Crowder

119A: Pre-Colonial Africa from earliest times to 1885.
119B: Africa under colonial rule from 1885 to 1960.
(Approved for one offering only, 1964–1965.)

131, to be given I by Mr. D. Weinstein.
171L, to be given by Mr. Harper, W 7–10 p.m. in 134 Dw. Examination group is 9.
172C, to be given I by Mr. Harper at a time to be arranged.
195A, room changed to 120 W.
197A–197B, to be given by Mr. Irschick.

§201H (new section) Africa South of Sahara. (3) II.  Mr. Crowder
(Approved for one offering only, spring semester, 1965.)

§219 (new course) Africa South of Sahara. (3) I.  Mr. Crowder
(Approved for one offering only, fall semester, 1964.)

History of Science
278, incorrectly listed under History. To be given Tu 3–5 in 3594 LSB.

ECONOMIC HISTORY

ITALIAN
Departmental Office changed to 5205 Dw.

JOURNALISM
Departmental Office changed to 350 Barrows.
Advance Enrollment room changed to 454 Barrows.

21, Sections 1, 2, and 3 room changed to 64 Barrows.
131A, all laboratory sections room changed to 44 Barrows.
147, not to be given I.
165, room changed to 2301 Tolman.
181J, room changed to 123 W.
196, room changed to 120 W.
H198, room changed to 156 Barrows.
201, to be given Tu 2–5 in 150 Barrows.
240, room changed to 156 Barrows.

LAW

209 (change in title) Legislative and Administrative Processes. To be given by Mr. Linde, Mr. Newman, Mr. Stolz.
220. Required for second-year students during 1964–1965. For subsequent classes the requirement is replaced by course 209.
222 (change in title) Business Associations.
228, to be given II.
230, to be given I by Mrs. Armstrong, Mr. Collings, not to be given II.
232, to be given II.
239 (new course) Psychiatry and the Criminal Law. (2) II.  Mr. Diamond
240, not to be given 1964–1965.
244, to be given I and II by Mr. Riesenfeld, Mr. Laube.
249A, to be given II by Mr. Fleming.
249B, to be given I by Mr. King.
250 (change in title) Basic Evidence. (2) I.
251, to be given I.
254, to be given I by Mr. Berger.
259 (change in title) International Conflicts Law.
270, not to be given 1964–1965.
272, to be given I by Mr. Buxbaum, II by Mr. Riesenfeld.
273, to be given I by Mr. Kadish.
279, to be given I.
280, to be given II.
282, to be given I by Mr. McNulty.

LIBRARIANSHIP

220A, to be given W 3–5 in 419 L.
220B, to be given W 1–3 in 318 L.
225A, time and room changed to Tu 10–12 m. in 423 L.

LINGUISTICS

Departmental Office changed to 2337 Dw.

290C (Formerly numbered 251.) Indo-European Comparative Grammar.  
Mr. Beeler

290e (Formerly numbered 290c.) Applications of Linguistics.  
Mr. Sawyer

MATHEMATICS

1A, Sec. 35 room changed to 110 Biochem.
1A, Sec. 56 room changed to 525 Earth Sci.
2A, Sec. 10 room changed to 115 Kroeker.
3A, Sec. 15 room changed to 151 Barrows.
6, Sec. 4 room changed to 525 Earth Sci.
120A, Sec. 1 room changed to 102 W.
123, room changed to 9 Lewis.
125A, Sec. 3 room changed to 175 Barrows.
202, Sec. 1 room changed to 185 Barrows.
206, Sec. 2 room changed to 155 Kroeker.
219A, Sec. 2 time and room changed to MW 3–4:30 in 116 Eng.  
Examination group is 24.
223A, Sec. 1 room changed to 2304 Tolman.
223A, Sec. 5 room changed to 127 Dw.
226, not to be given I.
228A, room changed to 343 LeConte.
250A, Sec. 3 room changed to 82 Dw.
270, to be given I by Mr. Wehausen MWF 9 in 121 T.3.  
Examination group is 1.

MILITARY SCIENCE

141B, to be given I by Mr. Houlson MTuWF 2 in 157 Harmon.
MUSIC

127B, to be given I.

NEAR EASTERN LANGUAGES

139A–139B (changed to 168A–168B).
150A–150B (Formerly numbered 150.) Ancient Israel. (3–3) Yr.
152, withdrawn.
202A–202B (new course) Egyptian Texts. (3–3) Yr. Mr. Baer
Prerequisite: concurrent or previous enrollment in course 201A–201B or consent of instructor.
Philological analysis of texts of a single genre and period. May be repeated for additional credit.

ORIENTAL LANGUAGES

1J, Sec. 3 (new section) to be given by Mr. Motofuji MTuWThF 3 in 183 Dw.
Examination group is 24.
113, not to be given 1964–1965.
132, to be given by Mr. Motofuji MWF 2 in 150 Barrows. Examination group is 5.
149A, to be given by Mr. Nakamura TuTh 9 in 2525 Tolman. Examination group is 21.

PHILOSOPHY

108, to be given I.
115, to be given I.
145, to be given I.
290, Sec. 5 not to be given I.
290, Sec. 7 room changed to 156 Barrows.

PHYSICAL EDUCATION

199, Sec. 5 canceled.
290, Sec. 5 canceled.

PHYSICS

2A, Discussion Sec. 19 room changed to 525 Earth Sci.
2B, room changed to PSL.
4B, Sec. 2 room changed to 1 LeConte.
10, Sec. 3 (new section) to be given MWF 3 in PSL. Examination group is 24.
105A, Sec. 5 (new section) to be given by Mr. Caldwell TuTh 2–3:30 in 3 LeConte. Examination group is 15.
110C, Sec. 3 time changed to M 1–5.
110D, Sec. 3 times changed to M 1–5.
137A, Sec. 1 room changed to 1 LeConte.
245A–245B (change in existing course) Elementary Particles and Resonances.
(3–3) Yr. Mr. Rosenfeld, Mr. Crawford, Mr. Zemach
(Formerly numbered 245.)
Prerequisite: course 221A and 221B (221B may be taken concurrently with 245A).
For students working on experimental physics of elementary particles and resonances. Classification of their properties according to mass, spin, parity, isotopic spin, unitary spin. Theories and phenomenology of strong and weak interactions. Systematization of experimental data on particle production and decay.

250 (new course) Special Topics in Contemporary Physics. (3) I and II.
Prerequisite: advanced graduate standing.
This course will be concerned with matters at the frontier of contemporary theory and understanding in selected fields of physics. It is intended to serve the needs of advanced research students.

(not to be given 1964–1965.)

POLITICAL SCIENCE

102, room changed to 104 Cal.
142A, to be given I.
162, room changed to 2503 LSB.
230, time changed to Th 2–4.

PSYCHOLOGY

104, not to be given I.
113, to be given I.
134, not to be given 1964–1965.
160, not to be given 1964–1965.
161, not to be given 1964–1965.
170 (new course) Programmed Instruction and Learning. (3) I. Mr. Covington
Prerequisite: course 1A.
Study of psychological principles of programmed instruction and learning, and review of the research literature. Survey of available programs in education and industry, and of teaching machines and computer-based devices. Role of these methods in a science of instruction. Application to training of cognitive skills in thinking and problem-solving, and to the changing of attitudes.

280 (new course) Directed Study. (1–9) I and II.
The Staff
Prerequisite: consent of instructor.
Open to qualified graduate students who wish to pursue special studies under the direction of a member of the staff.

PUBLIC HEALTH

290E, to be given F 10–12 in 116 Haviland.

SCANDINAVIAN

Departmental Office changed to 1305 Dw.

SLAVIC LANGUAGES AND LITERATURES

3, change to, Three lectures and two recitation hours per week.
104A–104B (change in existing course) Advanced Russian Composition.
(3–3) Yr.
(Formerly numbered 104, 124.)
155, to be given I.
198, room changed to 211 Dw.
230 (change in existing course) Russian Prose. (2) I.
(Formerly numbered 285.) Mr. Setchkarev, Mrs. Maslenikov
Lecture course given in Russian.

299 (new course) Directed Research. (1-6) I and II. The Staff
Normally reserved for students directly engaged upon the doctoral dissertation.

Hungarian

186 (new course) Hungarian Poetry of the Nineteenth and Twentieth Centuries (2) I.
Prerequisite: course conducted in Hungarian.

SOCIAL SCIENCE

1A, Discussion Sec. 34 room changed to 2326 Tolman.

SOCIAL WELFARE

258, Sec. 6 canceled.
296A–296B (change in description) Limited to advanced students majoring in Public Health Social Work, and to graduate social workers enrolled in the Master of Public Health degree program in the School of Public Health.
299, Sec. 3 room changed to 14 Haviland.

SOCIOLOGY

30 (add prerequisite) not open to students who have taken an upper division course in Sociology or Psychology.
100, not to be given 1964–1965.
109, to be given by Mr. MacRae MWF 10 in 166 Barrows. Examination group is 4.
120, to be given I.
130, to be given I and II by Mr. König, Miss Archibald.
160, not to be given I.
205 (new course) Field Research and Data Collection. (3) II. Mr. Clausen
A critical analysis of techniques for the collection of data relating to individual and group behavior and to social organizations with attention to problems of perspective, reliability and validity.
253, not to be given

SOILS AND PLANT NUTRITION

212, not to be given 1964–1965.

SPANISH AND PORTUGUESE

Spanish

199 (change in description) Restricted to senior honor students with an adequate preparation for the subject proposed for special study, by previous arrangement with members of the departmental staff.

Portuguese

199 (change in description) Restricted to senior honor students with an adequate preparation for the subject proposed for special study, by previous arrangement with members of the departmental staff.
299 (change in description) Restricted to candidates for higher degrees with an adequate preparation for the subject proposed for special study, by previous arrangement with members of the departmental staff.

**SPEECH**

Departmental Office changed to 2125 Dw.

2A, Sec. 1 to be given by Mr. Wilson MWF 9 in 215 Dw. Examination group is 1.

2A, Sec. 3 to be given by Mr. Anderson MWF 11 in 215 Dw. Examination group is 7.

40, Sec. 5 (new section) to be given by Mrs. Bright TuTh 8-9:30 in 24 W. Examination group is 23.

Sec. 6 (new section) to be given by Mr. Grier MWF 4 in 87 Dw. Examination group is 17.

135, to be given I by Mr. Willy MWF 11 in 262 Dw. Examination group is 7.

141A, not to be given I.

107, to be given II.

107C, to be given II.

114, to be given I.

114C, not to be given 1964–1965.

126, not to be given 1964–1965.

**ZOOLOGY**

107, to be given II.

107C, to be given II.

114, to be given I.

114C, not to be given 1964–1965.

126, not to be given 1964–1965.
Supplementary Announcements

to the Schedule and Directory and the General Catalogue

Spring, 1965
Supplementary Announcements

to the Schedule and Directory and the
General Catalogue

January, 1965

All classes assigned to 331 LeConte to be given in 375 Birge.
All classes assigned to 333 LeConte to be given in 225 Birge.
All classes assigned to 335 LeConte to be given in 167 Birge.
All classes assigned to 337 LeConte to be given in 161 Birge.

ANTHROPOLOGY

2B, Quiz Sec. 16 to be given Th 3 in 115 Krober.
118, Sec. 2 room changed to 204 Eng.
129 (new course) Marriage and the Family in Non-western Societies. (3) II.
   Mr. Perlman
   Comparative analysis of types of conjugal unions and households in non-Western societies and how these change.
247, not to be given II.
297 (new course) Individual Study. (1-6) I and II.
   The Staff
   In consultation with graduate adviser, intended to provide opportunity for qualified students to prepare themselves for the various examinations required for the Ph.D.
298 (new course) Special Study. (1-3) I and II.
   The Staff
   Prerequisite: advanced graduate status; consult graduate adviser for details.

ART

159 (change in prerequisite and description) Prerequisite: subject to general Group C prerequisite; upper division standing and consent of instructor.
   The art of Rome and of the Roman Empire, from its sources in the Republican era to the end of the Empire in the West.
264 (new course) Seminar in the History of Ancient Art of Western and Central Asia. (3) II.
   Miss Azarpay
   May be repeated for credit.
272 (new course) Seminar in the History of Early Mediaeval Art. (3) II.
   Mr. Wright
   May be repeated for credit.
283, should read 283B.

ASTRONOMY

1, Quiz Sec. 10 room changed to 375 Birge.
1, Quiz Sec. 12 room changed to 347 LeConte.

BUSINESS ADMINISTRATION

1B, Sec. 6 room changed to 160 Barrows.
118, Sec. 3 room changed to 102 MBV Lab.
120G, Sec. 2 to be given MTuWThF.
121B, Sec. 1 room changed to 175 Barrows.
131, Sec. 2 to be given by Mr. Lynn. Time and room changed to TuTh 8–9:30 in 103 Cal. Examination group is 23.
131, Sec. 4 to be given by Mr. Lynn. Time and room changed to TuTh 9:40–11 in 136 Barrows. Examination group is 8.
141, to be given by Mr. Vergin MWF 10 in 20 Barrows. Examination group is 4.
165, room changed to 174 Barrows.
259, room changed to 122 Barrows.

**CHEMICAL ENGINEERING**

254 (change in existing course) Computational Methods in Chemical Engineering. (2) II.

(Formerly numbered 290E).
Prerequisite: course 243. Open to senior honor students with consent of instructor.
Introduction to modern computational methods available to chemical engineers for treatment of problems not amenable to analytical solutions. Application of numerical techniques to chemical engineering calculations with emphasis on computer implementation.

244, not to be given II.
252, to be given II.
260, Sec. 4 room changed to 105 MBV Lab.
290A, to be given II.
290F, time changed to Tu 7–9 p.m.

**CITY AND REGIONAL PLANNING**

100, to be given MWF 8 in 102 Wurster.
206 (change in existing course) City Planning Legislation and Governmental Organization. (2) II.

(Formerly numbered 252.)
Prerequisite: course 201 or consent of instructor.
Duties and role of the physical planning agency in municipal and metropolitan governments; major alternative definitions of city planning; relationship of long-range physical plan to urban development agencies; significance of city planning legislation in reorganization of local government.

208, to be given MW 2–5 and F 1–4 in 314 Wurster.
209 (new course) Introduction to Housing, Renewal and Development (3) II.

Mr. Wheaton
Structure of the housing industry, finance, public policies, technology. Planning for neighborhoods, new development, urban renewal. Roles of the market, public action, design and building processes. Social consequences of alternative policies.

209, to be given Tu 10–12 in 214B Wurster.
211 (new course) Location Theory and Spatial Interaction Models. (3) II.

Mr. Teitz
Prerequisite: Economics 100B or equivalent; one semester of college calculus.
Density and interactional approaches to analysis of spatial distribution. Ecological descriptive theories and economic behavioral theories of location and of spatial structure. Introduction to static and growth models of residential and industrial location. Governmental influences on spatial distribution of urban activities.
212 (new course) Introduction to Economics of Public Enterprise. (3) II.
Prerequisite: Economics 100B or equivalent, or consent of the instructor.
Roles of governmental agencies as producers of urban services in nonmarket setting. Measurement of benefits and costs, and their incidences. Criteria and procedures for investment decisions concerning types and qualities of services and facilities.
212, to be given M 2-4 in 214B Wurster.
232, to be given W 3-5 in 214B Wurster.

CLASSICS

10B, Quiz Sec. 2 time and room changed to Tu 12 in 188 Dw.
10B, Quiz Sec. 3 time and room changed to Th 12 in 188 Dw.

COMPARATIVE LITERATURE

190UL (new course) Comparison of Authors: Unlisted Literatures. (3) I and II
Prerequisite: course 100 or the equivalent, and at least 12 units in upper-division literature courses including at least 3 units in a relevant foreign language.
Comparison of 2 or 3 important authors including at least one belonging to a literature unlisted in the other 190 courses. The works belonging to the literature unlisted in the other 190 courses must be read in the original languages. Substantial comparative paper required.
204B, room changed to 134 Dw.
205, withdrawn.
297 (new course) Individual Study. (1-6) I and II.
Prerequisite: Completion of at least 24 units in upper-division and graduate courses beyond the B.A., including all the courses required for the M.A. in Comparative Literature at Berkeley or their equivalent elsewhere.
Individual study, in consultation with the graduate adviser, intended to provide opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. in Comparative Literature.

ECONOMICS

100B, Sec. 3 to be given in 180 Barrows.
188, to be given MWF 3 in 136 Barrows. Examination group is 24.

ECONOMIC HISTORY

113, time and room changed to TuTh 11-12:30 in 205 Eng. Examination group is 10.

EDUCATION

206B, to be given by Mr. Bowers Tu 4-6 in 2304 Tolman.
218B, to be given by Mr. Ruddell M 4-6 in 2304 Tolman.
288E (change in existing course) Approved for one offering only, 1965-1966.
320A, 320B, 320C, 320E, 323, Sec. 3 room to be arranged.
320A, 320B, 320C, 323, Sec. 74 time and room changed to M 5 in 2332 Tolman.
320E, Sec. 74 time and room changed to M 3-5 in 2332 Tolman.

ELECTRICAL ENGINEERING

101A, time and room changed to MWF 8 in 247 Cory. Examination group is 13.
$290T$ (new course) Symbol Manipulation and Artificial Intelligence. (2) II.
Prerequisite: course 290S, or permission of instructor. Mr. Raphael
(Approved for one offering only, Spring 1965).

INDUSTRIAL ENGINEERING

130, withdrawn.
132, withdrawn.
133, withdrawn.
296, Sec. 5 to be given by Mr. Proschlan MWF 3 in 3106 Etcheverry.

MECHANICAL ENGINEERING

141 (new course) Principles of Material Removing and Forming. (3) I.
Mr. Thomsen
Prerequisite: course 101 (formerly Industrial Engineering 101).
Application of the theory of plasticity to material removing and forming processes, with emphasis on prediction of forces and power. Analysis of newer processes such as ultrasonic machining, electrolytic machining, high rate forming and others.

143 (new course). Designing for Weldments and Castings. (3) II. Mr. Hazlett
Prerequisite: Engineering 45.
An analytical survey of the basic factors that must be considered from a materials and fabrication standpoint when utilizing weldments or castings. Selection of materials and fabrication processes are stressed from the viewpoint of fabrication problems, service properties and reliability.

174 (new course). Acoustical Environment Control. (3) II. Mr. Soroka
Prerequisite: senior standing in engineering, environmental design or physical sciences.

298, Sec. 1 to be given TuTh 9:30–11 in 142 Hesse.

APPLIED MECHANICS

284B, time and room changed to MWF 10 in 2109 Etcheverry.

ENGLISH

1A, Sec. 1 room changed to 103 Cal.
1B, Sec. 6 room changed to 121 W.
125E, not to be given.
142A, Sec. 1 to be given in 29 Dw.
142B, Sec. 1 room changed to 24 W.
151S, Sec. 1 room changed to 169 Earth Sci.
151TE, to be given in 87 Dw.
151W, to be given in 2305 Tolman.
H199, should read 199.
213, Sec. 2 to be given in 121 Latimer.

FORESTRY

108, room changed to 230 Mulford.
FRENCH

4 (change in prerequisite) course 3 or equivalent.
106A–106B (new course) Introduction to French Linguistics. (2–2) Yr.
   Prerequisite: upper division standing.
   Mr. Sandmann
   First Semester: sounds (course on spelling to introduce historical grammar);
      words (elementary semantics and linguistic geography).
   Second Semester: constructions (personal and impersonal, verbal and
      nominal, coordinating and subordinating, etc.).
106A, to be given MW 3–4 in 187 Dwinelle. Examination group is 24.
202B, room changed to 233 Dw.
      (2) II.
      Mr. Duisit
      To study, through careful analysis of texts chosen from Memoirs and letters,
      the various literary techniques used in the seventeenth and eighteenth centuries
      and to evaluate their relative effectiveness from an aesthetic point of view.
      To be given W 2–4 in 104 Barrows.
206B, time changed to Th 7:30–9:30 p.m.

GENETICS

10. Quiz Sec. 10 to be arranged.
103 (change in existing course) Organic Evolution. (3) II.
      (Formerly numbered 103A–103B).
      Prerequisite: course 100.
103, to be given by Mr. Stebbins, time and room changed to Tu 1–3 in 141
      Earth Sci.
107, time changed to MF 2.
107, Laboratory time changed to MF 3–5.

GEOGRAPHY

1. Sec. 4 room changed to 369 Earth Sci.
207 (new course) Individual Study. (1–5) I and II
      The Staff (Mr. Glacken in charge)
      Individual study, in consultation with the graduate adviser, to provide opportu-
      nity for qualified students to prepare themselves for the various examinations
      required of candidates for the Ph.D.

GEOLOGY

106B, to be given II.

GERMAN

1. Sec. 3 examination group is 14.
125, to be given II.
262, room changed to 82 Dw.

HISTORY

H4B, Sec. 5 (new section) to be given by Mr. Weinstein Tu 1–3 in 110 Dw.
   Examination group is 11.
17B, room changed to 343 LeConte.
H102, room changed to 29 Dw.
103B, Sec. 5 not to be given.
103D, Sec. 11 room changed to 346 Dw.
103E, Sec. 2 to be given M 3–5 in 203 W.
148B, to be given by Mr. Webster MWF 4 in 135 Dw. Examination group is 17.
161B, time and room changed to TuTh 8-9:30 in 110 W. Examination group is 23.
259, room changed to 362 Dw.

**History of Science**

178A–178B (change in description) 178A. Science and Technology to 1865. I.
178B. Science and Technology Since 1865. II.

**HUMANITIES**

101 (change in existing course) Art and Music. (3) I and II.
I: Mrs. Alpers; Mr. Heartz; II: Mr. Grate; Mr. Lewin.
(Formerly numbered 101A, 101B).
Prerequisite: restricted to seniors in the Humanities Field Major.
Analytical and critical methods in music and the visual arts exemplified
through careful study of selected masterpieces. Problems in the comparison
of the arts; the roles of form and content in different media.
101, room changed to 124 Morrison.

**ITALIAN**

1. Sec. 10 to be given in room 182 Dw.

**JOURNALISM**

131B, to be given in 155 Barrows.

**LIBRARIANSHIP**

246 (new course) Introduction to Information System Design.
(2) I and II. Mr. Bourne
Prerequisite: course 201, 202, 203.
The design and analysis of information systems; special coding and indexing
procedures, punched cards, and microfilm; application of data processing equip-
ment in libraries.

**LINGUISTICS**

220B, Sec. 3 time and room changed to TuTh 2-4 in 106 Mulford.
290f, to be given II at a time to be arranged.

**MATHEMATICS**

1B, Sec. 1 room changed to 2003 LSB.
1B, Quiz Sec. 204 room changed to 2301 Tolman.
3A, Quiz Sec. 5 to be given in 29 Dw.
3B, Quiz Sec. 7 room changed to 161 Birge.
6, Quiz Sec. 1 room changed to 343 LeConte.
10, Quiz Sec. 7 room changed to 189 Dw.
10 (change in existing course) Mathematics for Liberal Arts Students.
(3) I and II. Mr. Kripke
(Formerly numbered 5).
Prerequisite: not open to students who have had 1A, 3A, or 16A.
Conceptions of modern mathematics for students who have no technical
background. The content varies among the following topics: algebra, geometry,
set theory, logic, number theory, statistics, mathematical methods in science.
(3) I and II. Mr. Lund
Development and structure of the real number system and its sub systems.
Elementary concepts of set theory, numeration, factoring and divisibility, non-metric geometry, measurement. Course is intended for prospective elementary school credential candidates.

185, Sec. 1 room changed to 166 Barrows.
290, Sec. 1 room changed to 83 Dw.
  Sec. 6 time and room changed to Tu 3-5 in 290 HM.
  Sec. 7 time and room changed to TuTh 2-4 in 8 Dw.
  Sec. 9 to be given M 4-5:30 in 209 Eng.
  Sec. 10 to be given F 2-4 in 101 Campbell.
  Sec. 11 to be given W 2-4 in 358 Dw.
  Sec. 12 to be given MW 4 in 299 Cory.
  Sec. 13 to be given Tu 11-1 in 150 Barrows.
  Sec. 14 to be given MWF 1 in 186 Barrows.
  Sec. 15 to be given by Mr. Helson MW 3 in 299 Cory.
  Sec. 16 to be given W 2-4 in 206 Dw.
  Sec. 17 to be given Tu 2-4 in 101 Campbell.
  Sec. 18 to be given by Mr. Kato M 3-5 in 193 Cory
  Sec. 19 to be given by Mr. Protter W 3-5 in 293 Cory.

MUSIC
145, time and room changed to M 3-5 in 320 Hertz, W 7:30-9:30 p.m. in 125 Morrison.
202, room changed to 117 Morrison.

NEAR EASTERN LANGUAGES
171, not to be given II.

NUTRITIONAL SCIENCES
102, withdrawn.
104, withdrawn.
211 (new course) Research Methods in Nutritional Sciences. (3) II.
  Mr. Brown, Mr. Margen, Mr. Stockstad
  Prerequisite: graduate standing and consent of the instructor.
  Advanced experimental techniques in food science and nutrition; application of chromatography, radioisotopes and physical and chemical measurements to individual problems in nutritional science research. Students may select special problems of their interest.

OPTOMETRY
Physiological Optics
297 (new course) Individual Study. (1-6) I and II.
  Mr. Westheimer
  Prerequisite: graduate standing and approval of graduate adviser.
  Individual study in preparation for the qualifying examination for the Ph.D.
  Time and room to be arranged.

PHILOSOPHY
290, Sec. 3 time and room changed to Tu 4-6 in 235 Dw.

PHYSICAL EDUCATION
12, Sec. 73 (new section) Creative Dance for Children. To be given by Mrs. Bioland TuTh 4 in 251 Hearst Gym.
341, withdrawn.
344, time and room to be arranged.
345, withdrawn.

PHYSICS
All classes assigned to 331 LeConte to be given in 375 Birge.
All classes assigned to 333 LeConte to be given in 225 Birge.
All classes assigned to 335 LeConte to be given in 167 Birge.
All classes assigned to 337 LeConte to be given in 161 Birge.
2B, Discussion Sec. 7 Tu 1 room changed to 101 Campbell.
4A, Sec. 2* time changed to TuTh 9:30–11.
4A, Discussion Sec. 4 room changed to 101 Campbell.
4B, Discussion Sec. 4 room changed to 343 LeConte.
231 (change in existing course) General Theory of Relativity. (3) I and II.
Mr. Weinberg

An introduction to Einstein’s theory of gravitation, with applications to cosmology and astrophysics.

297 (new course) Individual Study. (1–6) I and II.
The Staff (Mr. Moyer in charge)

Prerequisite: completion of 24 units, or the equivalent, of graduate course study in the Physics Ph.D. program, and active involvement with a research area.

The purpose is to provide opportunity for individual study, in consultation with the research adviser, intended to prepare the student for the qualifying examination.

MEDICAL PHYSICS

290N, not to be given II.

POLITICAL SCIENCE

33B, Th 10–12 room changed to 322 L.
161B, Sec. 2 room changed to 30 W.
163, Sec. 2 not to be given.
194B, not to be given.
220A, not to be given.
221, to be given by Mr. Haas TuTh 2–3:30 in 88 Dw.
240B, room changed to 140 Barrows.
243G, time and room changed to W 2–4 in 102 Barrows.
261D, time and room changed to Tu 4–6 in 115 Barrows.
283, room changed to 233 Dw.

297 (new course) Individual Study. (1–6) I and II.
The Staff

Prerequisite: a master’s degree from another institution or completion of at least 24 semester hours beyond the A.B.

Individual study, in consultation with the graduate adviser, intended to provide opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D.

POULTRY HUSBANDRy

299 (change in existing course) Research in Poultry Husbandry (1–9) I and II.
(Formerly numbered 200A–200B) Mr. Lepkovsky, Mr. Lerner, Mr. Taylor

PSYCHOLOGY

112, time and room changed to TuTh 12:30–2 in 104 Cal. Examination group is 11.
170 (new course) Programmed Instruction and Learning. (3) II. Mr. Covington
Prerequisite: course 1A.
Study of psychological principles of programmed instruction and learning, and review of the research literature. Survey of available programs in education and industry, and of teaching machines and computer-based devices. Role of these methods in a science of instruction. Application to training of cognitive skills in thinking and problem-solving, and to the changing of attitudes.

208A–208B (new course) Neuropsychological Research. (3) I and II.
Prerequisites: course 204A–204B.
Mr. Leiman
Basic experimental methods in investigation of neural correlates of behavior.

PUBLIC HEALTH
201, to be given by Mr. Rogers F 9–12 in 2521 Tolman.
298, Sec. 2 (new section) to be given by Mr. Dooley Th 10–12 in 2501 Tolman.
   Sec. 3 (new section) to be given by Mr. Thiele, Miss Fraser, Miss A. Harris
   Tu 10–12 in 324 Warren.
   Sec. 4 (new section) to be given at a time to be arranged.

SCANDINAVIAN
151B, room changed to 160 Barrows.

SLAVIC LANGUAGES AND LITERATURES
3, Quiz Sec. 2 room changed to 262 Dw.
220, room changed to 287 Dw.

SOCIAL WELFARE
299, Sec. 5 room changed to 4 Haviland.
299, Sec. 8 room changed to 2400 Bancroft.

SOIL SCIENCE
102, room changed to 107 Mulford.

SOCIOLOGY
30, Discussion Sec. 25 room changed to 75 Callaghan.
109, Quiz Sec. 3 room changed to 33 Dw.
§156 (new course) Comparative Community Development. (3) II.
Mr. Brokensha
Social organization and social change in selected rural societies, including research methods, organized community change and comparative studies of specific institutions.
   (Approved for one offering only, spring 1965.)
H195 time and room changed to MWF 3 in 190 Barrows,
210, to be given by Mr. Blauner Th 4–6 in 136 Barrows. Examination group is 22.
232, not to be given.

SPANISH AND PORTUGUESE
Spanish
233 (new course) Recent Trends in Latin America. (2) II.
Mr. Halperin

STATISTICS

SUBJECT A
Section 13, room changed to 160 Dw.
ZOOLEGY

1A, time and room changed to TuTh 10 in 4505 LSB. Examination group is 8.
108, time changed to TuTh 9 in 4093 LSB. Examination group is 21.
128 (change in existing course) to be offered as a two-unit course (deleting laboratory section) for the spring 1965 semester only.
131 (new course) Physiological Ecology of Vertebrates. (2) II. Mr. Licht
Prerequisite: course 1B.
Physiological relations of vertebrates to various factors of the environment.
145, should read MWF 10.
222, to be given by Mr. Leopold M 4–6 room to be arranged.
PUBLIC HEALTH

SCandinavian

SOCIAL WORK

SOCIAL SERVICE

SOCIOLOGY

SUCH AND BOUNTIFUL

SUBJECTS
Publications

GENERAL CATALOGUE, BERKELEY

Contains complete information about the academic program on the Berkeley campus—admission requirements, curricula, course descriptions, degrees conferred, regulations and requirements for degrees, financial aids for students, the academic calendar, extracurricular student activities—and gives general information about the campus community.

Address: The Registrar, University of California, Berkeley, California 94720.
(Price, 50¢, including 2¢ sales tax for California residents.)

UNDERGRADUATE ADMISSIONS CIRCULAR

A complete statement of the University of California's requirements for admission as an undergraduate.

Address: Office of Admissions, 127 Sproul Hall, University of California, Berkeley, California 94720. (No charge.)

ANNOUNCEMENT OF THE GRADUATE DIVISION, BERKELEY
(INCLUDING MOUNT HAMILTON)

A description of the graduate program, including requirements for higher degrees, facilities for research, fees and expenses, and information on procedures for applying for fellowships, graduate scholarships, and assistantships available. Course descriptions not included.

Address: Dean of the Graduate Division, 250 Sproul Hall, University of California, Berkeley, California 94720. (No charge.)

COLLEGE AND SCHOOL ANNOUNCEMENTS*

Information about requirements and regulations in the respective colleges and professional schools, with lists of courses. Issued by:

Colleges of:
- AGRICULTURE
- CHEMISTRY
- ENGINEERING
- ENVIRONMENTAL DESIGN
- LETTERS AND SCIENCE

Schools of:
- BUSINESS ADMINISTRATION
- GRADUATE SCHOOL OF BUSINESS ADMINISTRATION
- CRIMINOLOGY
- EDUCATION
- FORESTRY
- LAW
- LIBRARIANSHIP
- OPTOMETRY
- PUBLIC HEALTH
- SOCIAL WELFARE

Address: The Dean of the School or College. (No charge.)

SCHEDULE AND DIRECTORY

Lists time and place of meeting for specific classes, names of instructors, and units of credit awarded. Also contains a directory of offices and officers of instruction for the various departments.

Address: The Registrar, University of California, Berkeley, California 94720.
(Price: 15¢; 30¢ by mail.)

SUMMER SESSIONS BULLETIN

Complete information about the summer program of instruction.

Address: Office of the Summer Sessions, 1 Sproul Hall, University of California, Berkeley, California 94720.

* Descriptive material about instruction in medicine and nursing may be obtained from the schools at Los Angeles and San Francisco; for dentistry, pharmacy, and physical therapy, from San Francisco; and for veterinary medicine, from Davis. (No charge.)
Each of us is born into the world unclothed in mind, unshaped in character, bare of understanding and appreciation, innocent of history. Only as learning clothes us, shapes us, furnishes us with knowledge, and orients us to past and future, are we lifted from animal existence to become participants in the life of reason. This transformation ever recurring sustains a civilization and can be continuously creative in thrusting it toward new heights of accomplishment and worth.

E. W. Strong
Chancellor