COURSES AND CURRICULA

Colleges and Schools are presented alphabetically as indicated in the Table of Contents. Following the Colleges and Schools is a list of Special Programs. Departments are treated as subdivisions within the Colleges, Schools, and Special Programs. If you are unable to locate the department of your choice, consult the Index. Prerequisites for courses should be noted carefully, although they are sometimes waived at the discretion of the instructor.

Courses with double numbers (for example, English 1A–1B) are two-quarter sequences beginning in the quarters indicated. Courses with triple numbers (for example, Mathematics 1A–1B–1C) are three-quarter sequences normally beginning in the fall quarter. Except as noted, each course in a sequence is normally prerequisite to one following, and a student may normally receive credit for completion of the first 1/3, 2/3, or 1/2 of a sequence. Course numbers preceded by the letter H are special honors courses, subject to such general restrictions as may be imposed by the department.

The number in parentheses following the course title indicates the credit value; the abbreviation in parentheses indicates the quarter in which the course is offered: (F) fall, (W) winter, (Sp) spring.

Course numbers are assigned as follows:

1–99
Lower division courses, including courses designated by a letter. Open to freshmen and sophomores; not acceptable for upper division credit.

100–196
Upper division courses. Ordinarily open to students who have completed at least one lower division course in the given subject, or two years of college work.

197
Field study (upper division). Effective fall 1973, the student is limited to ten units of credit for courses numbered 197, with a maximum of five units in any one quarter. This is not retroactive for any student who had accumulated more than ten quarter units of credit for 197 by the end of the spring quarter 1973, but such a student may not enroll in subsequent quarters for additional credit.

198
Directed group study (upper division). A student should not expect to use more than a total of ten units of 198 credit for a bachelor’s degree without the permission of his dean.

199
Supervised independent study and research courses for undergraduates (upper division), which may be graded only Passed or Not Passed. Students must be in good standing (2.00 grade-point average or better). They must obtain the prior consent of the instructor who is to supervise the study, the major adviser, and the chairperson of the department in which the study is to be conducted (or the equivalent). This approval must be based upon a written proposal submitted to the chairperson. The instructor shall indicate consent in writing—for example, by initialling the student’s study list adjacent to the 199 entry. The applicants shall show that their background is adequate for the proposed study, and must have completed at least 90 units of undergraduate work. The total units in any one quarter in 199 courses may not exceed 5. On the advice of the instructor or instructors concerned, the dean of a student’s college or school may recommend exceptions to the limitations listed.

200–299
Graduate courses. Adequate preparation, subject to instructor’s approval, is normally 18 upper division units of work basic to the subject matter of the course.

300–399
Professional courses for teachers or prospective teachers.

400–499
Professional courses which, like teaching courses, are acceptable toward academic degrees only within the limitations prescribed by the various colleges or schools or the Graduate Division.

601
Special study for graduate students in preparing for the master’s examination.

602
Special study for graduate students in preparing for the Ph.D. qualifying examination.

Note: The University offers a number of experimental courses. Information on these courses is contained in this Catalog under the Collegiate Seminar Program and the Personalized System of Instruction, both presented under Special Programs; some of the Interdepartmental Studies courses, also under Special Programs; and all courses numbered 91, 191, and 291 in various departmental course listings throughout this Catalog.
The School of Business Administration Office, 350 Barrows Hall

Professors: David A. Alhadef, Ph.D. Richard A. Arlt, Econ Dr. Frederick E. Bader, Jr., Ph.D. David A. Alhadef, Ph.D. Charles A. Bucklin, Ph.D. Michael A. Carman, Ph.D. John L. Carter, Ph.D. Robert C. Chalmers, Ph.D. Carl West Churchman, Ph.D. John G. Myers, Ph.D. Mark B. Garman, Ph.D. Austin C. Hoggatt, Ph.D. Alan R. Cerl, Ph.D., C.P.A. C. West Churchman, Ph.D. Documentaries: *The Price System and Business Enterprise*, 1961—Business Fluctuations and Forecasting, 1961—Social and Political Environment of Business, 1920—Managerial Accounting. And, at least three of the following courses: 110—Legal Environment of Business, 130—Financial Management, 150—Organizational Behavior, 160—Marketing, 190—Introduction to Organization and Decision. Beyond these requirements, additional courses within a subject matter field must be taken. Advisers will assist students in the selection of these courses. The following subject matter fields are available: Accounting, Applied Economics, Finance, Management Science, Marketing, Organizational Behavior and Industrial Relations, Production Management, Real Estate and Urban Land Economics, Transportation. The Graduate School of Business Administration requires that you maintain a B average in all courses taken since Bachelor’s degree and must satisfy a comprehensive examination requirement. All “G” courses are open only to graduate students in the Graduate School of Business Administration. The Ph.D. program is open to students from any undergraduate or graduate major. A background in quantitative tools is desirable. For residency and other requirements please consult the Announcement of the Graduate School of Business Administration as well as the Annoucement of the Division of Social Science. LOWER DIVISION COURSE 1. Introduction to Accounting. (5) Two 1/2-hour lectures and 3 hours of discussion per week. Prerequisite: sophomore standing. Required for admission to the School of Business Administration. The identification, measurement, and reporting of the financial effects of economic events on enterprises; the concepts and procedures of accounting. The Ph.D. degree is offered to students from any undergraduate or graduate major. A background in quantitative tools is desirable. For residency and other requirements please consult the Announcement of the Graduate School of Business Administration. The Ph.D. program is open to students from any undergraduate or graduate major. A background in quantitative tools is desirable. For residency and other requirements please consult the Announcement of the Graduate School of Business Administration as well as the Annoucement of the Division of Social Science. LOWER DIVISION COURSE 1. Introduction to Accounting. (5) Two 1/2-hour lectures and 3 hours of discussion per week. Prerequisite: sophomore standing. Required for admission to the School of Business Administration. The identification, measurement, and reporting of the financial effects of economic events on enterprises; the concepts and procedures of accounting. The Ph.D. degree is offered to students from any undergraduate or graduate major. A background in quantitative tools is desirable. For residency and other requirements please consult the Announcement of the Graduate School of Business Administration as well as the Annoucement of the Division of Social Science.
and 101. Advanced analysis of the theory and practice of decision making in business firms, utilizing the concepts and techniques of managerial economics. The School of Business Administration. Students will not receive credit for course 125 and course 1. Introduction to accounting and understanding the role of the controller, and controlling the operations of all types.

102. Theory and Models of Economic Forecasting. (5) Three 1 1/2-hour lectures per week. Prerequisite: course 101 and 102 or the equivalent. Theory and analysis of the long-run and short-run forecasts of economic variables. Mrs. Sterne (W, Sp)

103. Legal Environment of Business. (5) Three 1 1/2-hour lectures per week. An analysis of the law and the legal process, emphasizing the nature and functions of law, the legal system, and the role of law in the business world. The law of contracts and related topics in business law on an economic enterprise. Mr. Katz, Mr. Conant, Mr. Smith, Mrs. Redwine (F, W, Sp)

110. Social and Political Environment of Business. (5) Four and one-half hours of lecture per week. Prerequisite: senior standing. Study and analysis of American business in a changing social and political environment. Interaction between business and other social institutions. Role of business in the development of social values, goals, and national priorities. The expanding role of the corporation in dealing with social problems and issues. Mr. Epstein, Mr. Vogel, Mr. Kennedy, Mr. Brown (F, W, Sp)

114. Legal Aspects of Business Transactions. (5) Three 1 1/2-hour lectures per week. An introduction to the legal aspects of business transactions. Mr. Aharoni, (F, W, Sp)

120. Managerial Accounting. (5) Two 1 1/2-hour lectures and two hours of discussion per week. Prerequisite: course 110. A review of the legal implications of certain common business transactions and situations, including problems arising in sales, installment buying, inventory, financial statements, credit, negotiable instruments, and insolvency, with emphasis on the Uniform Commercial Code. Mr. M. Smith (W)

125. Administrative Accounting. (4) Three 1/2-hour lectures and two hours of discussion per week. Prerequisite: courses 1 and 120. Course 125 recommended. Determination of individual and corporate transactional liability; influence of federal taxation on economic activity; tax considerations in business and investment decisions. Mr. Cerf, Mr. M. Smith (F, W, Sp)

129. Field Study in Accounting. (5) Hours to be arranged. Prerequisite: course 107G recommended. The student as client. A planned program of exposure to actual accounting practice designed to broaden students' perspective of the field and theory of accounting. Assignment to specific corporations, CPA firms, or government agencies for orientation and work experience. Research reports based on work done. Mr. Starr (Sp)

130. Financial Management. (5) Four and one-half hours of lecture per week. Prerequisite: courses 104 and 120. Analysis and management of the flow of funds through and within the enterprise, including source and application of funds, term loans, and sources of long-term capital. Capital budgeting, cost of capital, and financial structure. Introduction to capital markets. Mr. Goshay, Mr. Swan, Mr. Geske (F, W, Sp)

132. Money and Capital Markets. (5) Four and one-half hours of lecture per week. Prerequisite: courses 107G and 108G or equivalent. The nature and behavior of money and capital markets. Mr. Hoag, Mr. Solnik (F, W, Sp)

137. Economics of Insurance. (5) Three 1 1/2-hour lectures per week. An introduction to the underlying principles of insurance, followed by a descriptive and analytical study of the practices in the more important branches of the insurance business. Mr. Goshay (F)

138. Contemporary Problems of Insurance. (5) Three 1 1/2-hour lectures per week. Prerequisite: course 137. Selected topics of current interest in insurance; specialized topics in life insurance, corporate finance, medical insurance, and risk management in insurance. Mr. Koenigsberg (W)

140. Introduction to Production Management. (5) Three hours of lecture and one-half hours of discussion per week. Management problems related to the selection and evaluation of products, processes, equipment, and jobs. Elementary models for scheduling, maintenance, and inventory control. Techniques to enhance problem-solving motivation, incentives, and control. Mr. Rogers (F)

142. Production Control Systems. (5) Four hours of lecture per week. Prerequisite: course 140 or equivalent. Development and operation of systems for production control, with special emphasis upon computer applications in the solution of uncertain demand conditions; special problems of scheduling operations in job shops; planning activities in uncertain seasonal and stochastic demand fluctuations; use of CPM, PERT, and simulations.

144. Management Science Workshop. (5) Four and one-half hours of lecture per week. Prerequisite: content of instructor. The use and development of computer information systems. Mr. Shogan (W)

145A—145B. Survey of Operations Research. (5) Four and one-half hours of lecture per week. Prerequisite: basic concepts of calculus, matrix algebra, and statistics. The techniques and models of operations research are presented with an emphasis on applications to management problems. Topics covered include linear programming, network analysis including PERT/CPM, dynamic programming, queueing theory, and inventory theory.

146A. Applications of Linear Models to Management Decision Making. (5) Four and one-half hours of lecture per week. Prerequisite: Mathematics 1A—1B and Statistics 20 or courses 106G and 107G or equivalent. It is possible to use the concepts and models of linear regression, correlation, and analysis of variance on the following topics: The use of linear regression in forming forecasts and evaluating the possible effects of various independent variables on a particular criterion variable. It is possible to include an analysis of the issues arising from the use of the computer to perform these calculations. Mr. Koenigsberg (F)

146B. Problems in Decision Under Uncertainty. (5) Four and one-half hours of lecture per week. Prerequisite: Mathematics 1A—1B and Statistics 20 or courses 106G and 107G or equivalent. It is possible to study decision making under uncertainty. It is possible to include an analysis of the issues arising from the use of the computer to perform these calculations. Mr. Shogan (F)

147. Computers and Modern Organizations: Theory and Application. (5) Four and one-half hours of lecture per week. Prerequisite: consent of instructor. The use and development of computer systems in organizations. This course will concentrate on the formulation and analysis of such linear models. Mr. Brown, Mr. Ritchie, Mrs. Roberts, Mr. Freeman, Mr. Strauss (F, W, Sp)

150. Organizational Behavior. (5) Four and one-half hours per week. A general descriptive and analytical study of organizations from the behavioral science point of view. Problems of motivation, role, social structure, groups, communications, hierarchy and control in complex organizations. The interaction of group technology, environment, and human behavior. Discussion of alternative theoretical models.

151. Management of Human Resources. (5) Four and one-half hours of lecture per week. Prerequisite: course 150 or permission of the instructor. The design of systems of rewards, assessment, and manpower development. The interaction of selection, placement, training, personnel evaluation, and career ladders with other variables. An analysis of organizations. Mr. Brown, Mr. Rogers (F, W, Sp)

154. Industrial Relations. (5) Four and one-half hours of lecture per week. Prerequisite: students will not receive credit for both Economics 151 and course 154. An analysis of management, professional employee relationships. Background and functioning of employee and employer organizations. Wage, manpower, labor relations, collective bargaining. Public policy questions. Mr. Strauss, Mr. Kennedy (F, W, Sp)

155. Labor and the Law. (5) Four and one-half hours of lecture per week. Analysis of the law governing labor and labor relations. Includes programs to deal with racial, ethnic, sex, and age discrimination as well as the law of union-management relations.
160. Marketing. (5) Four and one-half hours of lecture per week. Prerequisite: course 160 or equivalent. The evolution of markets and marketing; market structure, organization and management, marketing strategies in product development, pricing and promotion policy; marketing cost and efficiency; public and private regulation. Mr. Carman, Mr. Bagozzi.

162. Retailing. (5) Three 1 1/2-hour lectures per week. Prerequisite: course 160. History and development of retail management types; geographic structure of retail trade; assortment of goods and services; store management; government regulations. Mr. Revzan (W).

163. Advertising. (5) Three 1 1/2-hour lectures per week. Prerequisite: course 160. Basic concepts and functions of advertising in the economy; consumer motivation; problems in utilizing advertising and measuring its effectiveness. (F, Sp).

164. Industrial Procurement. (5) Four and one-half hours of lecture per week. Prerequisite: course 160. The interaction of buyer and seller in a non-ultimate consumer environment. The problems met in purchasing by industrial organizations and the major buying policies; vendor selection; quantity and quality determination; and relation of buying price, production cost, quality, and delivery. Mr. Ahadian.

165. Marketing Management. (5) Three 1 1/2-hour lectures per week. Prerequisite: course 160. Analysis of marketing functions primarily in manufacturing firms including product selection, pricing and sales administration; development of marketing organization within the firm. Mr. Aaker.

166. Wholesaling. (5) Three 1 1/2-hour lectures per week. Prerequisite: course 160. The meaning and importance of wholesaling; its place in the marketing structure; functions of wholesaling; the agency structure; buying and selling operations; government regulations; trials and costs, profits, and efficiency.

168. Physical Distribution and Transportation Management. (4) Three hours of lecture per week. Problems in transportation of persons and physical distribution of goods. Provision of transportation facilities; transportation and related services by professional and private carriers. Analysis of governmental subsidies and regulations. Mr. Conant (W).

180. Introduction to Real Estate and Urban Land Economics. (5) Three hours of lecture per week. The nature of real property; market analysis; construction, cycles; mortgage lending; equity investment; real estate administration; metropolitan growth; urban land utilization; real property valuation; public policies. Mr. W. Smith, Mr. Schaaf (W, Sp).

181. Valuation of Real Property. (5) Three 1 1/2-hour lectures and three hours of discussion section per week. Prerequisite: course 180. Critical examination of appraisal concepts and methods; the role of value estimates in private land-use and real estate administration; metropolitan growth; urban land utilization; real property valuation; public policies. Mr. W. Smith, Mr. Schaaf (W, Sp).

183. The Financial Management of Real Estate Resources. (5) Four and one-half hours of lecture per week. Prerequisite: course 180. Valuation of real estate; equity financing; mortgage market structure; effects of debt on demand; equity investment; real estate policies in real estate finance and urban development. Mr. Schaaf (W).

185. Introduction to International Business. (5) Four and one-half hours of lecture per week. Prerequisite: course 180. Senior standing. A survey involving environmental, economic, political, social and cultural conditions on the world scene; effects of overseas investments on domestic and foreign economies; foreign market analysis and operation strategy of a firm. Mr. Burns (F, W).
Markets. (4) Three hours of lectures per week. Prerequisite: one industrial relations course or consent of instructor. Analysis of factors of the labor force, and its interaction and interdependence with the labor market behavior of occupational groups, business and clerical workers, managerial and professional workers. Problems of wage and income policies of the firm, union and the national economy. Mr. Garbarino (F).

256. Seminar in Collective Bargaining. (4) Three hours of lectures per week. Prerequisite: course 154 or consent of instructor. Studies of the bargaining process; the legal and factual basis of collective bargaining; the provisions of collective agreements; administrative interpretation; including contract negotiation and arbitration of grievances; processes of disputes settlement; influence of the larger environment on collective bargaining. Mr. Garbarino (W).

257. Human Behavior in Organizations. (4) Three hours of lectures per week. Prerequisite: course 150G or equivalent or consent of instructor. A study of the social and psychological factors affecting human behavior and performance in work places. Topics include motivation, job design, leadership, conflict, human information processing, social influence and organizational behavior. Mr. Pfleffer, Mrs. Roberts (F, W, Sp).

258. Technology, Organization, and Environment. (4) Lecture per week. Prerequisite: course 150G or equivalent or consent of instructor. A consideration of the various ways in which environmental factors impact upon the structure and management of organizations. Subjects include organizational growth, structure, control system, decentralization, and resistance to change and uncertainty. Mr. Freeman (W).

259. Special Topics in Organizational Behavior. (4) Three hours of lecture per week. Prerequisite: course 150G or equivalent or consent of instructor. Analysis of recent literature and developments related to such topics as organizational development; environmental determinants of organization; management of human resources and decision-making behavior; management of professionals, and management in temporary structures; cross-cultural studies of management and organizations. Mr. Ritchie (Sp).

260. Consumer Behavior. (4) Three hours of lecture per week. Prerequisite: course 150G or equivalent or consent of instructor. Analysis of consumer behavior and demand analysis. Emphasizes applications to the development of marketing strategy and planning and strategy to various decision areas within marketing. Mr. Nicosia (F).

261. Marketing Management and Strategy. (4) Three hours of lecture per week. Prerequisite: course 150G or equivalent. Focus is on the study of marketing cases of private or public firms and organizations and on the determination of marketing strategy and practices. Cases perspectives range over all parts of the marketing mix including sales management and personal selling, public relations and advertising, and integrated marketing policy in relation to organization culture and planning of the components of the total marketing program. Mr. Carman, Mr. Bagozzi (W, Sp).

262. Retailing Policies and Problems. (4) Three hours of lectures per week. Prerequisite: course 150G or equivalent. Case studies of executive determination of organizational structure and scope of policies; purchasing, advertising, personnel policies; advertising and sales promotion; personnel management; operating policies; accounting, financial policies; and general management problems. Study of the nature of competition at the retail level. Mr. Bucklin (W).

263. Advertising Management. (4) Three hours of lecture per week. Prerequisite: course 150G or equivalent. Course 260 is recommended. A specialized course in advertising focusing on management and development policies. Topics include objectives-setting, copy decisions, media decisions, budgeting, and examination of theories, models, and other research methods. Includes interdependence of these decision areas. Other topics include social/economic issues of advertising, regulations, and advertising by nonprofit organizations.

264. Industrial Marketing Behavior. (4) Three hours of lecture per week. Prerequisite: course 150G or equivalent. Course 260 is suggested. The environment of the industrial firm and its interdependence with the firm's marketing decisions. Models of organizational decision processes: examination of structural/behavioral characteristics of industrial procurement and selling processes. Applications of basic disciplines (economics/social psychology) and their research methods. Mr. Nicosia (F).

265. Marketing Organization. (4) Three hours of lecture per week. Course 150G or equivalent is recommended. Meanings and evolutionary aspects of marketing organization; marketing organization at the wholesale and retail levels; marketing channels and spatial aspects; general marketing strategy at each level and throughout the channel; specialization and integration within marketing organization; problems of "orderly" marketing.

266. Marketing Research. (4) Three hours of lecture and one and one-half hours of discussion per week. Prerequisite: Marketing course 202 is recommended. Nature and significance of marketing research; development of marketing research methods; examination of research marketing problems, including class research problems; presentation of research results; evaluation of the effectiveness of marketing research. Mr. Aker, Mr. Carman (F, W).

267. Seminar in Marketing. (4) Three hours of lecture per week. Prerequisite: open to students with permission of instructor. Course content changes from quarter to quarter and can be repeated for credit. Seminar treatment of marketing topics such as development of marketing thought; marketing organization and performance; marketing models; multivariate methods; marketing in nonprofit organizations; public and private regulation. Mr. Grether (F, W, Sp).

270. Transportation Management. (4) Three hours of lecture per week. Problems in the management of urban, interurban, and international transportation. Cost analysis and rate structure. Promotion and restriction by governmental agencies. Mr. Carter (W).

271. Economic Analysis in Transportation. (4) Three hours of lecture per week. Public spending on urban transportation, civilian air transport, highways, ports; cost analysis, pricing. Demand analysis. Mr. Morisson (F).

274. Seminar in Transportation. (4) Three hours of lecture per week. A topic of interest will be selected each quarter. Course may be repeated for credit. Mr. Schael (Sp).

280. Real Estate and Urban Land Economics. (4) Three hours of lecture per week. Prerequisite: consent of instructor. Intensive review of literature in the theory of land utilization, urban growth and real estate market behavior, property rights and valuation; residential and nonresidential markets; construction; debt and equity financing; public controls and policies. Mr. Schael (Sp).

282. Seminar in Urban Economic Resource Policy. (4) Three hours of lecture per week. Prerequisite: consent of instructor. The urban development of the national economy; the interaction of business institutions and public agencies in the performance of urban functions; environmental, economic, social and political impacts; economic aspects of public policies; urban housing needs. Mr. Rouleau (W).

284. Seminar in Real Estate Investment Analysis. (4) Three hours of lecture per week. Prerequisite: course 280 or consent of the instructor. Analysis of selected problems and special studies; cases in residential and non-residential development and financing; real estate taxation, mortgage market developments, equity investment, valuation, and financing. Mr. Ricks (F).

285. Applied International Economics. (4) Three hours of lecture per week. Prerequisite: courses 101G and 102G or equivalent. Analysis and review of international economics as applied to multinational business problems, including the study of international trade theory, the effect of tariffs and customs unions, economic development and foreign investment, and a comprehensive view of the changing international monetary system as a backdrop for multinational business decisions. Mr. Fish (F).

295. Business Research Methods. (4) Two 1 1/2 hours of lecture per week. Meaning of research and scientific methods. 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.

296. Special Topics in Business Administration. (1-6) Individually supervised study of subjects not available to the student in the regular schedule, approved by faculty advisor as appropriate for the student's program in business administration. The Staff (Mr. Bucklin in charge) (F, W, Sp).

299. Individual Research In Business Problems. (1-6) The Staff (Mr. Bucklin, Mr. Rogers in charge) (F, W, Sp).

NOTE: For key to symbols, see page 34.
40 / BUSINESS ADMINISTRATION

390. Professional Preparation for Teaching Assistants. (1-4) Special study under the direction of a staff member with emphasis on the teaching of undergraduate courses in business administration. Must be taken on a passed/not passed basis.

The Staff (Mr. Buckley in charge) (F)

601. Individual Study for Master's Students. (1-8) Individual study for the comprehensive requirements in consultation with the field adviser. Units may not be used to meet either unit or residency requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (Mr. Rogers in charge) (F, W, Sp)

602. Individual Study for Doctoral Students. (1-8) By appointment only. Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. degree. May not be used to satisfy unit or residency requirements for the doctoral degree.

Must be taken on a satisfactory/unsatisfactory basis.

The Staff (Mr. Buckley in charge) (F, W, Sp)

IDS 175. Introduction to the Ethics and Value Assumptions of Planning and Systems Design. (4) See interdepartmental Studies for the complete description of this course.

IDS 180. Economic and Biological Feedback Systems. (3) See interdepartmental Studies for the complete description of this course.


IDS 209A–209B–209C. Economics of Decision, Information, and Organization. (5-5-4) See interdepartmental Studies for the complete description of this course.

IE 100. Cultural Traditions of India. (1-4) See international Education for the complete description of this course.

IE 200. Cultural Traditions of India. (1-4) See International Education for the complete description of this course.

IE 400. Modernization in Contemporary India. (1-4) See International Education for the complete description of this course.

IE 497. Internship in India. (1-5) See International Education for the complete description of this course.

College of Chemistry Office, 420 Latimer Hall

The College of Chemistry comprises two departments, the Department of Chemistry and the Department of Chemical Engineering. The College offers programs leading to the B.S.M.S., and Ph.D. degrees in chemistry or chemical engineering. The College of Letters and Science offers a chemistry major leading to an A.B. degree through a curriculum with a greater proportion of courses in the humanities and social sciences than is included in the B.S. chemistry program.

Recommended high school preparation for Chemistry or Chemical Engineering should include: chemistry (1 year); physics (1 year); mathematics (4 years) including trigonometry, intermediate algebra, analytic geometry. Where the choice is available, the preferred foreign language is German.

For more specific description of the programs for the various degrees, as well as options of specialization, see the Announcement of the College of Chemistry.

Chemical Engineering

Department Office, 201 Gilman Hall


Scott Lynn, Ph.D., David N. Lyon, Ph.D., Assistant Professors: Les F. Donahge, Ph.D., Robert P. Merrill, Sc.D., John S. Newman, Ph.D., Eugene E. Petersen, Ph.D., John M. Prausnitz, Ph.D., Mitchell Shen, Ph.D., (Vice Chairman)

Charles W. Tobias, Ph.D., Theodore Vermeuven, Ph.D., Charles R. Wilke, Ph.D., Michael C. Williams, Ph.D., (Chairman)

Douglas W. Fuerstenau, Sc.D., (Vice Chairman)

Lecturers: Rolf H. Muller, Ph.D., Charles F. Gidenshaw, M.S., Otto Redlich, Ph.D., Arthur I. Morgan, Jr., Ph.D., J. Frank Valle-Restia, M.S.

ED 101. Chemistry of Inorganic Chemistry. (4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 140 with a grade of C or higher, Chemistry 14.

Sequence beginning (F, W)

ED 141A–141B. Chemical Engineering Thermodynamics. (4–4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 140 with a grade of C or higher, Chemistry 14.

Sequence beginning (F, W)

ED 141A. Thermodynamic principles with applications to phase problems, phase behavior of pure substances, power cycles, refrigeration and air conditioning. Calculus of thermodynamic properties of fluids.

ED 140A. Introduction to Chemical Engineering. (3) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 141A which may be taken concurrently and an elementary knowledge of Fortran programming obtained, for instance, by prior attendance at Computer Center instruction sessions or by taking Computer Center instruction sessions or by taking Computer Science 101. Material and energy balances. Properties of gases, liquids, solids, and solutions useful in solving industrial problems. Use of thermodynamic concepts. Numerical and graphical calculations.

ED 141B. Chemical Engineering Thermodynamics. (4–4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 140 with a grade of C or higher, Chemistry 14.

Sequence beginning (F, W)

ED 141A–141B. Chemical Engineering Thermodynamics. (4–4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 140 with a grade of C or higher, Chemistry 14.

Sequence beginning (F, W)

ED 141A. Thermodynamic principles with applications to flow problems, phase behavior of pure substances, power cycles, refrigeration and air conditioning. Calculus of thermodynamic properties of fluids.

ED 140A. Introduction to Chemical Engineering. (3) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 141A which may be taken concurrently and an elementary knowledge of Fortran programming obtained, for instance, by prior attendance at Computer Center instruction sessions or by taking Computer Center instruction sessions or by taking Computer Science 101. Material and energy balances. Properties of gases, liquids, solids, and solutions useful in solving industrial problems. Use of thermodynamic concepts. Numerical and graphical calculations.

ED 141B. Chemical Engineering Thermodynamics. (4–4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 140 with a grade of C or higher, Chemistry 14.

Sequence beginning (F, W)

ED 141A–141B. Chemical Engineering Thermodynamics. (4–4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 140 with a grade of C or higher, Chemistry 14.

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ED 141B. Chemical Engineering Thermodynamics. (4–4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 140 with a grade of C or higher, Chemistry 14.

Sequence beginning (F, W)

ED 141A–141B. Chemical Engineering Thermodynamics. (4–4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 140 with a grade of C or higher, Chemistry 14.

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ED 141B. Chemical Engineering Thermodynamics. (4–4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 140 with a grade of C or higher, Chemistry 14.

Sequence beginning (F, W)

ED 141A–141B. Chemical Engineering Thermodynamics. (4–4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 140 with a grade of C or higher, Chemistry 14.

Sequence beginning (F, W)

ED 141A. Thermodynamic principles with applications to phase problems, phase behavior of pure substances, power cycles, refrigeration and air conditioning. Calculus of thermodynamic properties of fluids.

ED 140A. Introduction to Chemical Engineering. (3) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 141A which may be taken concurrently and an elementary knowledge of Fortran programming obtained, for instance, by prior attendance at Computer Center instruction sessions or by taking Computer Center instruction sessions or by taking Computer Science 101. Material and energy balances. Properties of gases, liquids, solids, and solutions useful in solving industrial problems. Use of thermodynamic concepts. Numerical and graphical calculations.

ED 141B. Chemical Engineering Thermodynamics. (4–4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 140 with a grade of C or higher, Chemistry 14.

Sequence beginning (F, W)

ED 141A–141B. Chemical Engineering Thermodynamics. (4–4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 140 with a grade of C or higher, Chemistry 14.

Sequence beginning (F, W)

ED 141A. Thermodynamic principles with applications to phase problems, phase behavior of pure substances, power cycles, refrigeration and air conditioning. Calculus of thermodynamic properties of fluids.

ED 140A. Introduction to Chemical Engineering. (3) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 141A which may be taken concurrently and an elementary knowledge of Fortran programming obtained, for instance, by prior attendance at Computer Center instruction sessions or by taking Computer Center instruction sessions or by taking Computer Science 101. Material and energy balances. Properties of gases, liquids, solids, and solutions useful in solving industrial problems. Use of thermodynamic concepts. Numerical and graphical calculations.

ED 141B. Chemical Engineering Thermodynamics. (4–4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 140 with a grade of C or higher, Chemistry 14.
151A—151B. Chemical Engineering Laboratory. (4—4) Two 4-hour laboratories per week. Prerequisite: course 150A. Chemistry 111A. Sequence beginning each quarter.

151A. Experiments in physical measurements, fluid mechanics, heat transfer, and refrigeration. Emphasis on investigation of basic relationships important in engineering. Experimental design, analysis of results, and preparation of engineering reports are stressed.

Mr. Lyon (F, W); Mr. Lynn (Sp)

151B. Prerequisite: course 150B Experiments in mass transfer, simultaneous heat and mass transfer, vapor-liquid equilibria, separation techniques, and chemical reactors. Mr. Lyon (F, W); Mr. Lynn (Sp)

151S. Particulate Systems. (3) Three 1-hour lectures per week. Prerequisite: course 150A or knowledge of organic chemistry. Mr. Lyon (F, W); Mr. Donahue (Sp)

158. Polymer Science and Technology. (3) Two 1-hour lectures and one 3-hour laboratory per week. Prerequisite: course 150A or senior standing in physical or chemical sciences. Mr. Wilke (Sp)

160. Process Technology of Solid-State Materials and Devices. (3) Three 1-hour classes meetings per week. Prerequisite: Materials Science and Engineering 120 and chemical engineering 120. Introduction to chemical processing and properties of solid-state materials. Crystal growth and purification. Thin film technology. Control of growth defects and properties of electrical, magnetic, and optical properties. Application of chemical processing to the manufacture of semiconductors and superconductors.

Mr. Oldershaw (F); Mr. Lynn (W); Mr. Foss (Sp)

162. Dynamics and Control of Chemical Processes. (3) Three 1-hour lectures and one 3-hour laboratory per week. Prerequisite: senior standing in engineering or physical sciences. Theoretical and mathematical techniques used in the design and operating of chemical processes. Mr. Tobias, Mr. King (Sp)

166. Selection and Evaluation of Chemical Processes. (3) Two 1 1/2-hour lectures per week. Prerequisite: courses 141A, 140B. Development and discussion of a series of realistic cases involving the engineering of chemical processes. Selection and synthesis of a process and process elements. Identification and evaluation of process alternatives. Mr. Tobias, Mr. King (Sp)

170. Introduction to Biochemical Engineering. (3-3) Two 1-hour lectures and one 3-hour laboratory per week. Prerequisite: course 150A, 150B or consent of instructor. A review of special methods and theory useful in the design and operation of processes in the biochemical industries with particular emphasis on fermentation systems. Laboratory techniques for batch and continuous culture. Mr. Tobias, Mr. King (Sp)

182. Individual Study for Advanced Undergraduates. (2—5) Prerequisite: a written proposal like that required for course 199, as described on page 28. Independent study or investigation of problems. The Staff (Mr. King in charge) (F, W, Sp)

H194. Research for Advanced Undergraduates. (3—5) Prerequisite: senior standing and a written proposal like that required for course 199, as described on page 34. Students with honors standing may carry out original research under the direction of one of the members of staff. The Staff (Mr. King in charge) (F, W, Sp)

195. Special Topics. (3—4) Three or four 1-hour lectures per week. Prerequisite: consent of instructor. Lecture topics on special topics.

The Staff (Mr. King in charge) (F, W, Sp)

196. Special Laboratory Study. (2—5) Prerequisite: senior standing and a written proposal like that required for course 199, as described on page 28. Special laboratory work for advanced students. The Staff (Mr. King in charge) (F, W, Sp)

199. Supervised Independent Study and Research. (1—5) Enrollment is restricted by regulation to students who have attained passing standing in their study only. Must be taken on a passed or not passed basis. The Staff (Mr. King in charge) (F, W, Sp)

GRADUATE COURSES

230. Theoretical Methods in Chemical Engineering. (3) Three 1-hour lectures per week. Prerequisite: course 231 or equivalent. Methods for solving problems in chemical engineering. Mr. Goren (Sp)

231. Analysis of Chemical Engineering Problems. (3) Three 1-hour lectures per week. Prerequisite: course 230 or equivalent. Solving problems of complex chemical engineering problems using calculus of variations, boundary value problems, integral equations, and approximate methods. Mr. Goren (W)

232. Computer Methods in Chemical Engineering. (3) Three 1-hour lectures per week. Prerequisite: course 230 or equivalent. Methods for solving problems using numerical techniques to chemical engineering calculations with emphasis on computer methods.

234. Phase Equilibria. (3) Three 1-hour lectures per week. Prerequisite: graduate standing. Molecular thermodynamics of multicomponent systems with applications to engineering problems. Equilibrium properties of pure and mixed fluids. Mr. Prussin (F)

234. Applications of Statistical Mechanics. (2) Two 1-hour lectures per week. Prerequisite: course 240 and consent of instructor. Concepts of multistage and counter-current contacting. Techniques for computation of chemical engineering problems. Mr. Prussin (Sp)

233. Cryogenic Engineering. (3) Three 1-hour lectures per week. Prerequisite: course 141B and 150A or equivalent. Refrigeration principles and applications; gas purification; liquefaction and separation; magnetic, thermoelectric and von Ettingshausen cooling; transcritical and supercritical materials at low temperatures; cryogenic techniques in chemical processes.

Mr. Lyon (W)

234. Applied Chemical Kinetics. (3) Three 1-hour lectures per week. Prerequisite: course 244 or Chemistry 219A, or consent of instructor. Collision theory and transition state theory, chain reactions and free radical mechanisms, adsorption phenomena, Langmuir-Hinshelwood kinetics, description of selected systems of industrial importance.

Mr. Bell (W)

245. Catalysis. (3) Three 1-hour lectures per week. Prerequisite: course 244 or Chemistry 219A, or consent of instructor. Adsorption and kinetics of surface reactions; catalyst preparation and characterization; homogeneous and heterogeneous catalysis; surface chemistry; catalytic mechanisms and modern experimental techniques in catalytic research. Descriptive examples of industrial catalytic systems. Mr. Merrill (Sp)

247. Chemical Reaction Analysis. (3) Three 1-hour lectures per week. Prerequisite: courses 230 or consent of instructor. Principles of chemical kinetic processes and their use in the design and control of chemical processes. Mr. Merrill (Sp)

249. Biochemical Engineering. (3) One 1-hour lecture per week. Prerequisite: Bacteriology 102; Chemistry 110B, 112E; course 150B, or consent of instructor. Application of chemical engineering principles to the processing of biological and biochemical materials. Design of systems for cultivation of microorganisms and for the separation and purification of biological products.

Mr. Wilke (F)


Mr. Vermeulen (W)

251. Separation Processes. (3) Three 1-hour lectures per week. Prerequisite: consent of instructor. Concepts of multistage and counter-current contacting. Techniques for computation, and analysis of binary and multicomponent systems. Continuous, semi-continuous and batch operation.

Mr. King (F)

252. Adsorption Separations in Particulate Beds. (3-3) Three 1-hour lecture per week. Prerequisite: course 250 (may be taken concurrently), or 150B with honor standing. Mathematics 51C or course 230, or equivalent. Introduction to ion exchange, adsorption, partition adsorption and extraction, and regenerative heat transfer. Fixed-bed performance, axial dispersion, chromatographic beds, semi-continuous agitated systems, membrane processes and fluidized beds.

Mr. Vermeulen, Mr. Klein (F)

256. Advanced Transport Phenomena. (3) Three 1-hour lectures per week. Prerequisite: course 230 or equivalent. Formulation and rigorous analysis of the laws governing the transport of momentum, heat, and mass with emphasis on chemical engineering applications. Detailed investigation of laminar flows.

Mr. Newman (F)

258. Chemical Technology of Polymers. (3) Three 1-hour lectures per week. Prerequisite: course 159B or consent of instructor. Analysis of all steps in the sequence of production of monomers and polymers, processing and shaping, and recycling of polymeric materials. Chemical principles in the technologies of adhesives, rubbers, plastics, coatings, and fibers. Mr. Williams (Sp)

260. Optimization in Chemical Process Design. (3) Three hours of lecture per week. Prerequisite: course 160, or equivalent. Applications of linear and non-linear optimization techniques to problems of optimum design and operation of chemical processes.

Mr. Foss (Sp)

261. Process Simulation. (3) Two 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 159B or equivalent. Introduction to simulation by digital computer programs of chemical processes operated in the steady state or on decomposition of recycle systems. Practice in simulation of simple units and processes.

Mr. Grens (W)

262. Chemical Process Dynamics. (3) Three 1-hour lectures per week. Prerequisite: courses 230 or equivalent. The unsteady behavior of processes not amenable to analytic solutions. Application of modern computational methods for treatment of problems. The Staff (Mr. King in charge)

265. Design and Engineering of Integrated Chemical Process Systems. (3) Two 1 1/2-hour lectures per week. Prerequisite: a comprehensive background in chemical engineering. Consideration of specific, realistic cases involving the synthesis, evaluation, selection, and optimization of chemical processes. Qualitative and quantitative studies. Criteria for engineering judgment and economic evaluation.

Mr. King, Mr. Tobias (Sp)

266. Special Topics in Chemical Engineering. (1—4) Prerequisite: open to properly qualified graduate students. Current and advanced study in chemical engineering, primarily for advanced graduate students.

269A. Decay of Heterogeneous Catalysts. (2) Mr. Petersen (F)

269B. Studies in Electrochemical, Hydrodynamic, and Interfacial Phenomena. (2) Mr. Newman (F)

295D. Electrophoretic Energy Conversion. (2) Mr. Williams (Sp)

299E. Atmospheric Processes and Weather Modification. (2) Mr. King, Mr. Vermeulen (F)

NOTE: For key to symbols, see page 34.
295F. Topics in the Control of Chemical Processes. (2) Mr. F. D. Sp
295G. Particulate Systems. (2) Mr. Goren (Sp)
*295H. Estimation of Physical Properties for Chemical Process Design. (2) Mr. Bromley, Mr. Prausnitz (W)
295I. Chemical Process Economics and Project Evaluation. (3) Mr. Valle-Riestra (W)
*295J. Electrical Separation Techniques. (2) Mr. Hanson
295K. Chemical Process Synthesis. (2) Mr. King (W)
*295L. Molecular and Continuum Rheology. (3) Mr. Williams (F)
295M. Optical Methods in Chemical Methods of Analysis. (2) Mr. Muller (W)
295N. Topics in Polymers. (2) Mr. Shen (F)
295O. Special Topics in Surface Chemistry and Physics. (2) Mr. Merriр (Sp)
295P. Polymer Synthesis. (2) Mr. Michaels (Sp)
295Q. Applied Surface and Colloid Chemistry. (3) Mr. Radke (Sp)
*295R. Energy Resources and Production. (2) Mr. Grens (Sp)
*295S. Application of Electric Discharges to Chemical Reaction. (2) Mr. Bell (Sp)
295T. Chemical Reactor Engineering. (2) Mr. Vermeulen (F)
295U. Innovations in Food Production and Processing (2) Mr. Morgan (W)
295V. Chemical Processing of Inorganic Compounds (2) Mr. Donahay (Sp)
295W. Engineering Analysis of Microporous Materials (2) Mr. Wilke (Sp)
295X. Chemical Technology of Air Pollution Abatement. (2) Mr. Lynn (W)

**296. Special Study for Graduate Students in Chemical Engineering (1-12) Prerequisite: consent of instructor. Special laboratory and theoretical studies. To be graded on a passed/not passed basis. The Staff (Mr. Merrill in charge) (W, Sp)

298. Seminar in Chemical Engineering. (1-2) Prerequisite: open to properly qualified graduate students with consent of instructor. Lectures, reports, and discussions on current research in chemical engineering. Several sections are offered each quarter. To be graded on a passed/not passed basis. The Staff (Mr. King in charge) (F, W, Sp)

299. Research in Chemical Engineering. (1-12) To be graded on a passed/not passed basis. The Staff (Mr. King in charge) (F, W, Sp)

300. Professional Preparation: Supervised Teaching in Chemical Engineering. (2) Prerequisite: professional experience in teaching and permission of instructor. Must be taken on a supervised basis. The Staff (Mr. Merrill in charge) (F, W, Sp)

602. Individual Study of Doctoral Students. (1-8) Individual study in consultation with the major advisor for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. Must be taken on either a satisfactory/unsatisfactory basis or on a satisfactory basis. The Staff (Mr. Merrill in charge) (F, W, Sp)

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.

**Chemistry**

Department Office, 420 Latimer Hall

Professors:
- Neil Bartlett, Ph.D., O. D. Sc.
- Levo Breuer, Ph.D.
- Melvin Cahn, Ph.D., Sc. D., LL. D. (University Professor)
- James Cason, J. H., Ph. D.
- Joseph Cerny, Ph.D.
- Robert E. Crompton, Ph.D.
- Robert E. Crompton, Ph.D.
- David A. Shirley, Ph.D.
- Henry Rapoport, Ph.D.
- Kenneth S. Toner, Ph.D.
- Kenneth S. Toner, Ph.D.
- Alexander Pines, Ph.D.
- John W. Nashburn, Ph.D.
- William J. O. Rasmussen, Ph.D.
- Joseph C. Wang, Ph.D.
- Henry V. Schaefer, Ph.D.
- David A. Shirley, Ph.D.
- E. M. Landrum, Ph.D.
- E. M. Landrum, Ph.D.
- Isadore Perlman, Ph.D.
- Glenn T. Seaborg, Ph.D.
- James C. Smart, Ph.D.
- Richard E. Powell, Ph.D.
- Edwin F. Orlemann, Ph.D.
- James C. Wang, Ph.D.
- Glenda T. Seaborg, Ph.D.
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- James C. Wang, Ph.D.
- Glenda T. Seaborg, Ph.D.
and passive transport; biological macromolecules.

Mr. O'Konski, Mr. C. Harris, Mr. Tinoco,
Mr. Hearst, Mr. Wang

110A—110B. Physical Chemistry. (3—3) Three 1-hour lectures per week. Prerequisite: 110A, course 14, Physics 5E recommended; 110B, course 110A. Two-quarter sequence beginning (F, W, Sp).

110A: Quantum mechanics, molecular structure, and spectroscopy.

110B: Statistical mechanics, kinetic theory of gases, chemical kinetics. Up to two weeks may be spent on other topics to be determined by the instructor.

Mr. Gwinn, Mr. Templeton, Mr. Bell, Mr. Mahan,
Mr. Pitzer

111A—111B. Physical Chemistry Laboratory. (3—3) One 1-hour lecture and two 3-hour laboratories per week. Prerequisite: course 14 with a grade of C or higher, 110A, which may be taken concurrently, or 105B with the consent of instructor. Two-quarter sequence beginning (F, W).

Mr. Jura, Mr. Somorjai.
Mr. Lui, Mr. Strauss, 111A (F, W, Sp) 111B (W, Sp)

112. Organic Chemistry. (5) See Chemistry 12A for description of this course. (F, Sp) Mr. Rapoport.

112E. Organic Chemistry Lecture Only. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 128 with grade of C or better. The lecture part of course 112. Intended for students in chemical engineering who wish an additional course in organic chemistry, but open to others with consent of the instructor. (F, Sp)

H114. Advanced Chemical Thermodynamics. (3) Three 1-hour lectures per week. Prerequisite: course 110B and honors standing. A rigorous presentation of classical thermodynamics. Equilibria involving real gases and real solutions. Application of tabulated thermodynamic data involving intensive variables besides pressure and temperature.

Mr. Phillips, Mr. Moore (F); Mr. Strauss (Sp)

1117. Quantum Mechanics. (3) Three 1-hour lectures per week. Prerequisite: course 110B and honors standing. Some familiarity with linear algebra and differential equations is desirable. Elementary principles of quantum mechanics with application to light and matter.

Mr. Shirley, Mr. R. Harris (F)
Mr. Moore (Sp)


Mr. Myers (Sp)

123. Nuclear Chemistry. (3) Three 1-hour lectures per week. Prerequisite: senior standing.

Mr. Rasmussen (W)

127. Physical Organic Chemistry. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 128 or consent of instructor. Application of molecular orbital and resonance concepts to bonding, electronic and vibrational properties of organometallic compounds.

Topics discussed include orbital symmetry reaction rules. A reading knowledge of German is recommended.

128. Organic Chemistry—Structural Methods. (4) One 1-hour lecture and three 3-hour laboratories per week. Prerequisite: course 5 or 4C, 112, reading knowledge of German or consent of instructor. Determination of organic structures by chemical and spectroscopic methods.

Mr. Jensen (F); Mr. Noyce (Sp)

129. Organic Chemistry—Synthetic Methods. (4) One 1-hour lecture and three 3-hour laboratories per week. Prerequisite: course 112, a reading knowledge of German, or consent of instructor; course 128 recommended. Advanced synthetic reactions and techniques, designed as a preparation for experimental research.

Mr. Dauben (W); Mr. Cason (Sp)

192. Individual Study for Advanced Undergraduates. (1-9) Open to a 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.

The Staff (Mr. Noyce in charge) (F, W, Sp)

H194. Research for Advanced Undergraduates. (8-12) Research leading to course 103, 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 staff.

The Staff (Mr. Noyce in charge) (F, W, Sp)

GRADUATE COURSES

204. Advanced Topics in Inorganic Chemistry. (3) Three 1-hour lectures per week. Prerequisite: Chemistry 104A and B, Chemistry 111A and B, or the equivalents of these courses. Current lectures in theory and analysis in inorganic chemistry including discussion of the structure, bonding, and reactions of inorganic compounds.

Mr. Meyers (Sp)

206A—206B—206C. Organic Chemistry. (3—3—3) Two 1 1/2-hour lectures per week. Prerequisite: course 112, course 127 should be taken concurrently with 206A, or consent of instructor. The application to synthetic studies of current knowledge of reaction mechanism, molecular structure, and steric factors. Emphasis is on the development of techniques in obtaining mechanistic conclusions. Three-quarter sequence beginning (F).

Mr. Washburn, Mr. Heathcock, Mr. Dauben

*207. Organic Chemistry. (3) Three 1 1/2 hour lectures per week. Prerequisite: course 206C. The chemistry of heterocyclic compounds, with emphasis on those of natural origin.

Mr. Rapoport (F)

*208. Organic Chemistry. (3) Two 1 1/2 hour lectures per week. Prerequisite: course 206C. Kinetics and mechanism of organic reactions, mechanisms of rearrangements.

Mr. Dauben (F)

209. Organic Chemistry. (3) Three 1-hour lectures per week. Prerequisite: course 206C. The chemistry of polymeric compounds of biological interest, with emphasis on the synthesis, structure, and reactivity of natural products.

Mr. Dauben (F)

210. Contemporary Organic Chemistry. (1) One lecture per week. Prerequisite: graduate standing in Chemistry. Recent significant developments in the theory and practice of organic chemistry.

Mr. Vollhardt, Mr. Streitwieser (F, W, Sp)

218A—218B. Statistical Mechanics. (3—3) Three 1-hour lectures per week. Prerequisite: course 1114, and an introduction to quantum mechanics (which may be taken concurrently). Open to senior honor students with consent of instructor.

Two-quarter sequence beginning (W).

216A. Principles and applications of statistical mechanics. Ensemble theory, statistical thermodynamics of ideal and real gases, solids, and chemical equilibrium.

216B. Topics chosen from among the following: liquids, solutions, light scattering, polymeric systems, spectral line shapes, quantum statistics, phase transitions, transport properties.

Mr. Rice (W, Sp)

217A—217B. Advanced Quantum Mechanics. (3—3) Three 1-hour lectures per week. Prerequisite: course H117 or equivalent. Representation theory and matrix methods. Symmetry and conservation laws; coupling of angular momentum; stationary-state perturbation theory; time-dependent quantum mechanics; interaction of radiation with matter; introduction to scattering theory. Two-quarter sequence beginning (F, W).

Mr. Miller, Mr. R. Harris

219A—219B. Chemical Kinetics. (3—3) Three 1-hour lectures per week. Prerequisite: 219A, introduction to statistical mechanics, which may be taken concurrently. 219B, course H117 which may be taken concurrently. 219A: Deduction of mechanisms of complex reactions. Theory of elementary reactions, activated complex theory. 219B: Classical and quantum mechanical collision theory of elastic, inelastic, and reactive processes.) Two-quarter sequence beginning (W).

Mr. Lee, Mr. Miller

223A—223B. Advanced Nuclear Chemistry. (3—3) Three 1-hour lectures per week. Prerequisite: course 123 and introductory quantum mechanics (which may be taken concurrently). Two-quarter sequence beginning (Sp).

Mr. Rasmussen

295. Special Topics. (1—3) From time to time, lecture series are offered on topics of current interest. The following have been offered recently: inorganic compounds, biomolecular spectroscopy, magnetic resonance, and the chemistry of air pollution.

The Staff (F, W, Sp)

298. Seminars for Graduate Students. (1—3) Besides the weekly Graduate Research Conference and weekly seminars on topics of interest in biophysical, organic, physical, nuclear, and inorganic chemistry, there are group seminars on specific fields of research. Seminars will be announced at the beginning of each quarter.

The Staff (F, W, Sp)

299. Research for Graduate Students. (1—9) The facilities of the laboratory are available at all times to graduate students pursuing original investigations toward an advanced degree at this University. Such work is ordinarily in collaboration with a member of the staff. Credit is determined by the graduate adviser.

The Staff (F, W, Sp)

NOTE: For key to symbols, see page 34.
The School of Education offers three principal areas of study: a teaching credential program for those preparing for teaching positions in public schools; programs leading toward credentials for administrative, and pupil personnel services in the public schools; and degree programs, both academic (M.A.T. and Ed.D.) and professional (M.A.T. and Ed.D.). The M.A.T. (Master of Arts in Teaching) program is available in Comparative Literature, English, French, German, or Near Eastern Studies. The M.A.T. program combines a major emphasis in an academic field with professional training in education.

Applicants to programs in the School of Education must file an application with the Graduate Division. For M.A.T. and teacher education programs, contact the Student Personnel Office, 1615 Tolman Hall, for specific instructions on applying.

The State teaching credentials authorize service in the public schools of California. To qualify for a teaching credential, a bachelor's degree is required with a major in a field other than education. Other requirements include a teaching authorization and a professional preparation program in an area of specialization. Although most of the students in teaching credential programs are graduate students, it is possible to complete these programs as undergraduates.

For details concerning the requirements and areas of specialization for all credential and degree programs in education, consult the Announcement of the School of Education. Students interested in a teaching career should consult with the Student Personnel Office, 1615 Tolman Hall, early in their college studies.

UPPER DIVISION COURSES

100. Quantitative Methods in Education. (2) Two 2-hour lectures per week. An elementary survey course for students with limited background in high school mathematics. Location, dispersion, and association. Linear transformations. Reliability, relevancy, and validity. Linear hypotheses. Canonical analysis.

Mr. Kaiser (W)

100L. Quantitative Methods Laboratory. (1) One 3-hour laboratory per week. Must be taken concurrently with course 100.

Mr. Kaiser (W)

110L. Learning and the Learner. (3) Three hours of lecture per week. General introduction to educational psychology.

115. The Exceptional Child. (2–2) Two 1-hour lecture per week: Introduction to social, psychological, and educational problems for exceptional children. Must be taken concurrently with course 115L.

115A. Mental and Emotional Handicaps. Topics: mentally retarded, emotionally disturbed, multiphysicians, gifted, and preschool programs for the young handicapped. (F)

115B. Sensory and Motor Handicaps. Topics: blind, partially seeing, deaf, hard of hearing, deaf/blind, and physically handicapped. (W)

115L. The Exceptional Child Laboratory. (1–5) Three to fifteen hours of field work per week. Conferences, observations, and supervised field experiences with a variety of exceptional children. May be repeated with different supervisory personnel. (F, W)

118A. Introduction to Educational Research. (3)

One 3-hour lecture per week. An introduction and orientation to the concepts and methods of basic logic and methods of systematic inquiry, the fundamental techniques of inferential statistics, and the various types of research entitled to data analysis and theoretical problems.

Mr. Wilson (W)

118B. Foundations of Educational Research. (3) Three hours of lecture per week. Introduction to and review of the major research methods and research in educational research, such as the topics of theory, causality and operationalism; also acquainting students with the nature of data analysis, inference, and non-experimental investigations in various domains of concern to education.

119A. Introduction to Educational Statistics. (4) Four lectures per week. Prerequisite: consent of instructor. Introduction to probability, frequency and probability distributions; descriptive measures of central tendency and variability; sampling; point estimation and interval estimation.

Mr. Marascuilo (R)

119B. Foundations of Educational Statistics. (4) Four lectures per week. Prerequisite: course 119A and consent of instructor. Introduction to statistical inference and hypothesis testing, t-test, F-test: one-way analysis of variance; simple correlation and regression; complete chi-square tests of comparisons of frequencies and homogeneity.

Mr. Marascuilo (R)

119L. Educational Statistics Laboratory. (1) One 3-hour laboratory per week. Must be taken concurrently with course 119A.

Mr. Hardyck (F); Mr. Kaiser (W); Mr. Hardyck (Sp)

119M. Educational Statistics Laboratory. (1) One 3-hour laboratory per week. Must be taken concurrently with course 119B.

130. The School in America. (3) Two 1 1/2-hour lectures per week. Development and operation of the school as a social institution; current problems; roles of school personnel; contacts with other social agencies; professional and legal aspects of teaching.

132A–132B. Foundations for Teaching in Elementary Schools. (6–7) Six hours of lecture (F), seven hours of lecture (Sp), plus field work in the public elementary schools. Prerequisite: acceptance in Plan I Multiple Subject Teaching Credential Program.

132C–132D–132E. Foundations for Teaching in Elementary Schools. (6–7) Six hours of lecture (F), seven hours of lecture (Sp), plus field work in the public elementary schools. Prerequisite: acceptance in Plan II Multiple Subject Teaching Credential Two-Year Program.

133A–133B. Foundations for Teaching in Secondary Schools. (7–6) Seven hours of lecture (F), six hours of lecture (W, Sp) per week. Public work assignments in the public secondary schools. Prerequisite: Admission to Single Subject Credential Program Model I. Seminars, lectures, workshops to meet requirements for the single subject credential including psychological foundations, sociological foundations, curriculum, instructional theory and methodology of the subject area, and supporting subjects. Credit and grade assigned upon completion of full sequence. Must be taken on a pass/not pass basis.

The Staff (F, W)

133C–133D–133E. Foundations for Teaching in Elementary Schools. (7–6) Seven hours of lecture (F), six hours of lecture (W, Sp) per week. Public work assignments in the public secondary schools. Prerequisite: Admission to Single Subject Credential Program Model II. Seminars, lectures, workshops to meet requirements for the single subject credential including psychological foundations, sociological foundations, curriculum, instructional theory and methodology of the subject area, and supporting subjects. Credit and grade assigned upon completion of full sequence. The Staff (F, W, Sp)


**210A—210B—210C. Theoretical Base for School Psychology.** (3-3-3) One 2-hour lecture plus supervised field experience per week. Prerequisite: admission to School Psychology Program.


210B. Major theories of child development. Ms. Windmiller, Ms. Wilcox (W). Theories of child development, including Piagetian and neo-Piagetian theories.

210C. Psychology of intelligence and survey of current trends in testing, reading, mathematics, science, and social studies. Ms. Lambert (Sp).


211. Introduction to Theory and Research in Adult Education. (3) Two 1 1/2-hour sessions per week. Mr. Case (F). A study of the historical and contemporary relations of education and society, and the role of adult education in America.

212. The Psychology of Reading Acquisition. (3) Three hours of lecture per week. Mr. Watts (F). An introduction to the psychological processes of reading acquisition of decoding skills. There will be some consideration of the development of imagery processes: social-class comparisons.

213. Educational Measurement and Evaluation. 213A. Standard Tests in Education. (3) One 2-hour lecture and one 2-hour laboratory per week. Mr. Woodson (W). A consideration of the construction, validation, and interpretation of intelligence and achievement tests, and the scoring of contemporary tests of intelligence.

213B. Individual Appraisal. (4) One 3-hour laboratory per week. Prerequisite: course 213A. Individual Appraisal. Supervised practice in administration and scoring of contemporary tests of intelligence.

213C. Individual Appraisal. (4) Three hours of lecture and five hours of laboratory per week. Prerequisite: consent of instructor. Supervised practice in administration and scoring of contemporary tests of intelligence.

213D. Individual Appraisal. (4) Three hours of lecture and five hours of laboratory per week. Prerequisite: consent of instructor. Supervised practice in administration and scoring of contemporary tests of intelligence.

214. Human Development and Education. 214B. Social and Emotional Development. (3) Three hours of lecture per week. Prerequisite: course 192A. 119A, 119B or equivalents. Ms. Watts (Sp). An introduction to the psychological processes of reading acquisition of decoding skills. There will be some consideration of the development of imagery processes: social-class comparisons.

214C. Mental Health—Individual and Group Processes. (5) Twelve hours of seminar per week. Prerequisite: consent of instructor. Multidisciplinary examination of the modalities of play and games in relationship to human learning and development. Each student will devise and present a paper and theory related to human learning. Game theorists and researchers in play will serve as consultants.

215A. Advanced Topics on Exceptional Children. (3) Three hours of lecture and one hour of field work per week. Prerequisite: consent of instructor. Topics: Problems in mainstreaming mildly handicapped children. (Sp) Social psychological perspectives on the education of exceptional children. Mr. Jones (F, Sp)

215B. Counseling and Advising Parents of Handicapped Children. (3) Three hours of lecture per week plus field work. Students will explore the effects of stigma, emotional reactions, professional help on the family and child, and the role of the school in helping the child. Parent needs will be related to the developmental stages of the child. Counseling and consulting models and techniques will be explored for appropriateness to this population.

**216B. Principles and Theories of Psychological Measurement.** (3) One 3-hour session per week. Prerequisite: courses 119A, 119B, and consent of instructor. Advanced research in formal and informal tests, evaluation and appraisal.

217. Intellectual Development and Education. Prerequisite: course 193 or equivalent.

217A. Proseminar in Intellectual Development and Education. (3) Three 1 1/2-hour sessions per week. Must be taken on a satisfactory/unsatisfactory basis. Mr. Ammon, Mr. Case, Mr. Hardycy, Mr. Jensen, Mr. Rohwer (F).

217B. Cognitive Development. (3) One 3-hour session per week. A consideration of psychometric approaches to the study of children's intellectual development, with primary emphasis on Piagetian theory and research. Mr. Case (F).

217C. Development of Speech, Language, and Cognitve Processes. (3) One 3-hour session per week. Mr. Harding (F).

217D. Children's Learning. (3) One 3-hour session per week. A consideration of theories, methods, and experimental research pertaining to varieties of children's learning that have relevance for educational practice. Mr. Rohwer (W).

217E. Theories of Intelligence. (3) One 3-hour session per week. A consideration of psychometric approaches to the study of children's intellectual development, with primary emphasis on intelligence, including theories and empirical research on the measurement, structure and structure of abilities, from infancy to adulthood. Mr. Jensen (W)

218. Seminars in Intellectual Development and Education. Prerequisite: course 119B and consent of instructor.

**218A. Cognition.** (3) One 3-hour seminar per week. An intensive examination of specific topics in the area of cognitive development; topics vary.

218B. Language. (3) One 3-hour seminar per week. Seminar devoted to selected topics in each area: language and cognition, the development of communication skills, and subcultural variation in child language, as these relate to education. Mr. Ammon (Sp).

218C. Learning. (3) One 3-hour seminar per week. An intensive examination of specific topics (e.g., the development of imagery processes; social-cognitive processes) in the area of the development of learning processes. Mr. Rohwer (Sp)

218D. Cognitive Style. (3) One 3-hour seminar per week. A consideration of individual differences in human mental abilities, with emphasis on intelligence, including theories and empirical research on the measurement, structure and structure of abilities, from infancy to adulthood. Mr. Rohwer (Sp)

**NOTE: For key to symbols, see page 34.**
218. Advanced Topics in Educational Statistics. Four hours of lecture per week. Prerequisite: courses 119A and 119B.

219. Seminar in History of Education. One 3-hour laboratory per week. Must be taken concurrently with course 219.

222A. Comparative Education: An Introduction. Three hours of lecture per week. Topics on selected educational developments in Asian, African, European or Latin-American societies. Mr. Lilge (F, Sp)

222B. Comparative Education: An Introduction. Three 1 1/2-hour lectures per week. Comparative methods and theories in the humanities and social sciences applicable to the study of educational systems in various countries.

222C. Philosophy of Education: An Introduction. One 2-hour lecture and one 1-hour seminar per week. Epistemology, logic and theory of signs as they relate to education. Mr. Mosier (W)

222D. History of American Education. (1-3) Prerequisite: two 2-hour laboratory sessions per week. The development of educational thought with special reference to the processes of teaching and learning. Mr. Leonard (Sp)

222E. History of American Education. (1-3) Prerequisite: two 2-hour laboratory sessions per week. The development of educational thought with special reference to philosophical analysis and the techniques of inquiry. Mr. Leonard (Sp)

222F. History of American Education. Five 3-hour laboratory per week. Case studies of the contemporary history of education in economic, political, and social development in selected Asian, African, European, or Latin-American societies.

223A. Sociology of Education. (4) Two 1 1/2-hour lectures and one 1-hour seminar per week. The organizational structure of educational institutions, the processes of control and socialization within schools, and the functions of schools in society. Mr. Wilson (F)

223B. Sociological Theory and the Study of Education. (4) Two 1 1/2-hour lectures and one 1-hour consultation per week. Prerequisite: Sociology 157 or equivalent. The interplay of social factors and processes in the conduct and interpretation of educational research. Distinctions between and contributions of functionalism, exchange theory, conflict theory, symbolic interactionism and ethnomethodology as perspectives informing inquiry in education. Mr. Hansen (W)

225. Seminar in Philosophy of Education. One 3-hour seminar per week. Topics on selected educational theorists and trends in educational thought. *225A. Concepts of the Self. (3)

225B. Eighteenth Century. (3) Mr. Lilge (W)

225C. Nineteenth Century. (3) Mr. Lilge (W)

225D. Twentieth Century. (3) Mr. Lilge (Sp)

225E. Piaget as Philosopher. (3) Mr. Mosier (Sp)

225F. Cognitive Moral Education. (4) Mr. Scriven (F)

226. Seminar in History of Education. Three 1 1/2-hour laboratory per week. Prerequisite: consent of instructor. Mr. Afmy (F)

227A. Comparative Education: Soviet Union. One 3-hour colloquium per week. Prerequisite: enrollment in Sociology of Education. Mr. Lilge (Sp)

227B. Comparative Education: Western Europe. Three 1 1/2-hour colloquia per week. Educational policy, thought, and institutions in France, Italy, Germany and the Twentieth Century. Mr. Lilge (F)

227C. Education and Social Change in Africa. Three hours of lecture and discussion per week. Educational policy, thought, and institutions in traditional and modern African societies. Mr. Ruddell (W)

228A. Race and Ethnicity in Schools: Cross-Cultural Perspectives. (3)

228B. Educational Policy: Toward a Critical Sociology of Education. (3) Mr. Hansen (Sp)

229B. Educational Inequality: Comparative Studies. (3) Mr. Wilson (Sp)

230A. Diagnosis and Treatment of Reading Disability. One 3-hour seminar per week. Prerequisite: enrollment in Sociology of Education. Mr. Lilge (Sp)

230B. Reading. (3) Prerequisite: course 131C or equivalent, and consent of instructor. Mr. Ruddell (F)

230C. Speaking, Listening and Writing. (3) Prerequisite: courses 131A and 131B. Mr. Webster (W)

230D. Science. (3) Prerequisite: consent of instructor. Admissions to the junior high school and college level. Mr. Lilge (F)

230E. Art. (3) Prerequisite: consent of instructor. Admissions to the junior high school and college level. Mr. Webster (W)

230F. Humanities. (3) Prerequisite: consent of instructor. Admissions to the junior high school and college level. Mr. Webster (W)

230G. Foreign Languages. (3) Prerequisite: consent of instructor. Mr. Afmy (F)

230H. Art. (3) Prerequisite: consent of instructor. Mr. Ruddell (F)

230I. Journalism and Diagnosis of Reading Difficulties. (3) Prerequisite: course 230A and consent of instructor. Diagnosis and correction of reading and study skills difficulties of intellectually capable students. Mr. Maxwell (Sp)

230K. Policies and Practices in Developmental Reading. Formerly 291E. Prerequisite: consent of instructor. Overview of the current theories and curricular developments in high school and college level developmental reading programs. Suggested topics: diagnostic and evaluative testing; assessment of appropriate materials and equipment; methods of integrating the reading program into other academic areas and procedures for administering program. Mr. Ruddell (F)

231. Research in Curriculum and Instruction. One 3-hour seminar per week. Critical analyses of research in the subject areas. Mr. Lilge (Sp)

231A. Reading. (3) Prerequisite: course 230A Mr. Ruddell (W)

231B. Speaking, Listening and Writing. (3) Prerequisite: consent of instructor. Mr. Lilge (Sp)

231C. Literature. (3) Prerequisite: consent of instructor. Mr. Lilge (W)

231D. Mathematics. (3) Prerequisite: consent of instructor.

231E. Social Sciences. (3) Prerequisite: consent of instructor. Mr. Michaelis (F)

231F. Science. (3) Prerequisite: courses 119A and 119B or equivalent; course 230F recommended, and consent of instructor. Mr. Miller (Sp)

231G. Foreign Languages. (3) Prerequisite: consent of instructor.

231H. Music. (3) Prerequisite: consent of instructor.

231J. Psychology and Reading-Language Instruction. (3) Prerequisite: course 281 and consent of instructor. Ms. Fillmore (W)

232. Early Childhood Programs. One 3-hour seminar per week. Prerequisite: consent of instructor. Traditional and innovative programs for the education and care of young children.

232A. Infant and Pre-School Programs. (3) Ms. Almy (F)

232B. Kindergarten and Early Primary Programs. (3) Ms. Almy (W)

232C. Selected Issues in Early Childhood Education. (3) Ms. Almy (Sp)

233. The Media in Education. (3) Two hours of lecture and one hour of conference per week. Survey of new developments in media and their utilization in teaching, administration, curriculum planning, and research. Topics: mass media, individual media, auto-tutorial and multi-media techniques with projected and audio materials. Current trends in theory, research, and development are discussed.

234. Programmed and Automated Instruction. (4) Three hours of lecture and two hours of laboratory per week. Prerequisite: consent of instructor. Lectures, discussions, and readings regarding theories and applications of automated techniques in instruction. Emphasis will be upon instructional strategies. Students will prepare simple instructional programs and use a computer to evaluate their effectiveness.

235A. Curriculum Planning: Bases for Curricular Decisions. (3) Three 1 1/2-hour lectures per week. Theories of learning and cognitive development, socio-cultural factors; taxonomies in the cognitive and affective domains; current structure of the school curriculum; models and approaches to curriculum reform, and problems associated with curriculum evaluation. A curriculum development project designed to integrate the various aspects of the course is required. Mr. Webster (F, Sp)

235B. Curriculum Planning: Theories, Principles, and Practices of Instruction. (3) Two 1 1/2-hour lectures and one 1-hour seminar per week. Prerequisite: enrollment in Sociology of Education. Mr. Lilge (Sp)

235C. Supervision of Instruction. (3) Three 1-hour laboratory per week. Prerequisite: teaching credential, two years of teaching experience, and consent of instructor. Research into the supervisor-teacher relationships, and practice with classroom visits, faculty meetings, and individual conferences will provide the basis for criticism and analysis of supervisory techniques.

235D. The Logic of Instruction. (3) One 2-hour lecture and one 1-hour seminar per week. The teaching-learning process considered from the standpoint of symbolic logic and its applications to problems in instruction. Mr. Webster (W)

236. Advanced Studies in Elementary and Secondary Education.

236A. The Elementary School. (3) One 3-hour seminar per week. Prerequisite: consent of instructor. Advanced studies of topics and problems in elementary education.

236B. The Junior High School. (3) One 3-hour seminar per week. Prerequisite: consent of instructor. Advanced studies of topics and problems in secondary education.

236C. Supervision of Instruction. (3) One 3-hour laboratory per week. Prerequisite: course 230C or equivalent, and consent of instructor. Supervision of instruction. Mr. Webster (W)
requisite: consent of instructor. A study and analysis of current major educational problems and related research. Mr. Stewart (W)

236B. Seminar in Teaching Techniques and Materials for Speakers of Nonstandard Dialects. (3) Three hours of seminar per week. Prerequisite: course 236A and one 1-hour conference per week. Study of both the macro- and micro aspects of language and the integration of language instruction into curricular and organizational systems. Mr. Stewart (W)

236E. Inter-Ethnic and Interpersonal Relations in Education. (Formerly 291G) One 3-hour lecture and one hour of field work per week. Study of the educational problems of sub-cultures of African American and Hispanic minorities. Study of research regarding the ecology of prejudice and educational strategies for its elimination. Emphasis in interpersonal and intergroup relations and field work are involved. Mr. Stewart (Sp)

237. Curriculum Philosophy. (3) Three 1-hour lecture per week. Philosophical analysis of curriculum development and instructional processes; logical basis of teaching and learning. Mr. Miossi (Sp)

*238. In-Service Education. (3) Three 1-hour lecture per week. Theories, procedures, practices, and evaluation of in-service education for public school personnel. Mr. Stewart (Sp)

240. Student Personnel and Counseling Psychology. One 2-hour lecture and one 2-hour laboratory per week. Mr. Benveniste. Mr. Guthrie (F, W)

240A. Principles and Theories of Guidance. (3) Prerequisite: consent of instructor. Development and scope of guidance work as a profession; critical analysis of basic philosophies, ethics, and professional responsibilities. Mr. Stewart (F)

*240B. Theoretical Foundations of Counseling. (3) Prerequisite: consent of instructor. Pertinent theoretical and empirical developments in the social sciences for counseling personnel. Mr. Stewart (F)

240C. Environmental Factors in Counselor Adjust. (3) Three hours of lecture per week. Prerequisite: consent of instructor. Theories of interaction of environment, research factors in the counseling process. Analysis of theories of career development. Sources and interpretation of vocational data. Mr. Stewart (Sp)

*240D. Group Guidance. (3) Four hours of lecture and two hours of laboratory per week. Prerequisite: consent of instructor. Group procedures in counseling and personnel work. Theory, function, and operation of group guidance activities in an educational setting. Mr. Stewart (W)

*240E. Individual Appraisal in Counseling. (3) Prerequisite: course 213A, and consent of instructor. Theories of and practices in the psychological appraisal of counsees. Emphasis upon integration of appraisal data. Mr. Stewart (W)

245. Advanced Counseling. (3–3) One 3-hour seminar per week. Mr. Benveniste. Mr. Guthrie (F)

245A. Counseling Theory. Prerequisite: courses 240A and 240B. Counseling theories and schools of counseling. Intensive examination of counseling techniques and related research. Mr. Stewart (W)

*245B. Case Analysis Prerequisite: course 245A. Illustration of counseling theories and principles through intensive case analysis, evaluation of counseling.

249. Special Problems in Counseling Theory and Research. (3–3) Three 1-hour lecture and one 1-hour conference per week. Prerequisite: courses 240A and 240B. Designed to develop special areas of interest and research for individuals who wish to pursue special research problems of current interest and significance to the counseling field. Mr. Stewart (W)

250A–250B. Major Policy Problems in Education. (4-3) Three 1-hour lecture and one 1-hour conference per week. Prerequisite: courses 240A and 240B. Designed to develop special areas of interest and research for individuals who wish to pursue special research problems of current interest and significance to the counseling field. Mr. Stewart (W)

250A: Introduction to Systems Analysis. An overview of systems analysis. Applications of systems analysis to educational policy planning, rational planning of educational budgeting in education, major policy problems in education, and the costs of education; simulations of school finance systems and cultures. The response of bureau- cracies to changes in environment. Use of the computer in theory building and organizational analysis in education. Mr. Benveniste (Sp)

250B. Seminar on Organizational Design and Futurism. (3) Three 1-hour lecture per week. Organizational theory and future utopian models. Problems in analysis and design in educational organizations. Mr. Benveniste (Sp)

254. Economics of Education. (3) Three 2-hour lecture and one 1-hour conference per week. Topics to be considered include the following: alternative methods of assessing the relationship between education and economic growth; demand for education services, education production functions; efficiency criteria; cost analysis and sectoral planning; economic aspects of education. Mr. Benson (F)

256. Finance and Economics of Education: Public and Private Schools. (3) Three 2-hour lecture and one 1-hour conference per week. Sources of revenue for elementary and secondary schools; methods of distributing the revenue; state and federal laws governing the financial distribution of school expenditures; cost-effectiveness analysis; economic aspects of proposals for the operation of public schools into the private sector. Mr. Benson (W)

*256C. Economics of Higher Education. (4) Three 1-hour lecture and one 1-hour conference per week. Cost and revenue analysis of higher education. Resources allocation and economic policy of state and federal governments. Economics of student loans and grants. Mr. Reed (W) and other variables of various investment policies and financial incentives for institutional programming. International comparisons.

256D. Finance and Economics of Education: Informal Programs. (3) One 3-hour lecture and one 1-hour conference per week. Arrangements for the administration and finance of programs falling outside the formal education system. Special attention will be given to work-oriented training on the job, apprenticeship, work experience, and refresher courses. Mr. Benson (Sp)

257. Politics and Education. 257A. Determinants of State and Local Educational Policy. (3) One 3-hour lecture and one 1-hour conference per week. Examination of state and local government arrangements and political processes which influence education. Emphasis upon public opinion and the political aspects of educational planning. Mr. Benveniste (Sp)

257B. National Government Influences on Educational Policy. (4) One 3-hour lecture and one 1-hour conference per week. The role of a national government in formulating and administering educational policy. Problems in the analysis of the causes of public policies. Major areas include (1) social and political influences; (2) concepts of formal bureaucracies; (3) administration of national government policy. Mr. Guthrie (W)

*257C. Special Topics on Educational Policy. (3) One 3-hour lecture per week. Advanced research into political processes affecting educational policies at the level of government. Topic: (Sp) legislative behavior.

258. Organizational Theory and Education. 258A. Organizational Theory and Education. (4) One 3-hour lecture and one 1-hour conference per week. Logical and social analysis of the study of organizations with particular reference to education. Power and authority, control analysis, role analysis. Mr. Benveniste (Sp)

258B. Critical Comparative Educational Administration. (3) One 3-hour lecture per week. The styles and functions of management and various types of national systems and cultures. The response of bureaucracies to changes in environment. Use of the computer in theory building and organizational analysis in education. Mr. Benveniste (Sp)

258C. Seminar on Organizational Change in Education. (4) Three hours of lecture and one 1-hour conference per week. Sociopolitical approaches to organizational change. Innovation and risk in education. Control and authority, Participation, planning, organizational development (OD) in education. Mr. Benveniste (Sp)

258D. Seminar on Organizational Design and Futurism. (3) Three 1-hour lecture per week. Organizational theory and future utopian models. Problems in analysis and design in educational organizations. Mr. Benveniste (Sp)

259. Educational Administration. 259A-259B. Urban Educational Administration. (3-3) Three 2-hour lecture per week. Urban educational systems and the decision-making processes in urban schools. Mr. Benveniste (Sp)
258C. Administration of Instructional Programs and Services. (3) Three hour per week. Theories, policies, and practices relative to the administration of the program of instruction and auxiliary services in the public schools.

259D. Advanced Personnel Administration in Public Education. (3) One 3-hour lecture per week. Theories, policies, and practices relative to educational personnel.

Mr. Reed (Sp)

260. The Community College. (3) One 3-hour session per week. Participation in the community college program of the integrated community college in American society, a consideration of purposes, curriculum, student characteristics, and implications for instruction and college planning. Mr. Tillery (F)

**260L. The Community College Laboratory. (2) One 2-hour laboratory per week. Conferences and observations pertaining to curriculum and instruction in community colleges. Must be taken concurrently with course 260.**

261A. Higher Education: Historical and Philosophical Bases. (3) Three hours of lecture per week. Historical analyses of the roots and development of American higher education, an examination of the changing philosophical bases, and a review of the ongoing major issues and problems.

Mr. Heist, Mr. Borrowman (F)


Mr. Heist (W)

**264. College Teaching. (3) One 3-hour session per week. Consideration of the techniques of college teaching styles, issues and problems of adult learning. An analytical review of research on college teaching and the role of student involvement.**

Mr. Heist, Mr. Borrowman (F)

266. Advanced Study in Higher Education. Prerequisite: consent of instructor.

268A. The Student in Higher Education. (4) One 3-hour session per week. Consideration of the college student as a developing person, as an individual, and as a participant in institutional governance. Analytical review of research on personal characteristics, campus environments and social relationships related to the influences and effects of college education.

Mr. Tillery (Sp)

268B. The Curriculum of Higher Education. (4) One 3-hour session per week. Consideration of the selection and sequencing of course materials, and the participation of students in the development of the curriculum. Examination of the relationship of the curriculum to government, administration, and educational policies and legislation. Mr. Stone (F)

268C. The Administration of Higher Education. (4) One 3-hour session per week. The government, organization, and administration of higher education, the relationship of organizational and administrative theory to other fields and institutions of higher education.

Mr. Bailey (Sp)

268D. Teacher Education. (4) One 2-hour session and one hour of laboratory per week. Consideration of the philosophical, psychological, and social bases of professional education. Analytical review of research on teacher education programs, programmatic innovations, and their effects.

Mr. Stone (W)

268E. Theories and Practices of Management and Leadership in Higher Education. (4) One 3-hour session per week. Consideration of leadership and institutional relations, the need to understand and assess various practices and strategies in college governance and organization. Special attention given to policies and practices of minority and women's issues. Consideration of institutional and clinical case studies. Mr. Stone (W)

268F. Financing Higher Education. (4) One 3-hour session per week. Alternate methods of developing university budgets, cost-management systems, and budget formulas for operations and capital facilities. Strategies for effecting and maintaining balanced budgets. Sources of funding and financing research, public service instruction, and buildings.

Mr. Cheit (Sp)

270. Problems in Adult Education. (3) One 3-hour session per week. Consideration of the problems of adults, including adult education courses, curricula, administration, financing, leadership, teacher training, education and aging.

Mr. London (W)

275. Seminar in Adult Education. One 3-hour seminar per week.

**275A. Sociology of Adult Education. (3) A study of the social forces which create and mold various de-
signs of adult education in an industrial society, and in newly developing societies.**

275B. Problems of Work and Leisure. (3) The relationships of work and leisure to the continuing education of adults.

Mr. London (Sp)

275C. Community Development. (3) An examination of community development programs in the developing countries and the United States.

280A—280B—280C. Concepts and Theory of Leadership in Educational Administration. (2—4; 2—4; 2—4) One 3-hour session alternate weeks. Prerequisite: consent of instructor and open only to members of staff. A study of the leadership process and problems of education. Basic concepts, issues, and strategies will be identified and analyzed. M. M. Tillery (F)

280D—280E—280F. Colloquium on Educational Leadership in Research and Practice. (2—4; 2—4; 2—4) Two 3-hour colloquiums and one 1-hour conference alternate weeks. Prerequisite: consent of instructor only to members of staff. A study of the leadership process and problems of educational administration. Basic concepts and ideas will be identified and analyzed, with major emphasis given to the interaction of theory and practice. Credit and grade assigned on completion of full sequence.

Mr. Reed (F, W, Sp)

281. Basic Concepts in Language and Reading Development and Practice. Prerequisite: consent of instructor. An introduction to the relationship between language and society, linguistic and psychological aspects of language acquisition, reading and cognition, the educational process, instructional approaches to reading and language development, language and the child, and the aesthetics of language and literature.

Mr. Ammon, Mr. Ruddell, Mr. Johnson, Mr. Simons (W)

282. Small Group Processes. (3) Three 1-hour sessions per week. Theory and research in small group processes involving work groups, social groups, and the family. Group discussion will focus on the readings for each week. Facilitate a student to view different points of view to the subject — one more experimental and the other theoretical.

Mr. Hansen, Mr. Woods (F, W)

290. Methodology of Educational Research. One 3-hour session per week. Divisional seminars conducted by two or more faculty members, with emphasis upon the theories, methods, and techniques most commonly employed in research on educational problems within each division.

390C. Curriculum and Instruction. (3)

**290D. Educational Psychology. (3) Mr. Heist (F).**

290E. Higher Education. (3) Mr. Heist (F), Mr. Walker (W), Mr. Stone (Sp)

290N. Methodology of Language and Reading Research. Prerequisite: consent of instructor. An analytical study of methods employed in research on reading, language acquisition, and other psychological processes involved in language instruction in the language arts. Students collect and analyze language and reading data.

Mr. Simons (F), Mr. Ammon (W)

291. Experimental Courses.

291C. Concepts and Issues in Articulation within Systems of Higher Education. (3) One 3-hour session per week. Prerequisite: limited to graduate students. Study of the various types of postsecondary education in the United States with emphasis on concepts and issues in articulation of curriculum, organizational collaboration, and articulation of institutions and the changing state systems will be used. To be offered 1976-77 only.

291D. Introduction to Sociolinguistics and Education. (3) Three hours of lecture per week. Basic concepts and methods of sociolinguistics, verbal learning, instructional design, and language and instruction. Analysis of language and reading data.

Mr. Simons (W)

293A—293B—293C. Advanced Study and Research in the Methodology of Teaching. (4—2—2) Formerly 293A-293B-293C. Three hours of lecture and one hour of laboratory per week for 293A; two hours of lecture per week for 293B and 293C. Prerequisite: consent of instructor and enrollment in the University of California Cooperative Teacher Preparation Program. Exploration and research in advanced methods and strategies of teaching in general education. Credit and grade will be assigned upon completion of the full sequence.

Mr. Lowry, Mr. Miller (F, W, Sp)

294. Thesis Seminar—(1—8) Prerequisite: consent of instructor. Students register for credit only. Preparation and completion of either major dissertation papers or theses, and doctoral students preparing dissertation proposals. Unit credit awarded according to work accomplished. Must be taken on a satisfactory/unsatisfactory basis.

294A. Humanistic and Policy Studies. (1—8) Formerly 294A and 294B. The Staff (F)

294C. Counseling Psychology. (1—8) Mr. Stewart (F); Mr. Watts (W); Mr. Stewart (Sp)

294M. Educational Psychology. (1—8) Mr. Scott (F); Mr. Low (W); Mr. Ruddell (Sp)

294D. Educational Psychology. (1—8) Mr. Kaiser (F)

294E. Higher Education. Mr. Tillery (F); Mr. Heist (W)

294F. College Teaching. (1—8) Mr. Smith (F, W, Sp)

294H. Special Topics in the Methodology of Educational Research. (1—8) One 3-hour seminar per week. Coordinated seminars offered by faculty from several divisions to introduce special topics, such as questionnaire construction, attitude measurement, test construction, interviewing, interaction analysis, path analysis, and other topics not adequately covered elsewhere. Topics and content of seminars vary from quarter to quarter, and may be offered only to members of special doctoral programs. Credit of up to 3 units will be arranged. (Sp) Sec. 1, to be arranged; Sec. 2, general linear model and path analysis in non-experimental research.

Mr. Hurst (F)

Sec 1: Mr. Woodson (Sp); Sec 2: Mr. Wilson (Sp)

293A—293B—293C. Advanced Study and Research in the Methodology of Teaching. (4—2—2) Formerly 293A-293B-293C. Three hours of lecture and one hour of laboratory per week for 293A; two hours of lecture per week for 293B and 293C. Prerequisite: consent of instructor and enrollment in the University of California Cooperative Teacher Preparation Program. Exploration and research in advanced methods and strategies of teaching in general education. Credit and grade will be assigned upon completion of the full sequence.

Mr. Lowry, Mr. Miller (F, W, Sp)

294. Thesis Seminar—(1—8) Prerequisite: consent of instructor. Students register for credit only. Preparation and completion of either major dissertation papers or theses, and doctoral students preparing dissertation proposals. Unit credit awarded according to work accomplished. Must be taken on a satisfactory/unsatisfactory basis.

294A. Humanistic and Policy Studies. (1—8) Formerly 294A and 294B. The Staff (F)

294C. Counseling Psychology. (1—8) Mr. Stewart (F); Mr. Watts (W); Mr. Stewart (Sp)

294M. Educational Psychology. (1—8) Mr. Scott (F); Mr. Low (W); Mr. Ruddell (Sp)

294D. Educational Psychology. (1—8) Mr. Kaiser (F)

294E. Higher Education. Mr. Tillery (F); Mr. Heist (W)

294F. College Teaching. (1—8) Mr. Smith (F, W, Sp)

294H. Special Topics in the Methodology of Educational Research. (1—8) One 3-hour seminar per week. Coordinated seminars offered by faculty from several divisions to introduce special topics, such as questionnaire construction, attitude measurement, test construction, interviewing, interaction analysis, path analysis, and other topics not adequately covered elsewhere. Topics and content of seminars vary from quarter to quarter, and may be offered only to members of special doctoral programs. Credit of up to 3 units will be arranged. (Sp) Sec. 1, to be arranged; Sec. 2, general linear model and path analysis in non-experimental research.

Mr. Hurst (F)

Sec 1: Mr. Woodson (Sp); Sec 2: Mr. Wilson (Sp)
288R-288T. Evaluation of Innovative Programs. (2) Two hours of seminar per week. Seminar offered in conjunction with the Vice Chancellor's office in which students conduct evaluative research in innovative programs, curriculums, courses on the Berkeley campus. Credit and grade may be awarded upon completion of 288R or 298S. Mr. Stoner (F.W.Sp)

299. Special Study and Research. (1-8) Open to graduate students who wish to pursue special studies and research under the direction of a member of the staff. The Staff (F, W, Sp)


299B. Counseling Psychology.

299C. Curriculum and Instruction.

299D. Educational Psychology.

299E. Higher Education.

299F. Teacher Education.

299H. Special Programs.

299S. Research for Doctoral Candidates. Prerequisite: advancement to candidacy for the Ed.D. or Ph.D. degree. Individual study and directed research in consultation with the dissertation committee. Must be taken on a satisfactory/unsatisfactory basis.

PROFESSIONAL COURSES

310. Internship in School Psychology. (3-6) Two hours of lecture and one hour of meeting with mental health consultant per week. Supervised assignment to a school district in capacity of school psychologist. Must be taken on a satisfactory/unsatisfactory basis. The Staff (Ms. Lambert in charge) (F, W, Sp)

311. Field Work in Special Education. (3) Hours to be arranged. (F, W, Sp)

333C. Directed Practice in School Libraries. (6) One hour and 10-12 hours of field work per week. Prerequisite: consent of instructor. Must be taken on a satisfactory/unsatisfactory basis.

333D. Practicum in College Reading. (3) Two hours of lecture and eight hours of field work per week. Prerequisite: consent of instructor. Supervised work experience in the University of California Reading and Study Skills Service. Students will work individually with high school and college students. Tasks will include diagnosis, planning individualized remedial programs, and evaluating individual progress.

334A-334B. Supervised Teaching. (3-12; 3-12; 3-12) One to three hours of lecture and 9-30 hours of field work in the public schools per week. Prerequisite: advanced placement to a credential program (multiple subject or single subject). Students enroll in this course for a maximum of 18 units. The number of units and hours of lecture and field work vary with individual programs and with the quarter in the program sequence. The sequence in supervision may begin with the opening of the public schools in the fall and extend through the spring quarter. Initial entry into supervised teaching in quarters other than fall may be possible in some programs or teaching fields, subject to special arrangement. Credit and grade assigned upon completion of full sequence. Supervisory Staff (F, W, Sp)

334D. Supervised Teaching. (3-12) One to three hours of lecture and 9-30 hours of field work in the public schools per week. Prerequisite: advanced placement to a credential program (multiple subject or single subject). Students may repeat this course for a maximum of 18 units. The number of units and hours of lecture and field work vary with individual programs and with the quarter in the program sequence. The sequence in supervised teaching may begin with the opening of the public schools in the fall and extend through the spring quarter. Initial entry into supervised teaching in quarters other than fall may be possible in some programs or teaching fields, subject to special arrangement. Supervisory Staff (F, W, Sp)

335. Field Work for Advanced Reading-Language Leadership Program. (3) Two hours of lecture and four hours of field work per week. Prerequisite: admission to Advanced Reading-Language Leadership Program. Open only to those students who have completed an evaluation session and met all requirements. Proficiency in knowledge through implementation of exemplary reading-language programs in individual classrooms and school districts. Mr. Rupp (F, W, Sp)

340. Field Work in Student Personnel and Counseling Psychology.
Civil Engineering
Department Office, 760 Davis Hall
Chairman:
Carl L. Monismith, M.S.

HYDRAULIC AND SANITARY ENGINEERING
Division Office, 633 Davis Hall

Professors:
Hugo B. Fischer, Ph.D. (Emeritus)
James A. Harder, Ph.D. (Emeritus)
David Jenkins, Ph.D. (Emeritus)

Assistant Professor:
Alexander J. Horne, Ph.D.

Assistant Professor:
Jorg Imberger, Ph.D.

Lecturers:
Charles F. Dalziel, E.E.
Leonard J. Black, Ph.D.

STRUCTURAL ENGINEERING AND STRUCTURAL MECHANICS
Division Office, 721 Davis Hall

Professors:
Frank Baron, D.Sc.
Vitaly V. Varshavsky, Sc.D.
Jack G. Bowkulnerable, G.I.
Boris Breger, M.S.
Andr K. Chopra, Ph.D.
Ray W. Clough, Jr., Sc.D.
William G. Goddard, Ph.D.
James M. Kelly, Ph.D.
Jacoel Luchtner, Ph.D.
Howard D. McKinnon, Ph.D.
Pavel V. K. Mehta, D.Eng.
Joseph P. Nixon, Ph.D.
David Pirtz, M.S.
Karl S. Puler, Ph.D.
Milos Polvka, Ph.D.

Associate Professor:
Richard Williamson, Ph.D.

Professor:
Earl R. Parker, M.Sc.

Lecturers:
Clarence C. Golueke, Ph.D.
Pat Wilde, Ph.D.

TRANSPORTATION ENGINEERING
Division Office, 215 McLaughlin Hall

Professors:
James M. Anderson, Ph.D.
Tor Langlieg Brekke, Dr. Ing.
James M. Gunan, Ph.D.
William L. Gerst, Ph.D.
Ben C. Garlick, Jr., B.S.
Richard E. Goodman, Ph.D.
Robert Horowitz, Ph.D.
John Lerner, Ph.D.
Adol D. May, Jr., Ph.D.
James B. Mitchell, Sc.D.
Richard F. Palarczyk, Ph.D.
Dickson E. Galloway, Ph.D.

Associate Professor:
William H. Kemper, Ph.D.

Assistant Professor:
Ken C. Chandel, Ph.D.

Assistant Professor:
Adin Katalnitzky, Ph.D.

Lecturers:
Clarence K. Chan, M.S.
Wolfgang S. Homburg, M.S.
Thomas A. Lang.

Civil engineering is concerned with the planning, design, and construction of public and private works such as buildings, bridges, dams, transportation systems, and water supply systems. The civil engineer must have a full understanding of the physical and economic aspects of structures and systems. The four-year undergraduate curriculum leading to the B.S. degree is designed to provide a basic and fairly comprehensive background in civil engineering and related fields. This curriculum may provide a student with a direct entry to professional experience upon graduation or with preparation for graduate study. Students may arrange their program to integrate graduate and undergraduate study into a five-year program, leading to the bachelor's degree by the end of the fourth year and the master's degree by the end of the fifth year.

CURRICULUM FOR THE BACHELOR'S DEGREE
A total of 180 units is required. The program of study is described in detail in the Announcement of the College of Engineering (available without charge from the College of Engineering, University of California, Berkeley, California 94720). All students must complete a total of 27 units in humanities and social studies which must include a 2-quarter sequence from an approved list. At least 9 units must be upper division courses. Other courses include:

Lower Division: Required. Mathematics 1A–1B, 1C, 11, 15, 16, 17, 18, 21, 25, 26, 31, and 32. Students with a strong interest in either theoretical or computational applications should take Mathematics 51A–51B in place of Mathematics 41.

Chemistry 1A–1B, Physical or Biological Sciences: A 4-unit course in a subject approved by the adviser. Physics 3A–3B, and 5A–5C are recommended.

Computer Science Division 1 and Statistics 25. Electives: 22 units including at least 15 units in humanities or social sciences.

Upper Division: Required. Mechanical Engineering 104A, Civil Engineering 110, 118, 121, 130, 131, 133 or 134, 140, 141, 154A–154B, 170, 192, and 194.

Electives: 5 units of upper division civil engineering courses. 25 units of electives including 12 units in humanities and social sciences (of which 9 must be upper division) and 14 units of free electives.

GRADUATE STUDY
Graduate programs of study leading to the master's and doctoral degrees are available in the major civil engineering fields: air pollution, construction, geodesy and photogrammetry, hydrology, sanitation, sanitary, geotechnical engineering, ocean engineering, structural engineering and structural mechanics, transportation, and water resources. For details, please consult the Announcement of the College of Engineering.

Electrical Engineering and Computer Sciences
Department Office, 231 Cory Hall

Electrical Engineering students must complete the following minimum requirements:

I. Sixty units of engineering must be taken in the upper division, including: (a) Computer Science 1, Engineering 17 and 45; (b) 4 upper division laboratory courses in electrical engineering and computer sciences; (c) 30 upper division units in electrical engineering and computer sciences; (d) 6 units in engineering not in electrical engineering and computer sciences, including Not Computer Science 1 and Engineering 17 and 45.

II. A total of 24 units in physical or life science including Physics 5A, 5B, 5C, and 5D.

III. A total of 24 units in mathematics and statistics including Mathematics 1A, 1B, 1C or 1D or equivalent material covered by 12 units of Mathematics 15.

IV. Seventy-two units of electives including at least 27 units with a special objective as approved by their adviser and the department Undergraduate Study Committee.
units of humanities and social sciences with at least 9 units of the latter at the upper division level and containing at least one two-quarter sequence from an approved list of courses.

Beyond satisfaction of the minimum requirements for the B.S. degree, students follow one of three basic Sciences program in which they will receive an introduction to a large number of the areas outlined above. They may plan their curriculum in one of the four main programs in the Department of Electrical Engineering and Computer Sciences: electronics, systems, computer sciences, and bioelectronics. Or they may plan an individual program to suit their special needs or background.

General Electrical Engineering and Computer Sciences Program. The lower division program contains Physics 5A through 5D, Mathematics 1A through 1C or equivalent material covered by 12 units of Mathematics 15, Computer Science 1 or 1S, Engineering 17 and 45, about 15 units of humanities and social science, and about 40 units of electives. It is recommended that part of the elective units be taken in engineering, physical or life science, mathematics and statistics so as to strengthen and broaden the background and to satisfy some of the requirements in these areas. Engineering 102 or Computer 50 or equivalent selection of course in electric circuits, electronics, systems analysis, electromagnetic fields, communication and control theory, computer systems and programming, dynamics, thermodynamics, and quantum mechanics. A detailed listing of recommended courses can be found in the Announcement of the College of Engineering.

Programs in Specific Areas. In order to provide a choice of well-integrated programs for the student who has clearly defined interest in one of the major areas of Electrical Engineering and Computer Sciences, the department offers four programs of study in the following general areas:

- Electronics: For students whose interests fall into areas such as solid state electronics, cryogenic electronics, integrated circuits, plasma, electron beams, microwave electronics, quantum electronics, optical electronics, super-conductivity, and energy conversion.
- Systems: For students whose interests fall into areas such as networks, control theory, information theory, communication theory, finite-state systems, mathematical programming, system theory, and large-scale systems.
- Bioelectronics: For students interested in animal control systems, physical modeling of neural systems, application of circuit and system techniques to living systems, and ecological systems.

Computer Science and Engineering. For students interested in machine organization and logical design, programming systems and languages, digital devices and circuits, heuristic programming and artificial intelligence, switching and automata theory, algebraic theory of machines, mathematical theory of languages, data structures, coding theory, pattern classification, and learning systems.

Programs in Computer Science at Berkeley are offered through the Computer Science Division of the Department of Electrical Engineering and Computer Sciences.

Undergraduates who wish to major in computer science should have completed either Introductory Courses in Letters and Science or through the College of Engineering. Details of the Computer Science Major in the College of Letters and Science may be found in the Computer Science section of this Catalogue.

GRADUATE PROGRAM

To prepare the graduate student for work in the rapidly developing fields of electrical engineering and computer sciences, the department's program emphasizes fundamentals, yet provides a wide selection of courses and seminars and a reasonable amount of freedom for meeting degree requirements. There is no single required sequence of courses. Programs are designed by consultation between the student and his faculty adviser.

Graduate degree programs are available as preparation for research and teaching (Master of Science and Doctor of Philosophy), and for careers in design, development, and management (Master of Engineering and Doctor of Engineering). The Master of Science program requires about one year of study. About three additional years are usually required for the Doctor of Philosophy. The Master of Engineering degree requires five quarters of study and includes a minor in a technical subject outside the field of specialization, and a second minor in a nontechnical subject such as law, business administration, etc. The Doctor of Engineering program, of about two years duration, builds on the course work for the Master of Engineering and requires a one-year internship in a design and development organization. Students with either a B.S. or an M.S. who intend to study for the D.Eng. should apply first for the M.Eng. program.

A detailed description of the available fields of graduate study in electrical engineering and computer sciences is given in the Announcement of the College of Engineering. For further details on graduate programs and procedures, see the Electrical Engineering and Computer Science Graduate Orientation Notes, available from 197 Cory Hall.

Engineering Science

The student in engineering science studies in one of several areas where engineering closely interacts with the natural sciences, mathematics, statistics, or medicine. Students in this program may choose to prepare for graduate study in engineering fields, the natural sciences, or computer science. Graduate programs in engineering science are offered by the individual engineering departments.

PROGRAMS FOR THE BACHELOR'S DEGREE

The undergraduate Engineering Science curriculum is multidisciplinary and is administered by the Engineering Science Committee. Admission to the engineering science curriculum requires a grade-point average of 2.0. This average must be maintained in the lower division. A grade-point average of 2.5 or better must be maintained in the upper division. All Engineering Science programs must include 27 units of physical or life sciences, mathematics or statistics; sufficient units of physical or life sciences so that total is 24 units including Physics 5A–5B–5C.

Engineering Physics: Required: Mathematics 120A–120B–120C, or 104A–104B, and 185; Physics 110A–110B–110C or Electrical Engineering and Computer Science 104A and 117A–117B, Mathematics 120A–120B–120C, or 104A–104B, or Physics 110A–110B–110C; Electrical Engineering and Computer Sciences 141 or 143A or Mathematics 110A–110B–110C; Engineering 102 or Electrical Engineering and Computer Sciences 171 or Physics 111A; Mechanical Engineering 111 or Physics 112 or Materials Science and Engineering 102 or Mechanical Engineering 105A; Physics 141A or Electrical Engineering and Computer Science 130 or Materials Science and Engineering 108; Mechanical Engineering 165 or Civil Engineering 139 or Mechanical Engineering 106A or Civil Engineering 165A; 20 units of upper division courses in the Department of Physics.

Individual Program in Engineering Science. Required: 90 units of upper division electives of which 20 units must be in approved upper division courses in Natural Science or Mathematics.

PROGRAMS FOR GRADUATE DEGREES

Students with a B.S. degree in fields other than engineering, as well as those with a B.S. degree in engineering, may be eligible for the M.S. and Ph.D. degrees in engineering science. Programs of study and research leading to a graduate degree in engineering science are offered by all of the engineering departments. These programs emphasize the theoretical principles of engineering, the sciences, and the knowledge and skills in which developments in engineering and the applied sciences are based.

Industrial Engineering and Operations Research

Department Office, 4135 Etcheverry Hall

Professors:
Richard E. Barlow, Ph.D.
Edward R. F. W. Crossman, Ph.D.
Stuart E. Dreyfus, Ph.D.
C. Roger Glassey, Ph.D.
Jonathan J. Golovin, Ph.D.
Ronald W. Shepherd, Ph.D.
William S. Jewell, Sc.D.
Edward C. Keachie, Ph.D.
Richard M. Karp, Ph.D.
Robert M. Oliver, Sc.D.
Ronald W. Wolff, Ph.D.
Shepherd M. Ross, Ph.D.
Ronald W. Wolff, Ph.D.
Edward C. Keachie, Ph.D.
(Chairman)

Associate Professors:
R. Geiger Glasser, Ph.D.
James T. Lepstey, Jr., M.S.
Ronald W. Wolff, Ph.D.

Assistant Professor:
Ivan Adler, Ph.D.

Lecturers:
Jonathan J. Golovin, Ph.D.
Stephen Laner, Ph.D.

Industrial engineering and operations research in a modern field of systems design, analysis, and control which is concerned with integrated systems of men, machines, and materials, and in the design and operation of such systems. Increased emphasis is placed on applications in socio-engineering, such as water resources
management, transportation systems, pollution and waste disposal systems, and highway accident prevention, as well as the classical studies of production, automation, inventory, scheduling, systems reliability, engineering economics, incentives, organization, and man-machine systems.

Undergraduates in Industrial Engineering and Operations Research receive broad training in engineering fundamentals, as well as principles of economics and advanced mathematics and statistics in order to prepare them for elective sequences which stress the construction of systems models, the role of the human being in these systems, and the related mathematical methods of optimization and control. A unified core program is offered both for students who wish to pursue the professional aspects of the field, and for those who, after further education at the graduate level, wish to engage in teaching and research careers in the industrial development of students with diverse objectives, considerable flexibility in planning individual programs is provided.

**CURRICULUM FOR THE BACHELOR'S DEGREE**

A total of 180 units is required, including:

**Lower Division.** Required: Mathematics 1A–1B, 5A–5B–5C; Chemistry 1A–1B; Physics 5A–5B–5C; Engineering 17, 45; Computer Science 1, 2; 7 to 8 units of technical electives: to be selected from Engineering 22, 26, 36, Computer Science 41, Physical, or Biological Sciences courses approved by the advisor; 21 to 22 units of electives. 11

**Upper Division.** Required: Industrial Engineering and Operations Research 120, 130, 160, 161, 162, 170, 171, 172, 150, 153, 154, 180; Statistics 134A, 147; 44 units of electives. 11

**GRADUATE PROGRAMS**

Graduate programs leading to the M.S., M.Eng., Ph.D., and D.Eng. are offered in two interrelated areas of study: 12

- **Industrial Engineering.** This program has been developed to meet the needs and interests of engineers and scientists wishing to enhance their competence in industrial, service and public systems design, analysis and operation, thus preparing students for administrative positions.
- **Operations Research.** This program prepares the student for advanced work in the theory of systems science. The development of quantitative model structures and necessary methods of analysis and optimization are emphasized.

Undergraduates from scientific disciplines other than engineering may be accepted into these programs. A master's degree may be earned by thesis or by examination. Doctoral degrees require oral examination in the major and two minor fields followed by submission in a thesis demonstrating ability to conduct independent advanced research. Graduate research facilities are available in the Human Engineering and Organizational Sciences Laboratory, and in the Operations Research Center.

The department requires all graduate applicants to submit verbal and quantitative aptitude scores of the Graduate Record Examination. Further information on graduate programs may be obtained from the Industrial Engineering and Operations Research Office, 4135 Eichengay Hall and in the Announcement of the College of Engineering.

**Manufacturing Engineering**

Manufacturing Engineering is an interdisciplinary program offered jointly by the Department of Industrial Engineering and Operations Research and the Department of Mechanical Engineering. The program will train engineers in an integrated view of properties of materials, manufacturing process fundamentals, productive system analysis, and systems design and synthesis.

**CURRICULUM FOR THE BACHELOR'S DEGREE**

A total of 180 units is required, including:

- **Lower Division.** Mathematics 1A–1B–1C, 5A–5B–5C–5D; Chemistry 1A–1B; Physics 5A–5B–5C–5D; Computer Science 1, 2; Engineering 17, 28, 36, 45; 22 units of electives.
- **Upper Division.** Engineering 102; Civil Engineering 130; Mechanical Engineering 101, 102A, 102B or Industrial Engineering and Operations Research 180, 104A, 105A or 111, 134 or Industrial Geophysics and Operations Research 130; Industrial Engineering and Operations Research 120, 150, 153, 163; Statistics 134A, 147, 34 to 35 units of electives. Electives must include:
  - (a) Sufficient total units in humanities-social studies so that the total of such units from the lower and upper divisions is at least 27. The 27 units must include a two-quarter sequence from an approved list and at least 9 units must be completed in upper division courses. (b) Two courses from each of the following two groups: I. Mechanical Engineering 121, 122, 127, 131, 132. Group II: Industrial Engineering and Operations Research 170, 172, 154, 162, 168.

**Materials Science and Engineering**

**Department Office, 210 Heston Mining Building**


**Associate Professors:** Marshal F. Merriman, Ph.D.; J. W. Evans, Ph.D.

**Assistant Professors:** W. E. Farrel, Ph.D.; Michael C. Williams, Ph.D.

**Lecturer:** Kenneth H. Kelley, Ph.D.

The Department of Materials Science and Engineering administers an undergraduate program in materials science and graduate programs in materials science and engineering geoscience. (The undergraduate program in engineering geoscience is part of Engineering Science.)

Materials science deals with natural and man-made materials—their extraction, development, and characterization for use particularly in advanced applications as large-scale electronic computers, atomic energy, and aerospace industries. A student in the materials science and engineering curriculum is provided a basic background in chemistry, physics, and engineering and applies this background to a field of specialization: ceramic engineering, composite materials, polymer technology, or metallurgy.

Engineering geoscience applies the discoveries and knowledge of mathematics, statistics, physics, chemistry, and the geo- and remote fields to meet fundamental characterization of materials. Re- 12 Electives must include sufficient total units in humanities-social studies so that the total of such units from the lower and upper divisions is at least 27. The 27 units must include a two-quarter sequence from an approved list and at least 9 units must be completed in upper division courses. (b) Two courses from each of the following two groups: I. Mechanical Engineering 121, 122, 127, 131, 132. Group II: Industrial Engineering and Operations Research 170, 172, 154, 162, 168.

**CERAMIC ENGINEERING**

Ceramic engineering studies the chemical and physical properties of the raw materials and products of the ceramic industry and fundamentals of ceramic processing. Ceramics include inorganic and nonmetals which are subjected to their production or use, to high-temperature environments. Such materials include rocket nozzles, electrical insulators, precision molds for metallurgical indus- try, and porcelain and glass of all types. Ceramic engineers work not only in the industries producing ceramic products but also in industries which make extensive use of ceramic materials such as aerospace, nuclear, and electrical.

**METALLURGY**

Metallurgy is the science and art of processing, refining, and utilizing metals and alloys. The field has two major areas of specialization.

- **Extractive Metallurgy.** Studies of the scientific and engineering principles utilized in recovering metals from ores and in refining them to the desired purity. The subject includes mineral processing as well as smelting, leaching and electrochemical methods of extracting and refining metals and requires using the most recent advances in chemistry and physics.
- **Physical Metallurgy.** Primarily studies the relationships between the chemical and physical structure of materials and their properties. The improvement and control of properties of materials for advanced applications is a broad field within which primary emphasis can be directed toward fundamental physics, chemistry or engineering. Because of the ever-increasing demand for improved or better characterized materials, fundamental and applied research in the field is extremely active, providing a wide choice of rewarding career opportunities.

**CURRICULUM FOR THE DEGREE AND ITS PROGRAMS**

Students in all programs in materials science and engineering must complete a total of 180 units.

- **Lower Division.** Required: Mathematics 1A–1B–1C, 5A–5B–5C–5D; Chemistry 1A–1B–1C; Physics 5A–5B–5C–5D; Engineering 17, 28, 36, Computer Science 1, 2; 22 units of electives. 12
- **Upper Division.** Required: Chemical Engineering 101, 102A, 102B or Industrial Engineering and Operations Research 180, 104A, 105A or 111, 134 or Industrial Geophysics and Operations Research 130; 26 units of electives. 12 Note: Physics 5E and 8 units of mathematics, if not taken in the lower division, may be taken in the junior year without any delay in progress toward the degree provided a total of 90 units has been completed in the first two years.

**GRADUATE STUDY IN MATERIALS SCIENCE**

Qualified holders of the bachelor's degree in fields such as ceramic engineering, metallurgy, physics, chemistry, and various fields of engineering can all successfully undertake graduate study in materials science.

The graduate program emphasizes research. Techniques such as transmission electron microscopy, field ion microscopy, X-ray diffraction topography, mass spectrometry, precision electrical conductivity measurements, micro-probe X-ray emission spectroscopy, differential thermal analysis, precision calorimetry and cryogenic and high temperature mechanical testing are used for fundamental characterization of materials. 13

13 May be satisfied by Engineering 17 taken in the lower division.
**Mechanical Engineering**

**Department Office, 6193 Etcheverry Hall**

**Professors:**
- Cyril P. Atkinson, M.S., M.E.
- Stanley A. Berger, Ph.D.
- David B. Boggs, Ph.D.
- G. Wayne Brown, M.S.
- Michael J. W. Cole, Ph.D.
- Gilles M. Cormos, Ph.D.
- Ignatius L. Dang, Ph.D.
- Don M. Cunningham, M.S.
- Irving Fatt, Ph.D.
- Ian Finnle, D.Sc., D.Sc.
- Joseph W. Frisch, M.S.
- Werner Goetschin, Ph.D.
- Ralph Greil, Ph.D.
- Frank E. Hauser, Ph.D.
- Maught B. Hoeft, Ph.D.
- Walter J. S. Hwu, Ph.D.
- Francis A. Hult, Ph.D.
- Shobha K. Kalgavadi, Ph.D.
- Alan D. K. Laird, Ph.D.
- Donald L. Leis, Ph.D.
- George LaGreffe, Ph.D.
- Paul Lieber, Ph.D.
- Peter J. Liston, B.S.
- Cyril P. Atkinson, M.S.
- Israel I. Cornet, Ph.D.
- Frank C. Hurlbut, Ph.D.
- Shiro Kobayashi, Ph.D.
- Alan D. K. Laird, Ph.D.
- Clayton D. Mote, Ph.D.
- Paul Lieber, Ph.D.
- Charles W. Radcliffe, M.S., M.E.
- Associate Professors:
  - David M. Auslander, Ph.D.
  - John W. Dalby, Ph.D.
  - Constance W. Miller, Ph.D.

**Lecturer:**
- Milton R. Pickus, Ph.D.

**Engineering Office, 6193 Etcheverry Hall**

**Professors:**
- David B. Boggs, Ph.D.
- G. Wayne Brown, M.S.
- Michael J. W. Cole, Ph.D.
- Gilles M. Cormos, Ph.D.
- Ignatius L. Dang, Ph.D.
- Don M. Cunningham, M.S.
- Irving Fatt, Ph.D.
- Ian Finnle, D.Sc., D.Sc.
- Joseph W. Frisch, M.S.
- Werner Goetschin, Ph.D.
- Ralph Greil, Ph.D.
- Frank E. Hauser, Ph.D.
- Maught B. Hoeft, Ph.D.
- Walter J. S. Hwu, Ph.D.
- Francis A. Hult, Ph.D.
- Shobha K. Kalgavadi, Ph.D.
- Alan D. K. Laird, Ph.D.
- Donald L. Leis, Ph.D.
- George LaGreffe, Ph.D.
- Paul Lieber, Ph.D.
- Peter J. Liston, B.S.
- Cyril P. Atkinson, M.S.
- Israel I. Cornet, Ph.D.
- Frank C. Hurlbut, Ph.D.
- Shiro Kobayashi, Ph.D.
- Alan D. K. Laird, Ph.D.
- Clayton D. Mote, Ph.D.
- Paul Lieber, Ph.D.
- Charles W. Radcliffe, M.S., M.E.

**Associate Professors:**
- David M. Auslander, Sc.D.
- John W. Dalby, Ph.D.
- Constance W. Miller, Ph.D.

**Graduate Study**

**Aeronautics and Fluids Mechanics. Engineering 116, 117; Mechanical Engineering 133, 134, 147, 151, 159, 162, 164, 175; Civil Engineering 138, 166a; Physics 132, Astronomy 101.**

**Biomechanics. Engineering 116, 117; Mechanical Engineering 133, 134, 172, 175; Electrical Engineering and Computer Sciences 119, 128a-128b.**

**Environmental Engineering. Engineering 116, 117; Mechanical Engineering 133, 134, 172, 174, 175, 185, 282a; Mathematics 104a.**

**Energy Conversion Engineering 117, 160, 161; Mechanical Engineering 110, 145, 146, 147; Physics 132.**

**Environmental Engineering. Engineering 150, 151, 152; Mechanical Engineering 110, 142, 146, 151, 159, 160, 173, 174; Civil Engineering 140, Geography 146, Architecture 110.**

**General Mechanical Engineering. Engineering 117; Mechanical Engineering 133, 147, 151, 159, 185.**

**Heat and Mass Transfer. Engineering 117; Mechanical Engineering 151, 155, 159.**

**Materials Processing and Manufacturing Management. Mechanical Engineering 110, 121, 123, 133, 151; Industrial Engineering and Operations Research 120, 154, 166, 176, 180; Business Administration 140, 141, 142, 154; Economics 103A-103B, 121A-121B; Engineering 102.**


**Nuclear Architecture. Naval Architecture 151, 152A-152B, 153, 154A-154B; Civil Engineering 131, 138; Mechanical Engineering 133, 159, 162, 175; Mathematics 120A-120B-120C.**

**Nuclear Engineering. Nuclear Engineering 101, 102, 103, 120, 122, 150A-150B, 160A-160B, 162; Interdepartmental Studies 124; Mechanical Engineering 151, 155, 159; Physics 137A-137B; Mathematics 120A-120B-120C.**

**Petroleum Engineering. Mechanical Engineering 148, 149; Civil Engineering 116, 118; Engineering 160.**

**Graduate Study**

Both master’s and doctoral programs are available. The student may choose either a scientific emphasis in particular areas or integrated studies directed to professional objectives. Master of Science and Ph.D. degrees are the relevant degrees for the scientific emphasis, and Master of Engineering and D.Eng. degrees for the professional one. Specialization is offered in the following areas: (1) Fluid Mechanics and Dynamical Systems, (2) Fluid Mechanics, (3) Heat and Mass Transfer, (4) Mechanical Design, (5) Mechanics of Deformable Media, (6) Thermodynamics, (7) Bioengineering, (8) Environmental Engineering. Details on various aspects of graduate study are available from departmental brochures and from the Announcement of the College of Engineering.
Senior Lecturer:
Robert V. Fyle, Ph.D.

Lecturers:
Philip R. Pius, Ph.D.
Roger W. Wallace, Ph.D.

Nuclear engineering is concerned with the applications of nuclear reactions, including the design, analysis, and operation of nuclear reactors and their nuclear fuel cycles. The emphasis is on nuclear fission reactors, but the principles taught are also applicable to the development of nuclear fusion as an energy source. The nuclear engineering courses deal with the physical principles of nuclear reactions, the interaction of nuclear radiation with matter, the behavior of neutrons in reactor media, the thermal and hydrodynamic principles of heat extraction, the properties of nuclear materials, and the analysis of nuclear fuel cycles. These subjects are taught in courses at the undergraduate and graduate levels. Other courses include radiation protection and biological effects, environmental effects, nuclear safety, and thermonuclear fusion.

Undergraduates can major jointly in nuclear engineering and in other fields of engineering through the undergraduate double major programs (see below). Graduate programs leading to the master's and doctoral degrees involve advanced course work in nuclear engineering and in allied fields and direct participation in research under supervision of the nuclear engineering faculty.

For details on degree requirements please consult the Announcement of the College of Engineering and the Colleges and Schools section of this catalog.

Engineering: Special Programs

Double Major Programs of Study. The Double Major Program is designed for students who wish to undertake studies in two areas of engineering in order to qualify for employment in either field or for positions in which competence in two fields is required. Students may prepare for a bachelor's degree combining study in any of the following areas:

- Civil Engineering/Materials Science and Engineering
- Electrical Engineering and Computer Sciences/Materials Science and Engineering
- Mechanical Engineering/Materials Science and Engineering
- Materials Science and Engineering/Nuclear Engineering
- Civil Engineering/Nuclear Engineering
- Electrical Engineering and Computer Sciences/Nuclear Engineering
- Industrial Engineering and Operations Research/Nuclear Engineering
- Mechanical Engineering/Nuclear Engineering

These curricula include the core courses in each of the major fields. They involve normal course loads and can be completed in four years. Both majors are shown on the student's transcript of record. For complete information about programs of study under the Double Major see the Announcement of the College of Engineering.

Environmental Engineering. The College of Engineering offers a series of courses in environmental engineering open to all junior and senior engineering students and to qualified students in other fields. The courses are intended to provide a sound introduction to the identification of environmentally related problems in such areas as air pollution, water pollution, solid waste disposal, and nuclear power generation.

These courses, listed as the Engineering 150 series, are taught on an interdepartmental basis and bring together a number of faculty with expertise and interests in one of the problems.

For those students interested in applying their engineering background to the solution of specific environmental problems, graduate study is strongly recommended, and particulars of these programs are given under "Interdisciplinary Graduate Programs."

Interdisciplinary Graduate Programs

Many areas of graduate study encompass the work of faculty in more than one engineering department and include faculty and programs not included in the College of Engineering. Such interdisciplinary programs are continually developing within the College of Engineering. Following is a list of those programs that have been formally approved at press time. Each program is supervised by a special graduate programs committee which provides a unifying thread to the program. Study in these programs leads to degrees in Master of Science, Master of Engineering, Doctor of Engineering, or Doctor of Philosophy.

Further information on any of these programs can be obtained by writing to the Dean of the College of Engineering, Interdisciplinary Studies, 103 Naval Architecture Building, University of California, Berkeley, CA 94720.

Air Pollution Engineering. This is an interdisciplinary program which includes Civil Engineering, Mechanical Engineering, Chemical Engineering and School of Public Health. The core program is taken by all students who then specialize in the respective departments.

Bioengineering. The purpose of the bioengineering program is to equip a student with a strong background in engineering while at the same time providing either a broad interdisciplinary exposure to biological, physiological, medical, and other health or life science related areas, or a more intense, thorough professional training in a particular specialty within these areas. The intention of this type of hybrid education is to allow the student to become a unique multidisciplinary professional, with knowledge of both theoretical and practical disciplines related to biological or medical systems. This type of educational background the bioengineer can expect to bring new concepts, approaches, and techniques to bear on these problems.

Students engaged in the study of bioengineering can construct an individualized program of study including courses from a broad spectrum available in engineering, life sciences, health sciences, as well as interdisciplinary courses in bioengineering. This flexibility allows the student to develop interdisciplinary specialties of his or her own choice. The graduate program in Bioengineering at Berkeley spans the College of Engineering, with appropriate courses and research in most of the engineering departments. More than twenty faculty members in the College of Engineering are directly involved in bioengineering research, and many more have peripheral interests in the area and support student research in bioengineering. The following list illustrates the major research interests in each of the various departments:

- The Civil Engineering Department has a strong effort in sanitary engineering, air and water pollution, and the ecology of aquatic and estuarine systems, with a rich selection of courses in these areas. Research also is under way in this area on the hydrodynamics of fluvial and ciliar movement and other related problems in biological hydrodynamics.
- The Department of Electrical Engineering and Computer Sciences has major efforts in vision and other areas of neuroscience, in neuromuscular control systems, in the development of electron microscopy for biomedical applications, in biomedical instrumentation, in electronic prostheses design, and in the use of electrophysiological and theoretical biology, with a wide selection of relevant courses.
- The Department of Industrial Engineering and Operations Research offers a well-developed program of courses and research in human factors and the man-machine interface.
- The Mechanical Engineering Department offers wide-ranging research programs in several areas of biomechanics, including head-injury studies and mechanical prosthesis design, in biological fluid mechanics, in biomedical applications of computers and intensive care patient monitoring, in biological mass transport and heat transfer, and in population dynamics, with several graduate and undergraduate courses in general bioengineering.

The Department of Nuclear Engineering offers excellent opportunities for research in nuclear medicine in conjunction with the staff of the Lawrence Berkeley and Livermore Laboratories and the Donner Laboratory of Medical Physics, which adjoins the engineering buildings on the Berkeley campus.

In each department, the research is conducted in close collaboration with the Pile Laboratory, the Environmental Engineering Research Group, the School of Optometry, and the School of Public Health.

Graduate programs of study in Bioengineering are part of a general unit called Interdisciplinary Studies administered by the Dean of the College of Engineering and an Interdepartmental Bioengineering Committee of faculty. However, each student enrolling in Bioengineering registers for graduate study in one of the previously mentioned departments.

Earthquake Engineering. The College of Engineering has a wide range of course offerings in the general field of earthquake engineering which allows graduate students to individualize their programs to individual students' interests and objectives. Emphasis in these programs can be placed on various subject areas such as structural engineering, geotechnical engineering design and construction, mechanical engineering, ocean engineering, and dynamic systems. These programs are interdisciplinary in nature as the major field consists of courses selected from a number of subject areas. Selected courses in seismology and mathematics are recommended to provide the technical breadth complimentary to the major field.

Energy and Energy Resource Engineering. It is generally recognized that the provision of an adequate supply of energy in economic and environmentally acceptable forms will be one of the most important tasks facing the engineering profession in the decades ahead. The complexity of the problems in the energy field requires an interdisciplinary approach in which engineering analyses are set in a framework of socio-economic and public policy concerns.

The physical and environmental limits to the use of energy and the fuel supplies are two major concerns in the decisions of options in the conversion, utilization, and distribution of energy, present fundamental and challenging technical problems for both research and professionally oriented engineering students.

The College of Engineering offers a variety of graduate programs, including, in particular, a two year course of study for a Master of Engineering degree involving interdisciplinary work in energy and energy resource engineering across departmental boundaries and in including social and policy studies. The programs involve specialization in an energy technology within a student's "home" department, technical breadth courses in other engineering departments and in general energy studies, and a major selection of courses in socio-economic and policy areas. Individual study in involving synthesis and project design is an important part of the total program. Energy and energy resource disciplines are included in the engineering departments with associated fields of specialization as follows:

- Civil Engineering: structures; resources; environmental engineering; transportation.
- Electrical Engineering & Computer Sciences: electric power, systems and optimization, solid state, plasma.
- Industrial Engineering & Operations Research: optimization, large system studies, applied stochastic processes.
- Materials Science & Engineering: materials for energy conversion; materials process engineering, particulate materials.
Mechanical Engineering: thermal power, combustion, heat transfer, resources.

Nuclear Engineering: reactor engineering; safety and environment; fuels and materials; fusion.

Environmental Engineering. Within its Departments and Organized Research Units the College of Engineering offers many avenues for academic study and research in Environmental Engineering. Attention in some areas is focused on fundamental understanding of sources of environmental pollution and on methods of monitoring and treatment for the maintenance of environmental quality. In other areas the principal interest lies in applications of engineering technology to the recovery or utilization of resources while guarding against environmental deterioration. In each of these fields the excellence of faculty and the distinction of graduates is well known.

At Berkeley the development and preparation of the engineer qualified for professional practice builds upon his sound training in disciplines of a parent field. This background and professional orientation are broadened by additional studies appropriate to his professional goals.

Departments offering degree programs in environmental engineering areas are indicated in the summary below. Students desiring preparation in an environmental engineering field should enroll in a department of the College most nearly containing the core curriculum of their area of interest. Their program will be planned through conferences with the adviser and will contain both core and breadth elements according to interests and the special degree requirements of the department. For instance, students electing an M.S. degree program in Air Pollution Engineering may be enrolled in the Departments of Civil Engineering, Chemical Engineering (College of Chemistry), or Mechanical Engineering.

Students enrolled in the Department of Mechanical Engineering may select environmental engineering as an interdisciplinary Major Field. Within this area the student may arrange degree programs at all levels in fields of Air Pollution Engineering, Desalination, Geothermal Energy, Solid Waste Management, Waste Heat Management, and others. (See the brochure of Department of Mechanical Engineering.) Members of the Mechanical Engineering faculty are actively engaged in a variety of research and development projects in each of these areas.

The Division of Hydraulic and Sanitary Engineering, Department of Civil Engineering has long maintained a leading position in areas of water quality and hydraulic engineering. Programs for students enrolled in this division may be arranged in Coastal Engineering, Water Resources Engineering, and Sanitary Engineering. The faculty of the Division engages in vigorous and diversified programs of research in the Hydraulic Engineering Laboratory and the Sanitary Engineering Research Laboratory.

Nuclear Engineering offers programs in radiation protection, reactor safety, management of radioactive wastes, and environmental monitoring of radioactive releases.

In the various environmental engineering activities of the College, close working cooperation is maintained among the Departments and laboratories with the College of Chemistry and School of Public Health.

Ocean Engineering. Ocean Engineering is the application of engineering techniques and technology to the marine environment. Some of the present areas of concern faced by the ocean engineer are demands for increased utilization of non-living marine resources such as petroleum, aggregates, and metallic minerals; the impact of large coastal populations creating potential marine pollution problems; increased trade with other nations, particularly in bulk cargos, requiring not only new surface ship design but also modern port facilities and advanced cargo handling techniques; in essence, all those human activities which utilize the ocean.

As Ocean Engineering incorporates a wide range of engineering disciplines, four departments participate in Berkeley's Ocean Engineering Program: Civil Engineering, Materials Science and Engineering, Mechanical Engineering, and Naval Architecture.


Research is conducted chiefly in the various laboratories on the Berkeley campus and at the Richmond Field Station as well as at satellite laboratories, such as the Bodega Marine Laboratory. Oceanographic research vessels and ship time are available locally through working arrangements with the California Maritime Academy and other local sources and in San Diego for world-wide operations through the University's marine facilities at the Scripps Institution of Oceanography.

Student support is administered directly by the four participating departments. A variable and limited number of graduate traineeships are available through the University's Sea Grant Program.

Urban and Public Systems. The Program in Urban and Public Systems of the College of Engineering is intended to prepare engineers to assume a more effective role in improving our urban society.

The nature, arrangement and functioning of an urban complex derive from technological opportunities, together with social, economic and political forces, both public and private. The interactions among the many factors involved in the urban complex: housing, land use patterns, transportation, communication, municipal services, social programs, taxation practices, the legal system and governmental structure, need to be better understood. Urban facilities and services must be planned and provided so that they contribute positively to the overall welfare, and "specialists" must become not only more competent in their own fields but also more aware of the interactions their areas of expertise have with others.

Berkeley's Program in Urban and Public Systems offers a broadly based educational preparation for students who intend to follow professional careers involving the planning and design of public systems in the urban setting.

The program comprises in-depth quantitative study in a technological area of a student's interest, together with a flexibly arranged set of studies relating to the physical, economic, social and institutional environments within which an urban system must function. A two-year, professional Master of Engineering degree program calls for a minimum of 66 units.

Emphasis is placed on the processes of problem solving and decision-making where interacting subsystems of the urban region are involved. To this end, the program includes courses in a variety of other disciplines and a multidisciplinary, student-group, project-design course.

Engineering

LOWER DIVISION COURSES

13. Applications of Nuclear Energy. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: none. Open to students majoring in engineering: Radioactivity and nuclear reactions; applications of radioisotopes in medicine and industry; radiation effects and dosimetry; reactor principles; licensing and effluent release in power reactors; non-military applications of nuclear explosives; controlled fusion research; particle accelerators; nuclear energy in the future. (Sp)

17. Introduction to Electronics. (4) Three hours of lecture and two hours of recitation per week. Prerequisite: Physics 5C. Principles of electric circuits; techniques for solution of circuit problems; conduction of electric currents in semiconductors; the semiconductor p-n junction; the transistor; principles and applications of analog and digital electronic circuits. Mr. Lieberman, Mr. Susskind, Mr. Schwarz (F, W, Sp)

28. Engineering Graphics. (4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: Mathematics 1A-may be taken concurrently. Important of graphical presentations in engineering. Freehand sketching in preliminary design. Fundamentals of orthographic projection with applications to three-dimensional design problems. Graphical analysis and presentation of data and the results of engineering calculations. Graphical mathematics and empirical equations. Mr. Laitone, Mr. Steidel, Mr. Cunningham, Mr. Radcliffe (F, W, Sp)

36. Engineering Mechanics I. (4) Three hours of lecture per week. Prerequisites: Physics 8, 5A, and Mathematics 1C. A vectorial treatment of the principles of statics of particles and rigid bodies. Application to NOTE: For key to symbols, see page 34.
problems of equilibrium of two-dimensional and three-dimensional systems. Work and potential energy, the principle of virtual work, stability of equilibrium.

Mr. Atkinson, Mr. Corcos, Mr. Frisch, Mr. Green, Mr. Steidle (F, W, Sp)

44. Mineral Resources Engineering. (3) Three hours of lecture per week. Prerequisite: Physics 5A, Chemistry 1A, Mathematics 1A, or equivalent. The physical, chemical, and engineering properties, application, treatments, and uses of engineering materials, with specific emphasis on mechanical behavior of metals, concrete, and ceramics and upon the electrical properties of semiconducting materials.

Mr. Parker, Mr. Pirz, Mr. Williamson (F, W, Sp)

45. Properties of Materials. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: Physics 5A. Applications of basic principles of physics to the selection and evaluation of engineering materials, with specific emphasis on mechanical behavior of metals, concrete, and ceramics and upon the electrical properties of semiconducting materials.

Mr. Parker, Mr. Pirz, Mr. Williamson (F, W, Sp)

47. Supplementary Work in Lower Division Engineering. (1-3) Prerequisite: limited to students who must make up a fraction of a required lower division course. May be taken only with permission of the Dean of the College of Engineering. Students with partial credit in a lower division engineering course may complete the work under this heading. (May be repeated for credit.)

Mr. Pirz (F, W, Sp)

150. Environmental Engineering: Air Pollution. (3) Three hours of lecture per week. Prerequisite: Chemistry 1A, Mathematics 51C, Physics 5A. The introduction to the technology of air pollution dealing with air pollutants; chemical, physical, and biological processes; control technology, and abatement.

Mr. Sawyer (F, Sp)

151. Environmental Engineering: Water Pollution. (3) Three hours of lecture and two hours of laboratory per week. Prerequisite: Chemistry 1A, Mathematics 51C, Physics 5A. An overview of the environmental problems and technical solutions in the management of surface, ground, and marine waters. Consideration is given to water conditioning and to the nature, treatment, and envir-
montal effects of water.

Mr. Pearson, Mr. Schrock (F, W)

152. Environmental Engineering: Solid Waste Management. (3) Three hours of lecture per week. Prerequisite: Environmental Engineering 150. The practice and issues of solid waste management. Technology of collection, treatment, disposal, and disposal. Application of solid waste management research. Institutional, legal, social, and environmental aspects. Case studies. Mr. Golouke, Mr. Hurlbut (Sp)

UPPER DIVISION COURSES

100. Materials and Methods Used in Manufacturing. (3) Three 1-hour lectures per week. Prereq-

101. Introduction to Operations Research. (4) Three hours of lecture and two hours of laboratory per week. Prerequisite: Civil Engineering 225A or Mechanical Engineering 233 or Applied Mechanics 275A. An introductory study of the materials and process-

102. History and Impact of Technology on Society. (3) Two hours of lecture and one hour of dis-

103. Environmental Engineering: Consequences of Nuclear Technology. (3) Three hours of lecture per week. Prerequisite: Chemistry 1A–1B or Engineering 4 of Contemporary Natural Science 1A–1B, 1C, or equivalent. Power development, power growth, advantages, production and handling of radioactive and thermal wastes. Radioactivity: properties, detection and evaluation, consequences and avoidance of nuclear accidents. Reactor siting considerations: demographic, geological, meteorological, and technological standards and regulations for the design of nuclear applications.

Mr. Kaplan (Sp)

104. Energy and Power. (4) Four hours of lecture per week. Prerequisite: upper division standing in Engineering or Liberal Studies, Physics 5B, Mathematics 1A, 1B. Sources, conversions, transmission, and requirements for energy in human society, concentr-

105. Methods of Linear Algebra. (3) Three hours of lecture per week. Prerequisite: Mathematics 41 or 51A. Review of matrix algebra. Formulation of problems in engineering and methods of solution. Cartesian ten-

106. Application of Complex Variables. (3) Three hours of lecture per week. Prerequisite: Mathematics 51C. Methods of theoretical engineering analysis; application of complex variable theory to the design and analysis of engineering systems. Mr. Leitner (F)

107. Methods of Engineering Analysis. (3) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: Mathematics 51C. Methods of theoretical engineering analysis; tech-

108. Application of Numerical Methods to Engineer-


Mr. Parker (W)

147. Supplementary Work in Upper Division Engi-

148. Ocean Engineering Seminar. (2) Two and one-

149. Solar Energy. (4) Three hours of lecture and one hour of recitation per week. Prerequisite: Physics 5C or equivalent. Survey of solar energy engineering and prospects. Central station electricity generation, decentralized applications for heating and cooling of buildings. Fo-

150. High Strength Steels. (3) Three 1-hour lec-


Mr. Berger (W)

152. Critical Issues in Energy Technology. (3) Three hours of lecture per week. Prerequisite: course 250A or Mathematics 185 or equivalent. Current technical and environmental issues. Discussion of policy and institutional, legal, social, and environmental aspects. Students develop and present seminars. Mr. Bhattacharya (F)

272. Application of Digital Computer Methods to Engineering Problems. (3) Three hours of lecture per week. Prerequisite: course 225A or Mechanical Engineering 165 or consent of instructor. Quantitative methods for computational techniques to the numerical solutions of partial differential equations with special emphasis to equations associated with energy systems and nuclear engineering. Applications to various problems in which the design is determined by the examination of selected issues in technology and society, which are applied to problems of sampling, radiation, arrays and optimization. Mr. Pask (F, W, Sp)

290 L. Techniques in Discrete Dynamic Systems Analysis. (4) Three hours of lecture per week. Prereq-

290Q. Techniques in Continuous Dynamic Systems Analysis. (4) Three hours of lecture per week. Prereq-

290R. Group Studies or Seminars. (1-8) Advanced group study or seminars in subjects which are inter-

260. Energy and Society. (3) Three 1-hour lect-

IDS 1. Technology and Society. (4) See Inter-

IDS 60. Energy and Society. (3) See Inter-

Mr. Pask (F, W, Sp)

Mr. Shaaf, Mr. McNiven 230A (F, Sp), Mr. Berger 230B (W)
10. Engineering Survey Measurements. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: course 10 or Standard of Standards, units, scales, and linear measurement; direction and elevation measurement; traverse computations; horizontal and vertical curves. Mr. Anderson, Mr. Moffit (F, Sp).

113. Concrete and Concrete Materials. (3) Two 1-hour lectures and one 3-hour laboratory per week. Prerequisite: course 120 or course 124. Composition and properties of concrete. Concrete materials. Mr. Mehta, Mr. Brekke (Sp).

114. Soil Properties and Their Engineering Applications. (2) One 1-hour lecture and one 3-hour laboratory per week. Prerequisite: course 120 or course 124. Selected lectures and experiments on physical and mechanical properties of soils and their application in design problems. Preparation of engineering reports. Mr. Houston (F, W).

115. Asphalt and Asphalt Mixtures. (2) One 1-hour lecture and one 3-hour laboratory per week. Prerequisite: course 125. asphalt or Mechanical Engineering. Physical properties of asphalts, aggregates and their combinations; principles and practices in the design, construction, and maintenance of asphalt mixes. Laboratory tests for asphalts, aggregates, and mixture design. Mr. Mustel (F).

116. Introduction to Fluid Flow in Rocks. (3) Two 1-hour lectures and one 3-hour laboratory per week. Prerequisite: course 165A or Mechanical Engineering. 108B. Flow of fluids through porous media. Mr. Witherpoon (W).

116. Engineering Geology. (3) Two hours of lecture and one 3-hour laboratory per week. Prerequisite: Geology 5, 6, or 107. Principles of engineering geology. Influence of geological features on engineering work. Mr. Houston (W).

119. Introduction to Geophysical Engineering. (2) Two hours of lecture and one 3-hour laboratory per week. Prerequisite: course 116, 165A, or Geology 5. Principles of physical and structural geology. Geophysical exploration of rock masses for civil engineering structures. Application of geophysical data in engineering underground openings, rock slopes, and foundations. Field trips to construction sites. Mr. Brekke (W).

121. Soil and Foundation Engineering. (4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 116, 165A. Soil mechanics and soil mechanics. Site investigations, design of supporting structures. Site investigations, design of supporting structures. Mr. Mustel (W).

122. Soil Mechanics and Foundation Design. (3) Three 1-hour lectures per week. Mr. Brackett (F, W, Sp).

123. Reinforced Concrete and Prestressed Concrete. (3) Three hours of lecture and three hours of laboratory per week. Prerequisite: course 131 and 110 (may be taken concurrently). Design and construction of reinforced concrete elements. Mr. Raphael, Mr. Mitchell (F, W).

129. Introduction to Industrialized Building Systems. (3) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 128A. Analysis and design of long-span structural systems and special problems in design of high-rise buildings. The Staff (W).

128C. Structural Systems III. (4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 128B. Analysis and design of long-span structural systems. Approximate methods for determining elements of frame, arch, cable, and shell structures. The Staff (F).

129. Introduction to Dynamic Systems and Earthquake Engineering. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 131. Analysis and design of structures in earthquakes. The Staff (F, W, Sp).


131. Introduction to Structural Analysis. (3) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 130. Analysis and design of long-span structural systems. Approximate methods for determining elements of frame, arch, cable, and shell structures. Mr. Powell, Mr. Clough (F, W).

132. Introduction to Dynamics of Structures and Earthquake Engineering. (3) Two 1-hour lectures per week. Prerequisite: course 131 and Mechanical Engineering 104A. Analysis of structures to dynamic loads with emphasis on response to earthquake and ground motion. Mr. Chopra, Mr. Penzien (W, Sp).

133. Theory of Reinforced Concrete Design. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: course 131 and 110 (may be taken concurrently). Theory of working stress design and design of reinforced concrete elements. Mr. Raphael, Mr. Mitchell (F, W).

134. Elements of Metal Structures. (4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 165A or Mechanical Engineering 104A. Design and construction of metal structural elements. Mr. Raphael, Mr. Bursiel (F, W, Sp).

135. Reinforced Concrete and Prestressed Concrete. (4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 131 and 110 (may be taken concurrently). Design and construction of reinforced concrete elements. Mr. Raphael, Mr. Mitchell (F, W).

136. Advanced Structural Analysis. (3) Three hours of lecture per week. Prerequisite: course 127, 131. Digital computer analysis of linear structural systems. Mr. Raphael, Mr. Wilson (F).

137. Synthesis and Design of Structural Systems. (4) Two 1 1/2-hour lectures and one 3-hour laboratory per week. Prerequisite: course 127. Planning and design aspects of structural systems; sources of stress and strain; design criteria; lay-out of structural systems. Mr. Powell, Mr. Wilson (F).

138. Introduction to Flight Structures. (3) Three hours of lecture per week. Prerequisite: course 130. Structural design and analysis of aircraft and missile structural systems. Mr. Raphael (Sp).

139. Introduction to Mechanics of Solids. (4) Three 1-hour lectures per week. Mr. Mitchell (F).

140. Theory of Elasticity. (4) Three 1 1/2-hour lectures per week. Mr. Orlando (Sp).
140. Water Resources Engineering. (4) Three hours of lecture and four hours of laboratory per week. Prerequisite: course 165B (may be taken concurrently). Estimates of population and municipal, industrial, and agricultural water demands; factors such as climate, ground water sources. Planning and design of water distribution systems and wastewater and storm water collection systems, including impoundments, treatment, distribution systems and wastewater and storm water treatment plants. Special water conditioning problems including taste and odor removal, desalination, and corrosion control. Pollution control and its relation to process design. Mr. Pearson, Mr. Oswald, Mr. Galloway (F, W).

141. Water Quality Management. (3) Three hours of lecture per week. Prerequisite: course 140. Chemical, physical, and biological aspects of clean water and wastewater. Theory and practice of water and wastewater treatment plants. Special water conditioning problems including taste and odor removal, desalination, and corrosion control. Pollution control and its relation to process design. Mr. Pearson, Mr. Oswald. (F, W)

142. Design of Water Quality Management Systems. (3) One 1-hour lecture and one 3-hour laboratory per week. Prerequisite: course 165B. Lectures and discussions of the nature of engineering organizations, role of design in engineering practice, and concepts of systems, process, and functional design. Parallel problem assignments illustrating the application of design principles to typical units of water and wastewater treatment systems. Mr. Pearson and Staff (W).

143. Applied Ecology. (3) Two 1 1/2-hours of lecture per week. An introduction to some aspects of ecology for those with a background in physical science or no biological training. Elements of pollution in ecosystems and organisms. Relevant biology for interpretation of changes in ecosystems. Real ecosystems as a guide in the design of water pollution control systems. Mr. Todd (W).

144. Environmental and Sanitary Engineering. (3) Three 1-hour lectures per week. Prerequisite: for engineering, science, and public health majors. Not open to civil engineering students. The biochemical cycles of synthesis and decay, energy resources. The hydrological cycle, drinking water quality and treatment, sewerage systems, treatment and use. Domestic and industrial waste characteristics, collection, treatment, reclamation and disposal, water pollution control. Air quality and air pollution control. Mr. Oswald (W).

145. Chemistry of Waters. (3) Three 1-hour lectures per week. Prerequisite: Chemistry 1B. A consideration of the inorganic components in water in terms of water quality. Emphasis on the application of chemical principles employed to modify the concentration of the major anions, cations, and dissolved gases comprising the inorganic constituents. Mr. Thomas (W).

146A. Water Resources Chemistry. (3) One 1-hour lecture and two 3-hour laboratory periods per week. Prerequisite: Chemistry 1B. A systematic consideration of the chemical and biological characteristics of water with emphasis on the analytical techniques employed in the analysis of the major inorganic constituents found in waters. Several introductory exercises are included related to the quality control. Mr. Jenkins (F).

146B. Water Resources Chemistry. (2) One 1-hour lecture and one 3-hour laboratory per week. Prerequisite: course 146A but emphasis is placed on the analysis and treatment of waters containing organic constituents. Mr. Thomas.

147. Organic Chemistry of Water and Waste Water. (3) Three 1-hour lectures per week. Prerequisite: Chemistry 1B. A consideration of the organic components as a factor determining the quality of waste waters. Nomenclature and reactions of pertinent organic compounds as a factor determining the quality of waste waters. Nomenclature and reactions of pertinent organic compounds. Mr. Thomas (W).

148. Hydrology. (3) Two 1 1/2-hours of lecture per week. Prerequisite: consent of instructor. Not open to credit for students who completed course 165C. Circulation of water on the earth's land masses, the hydrological cycle, evaporation, transpiration, and interception between precipitation and runoff, ground water flow, flood analysis and applications of hydrology in engineering design. Mr. Todd (W).

149. Design of Hydraulic Structures. (3) Two hours of lecture and three hours of laboratory per week. Prerequisite: course 165C. Not open to credit for students who completed course 165B or 166C. Design of small hydraulic structures, such as dams, weirs, sluices, flood control elements, control and transition structures. Use of hydraulic models as an aid in design. Mr. Harder, Mr. Fischer (Sp).

150. Introduction to Transportation Engineering. (3) Three hours of lecture and three hours of laboratory per week. Prerequisite: course 104 or equivalent. Objectives, characteristics, policy, economics, location, design, and operation of transportation systems. The Staff, Mr. Monismith in charge (F, W, Sp).

151. Transportation Engineering. (4) Three hours of lecture and four hours of laboratory per week. Prerequisite: course 104 or equivalent. Objectives, characteristics, policy, economics, location, design, and operation of transportation systems. Mr. Todd (W).

152. Road Design. (3) Three 1-hour lectures per week. Prerequisite: course 104. Evaluation of road design methods. Mr. Galloway (F).

153. Bridge Design. (3) Three 1-hour lectures per week. Prerequisite: course 104. Evaluation of bridge design methods. Mr. Galloway (Sp).

154. Storm Drainage. (3) Three 1-hour lectures per week. Prerequisite: course 104. Principles of storm drainage design. Mr. Galloway (W).

155. Foundation Engineering. (3) Three 1-hour lectures per week. Prerequisite: course 104. Principles of foundation engineering design. Mr. Galloway (W).

156. Highway Design. (3) Three 1-hour lectures per week. Prerequisite: course 104. Principles of highway design. Mr. Galloway (Sp).

157. Coastal Engineering. (3) Three 1-hour lectures per week. Prerequisite: course 104. Principles of coastal engineering. Mr. Galloway (F).

158. Geotechnical Engineering. (3) Three 1-hour lectures per week. Prerequisite: course 104. Principles of geotechnical engineering. Mr. Galloway (F).

159. Water Resources Engineering. (4) Three hours of lecture and four hours of laboratory per week. Prerequisite: course 165C. Not open to credit for students who completed course 165B or 166C. Design of small hydraulic structures, such as dams, weirs, sluices, flood control elements, control and transition structures. Use of hydraulic models as an aid in design. Mr. Harder, Mr. Fischer (Sp).

160. Hydrology. (3) Two 1 1/2-hours of lecture per week. Prerequisite: consent of instructor. Not open to credit for students who completed course 165C. Circulation of water on the earth's land masses, the hydrological cycle, evaporation, transpiration, and interception between precipitation and runoff, ground water flow, flood analysis and applications of hydrology in engineering design. Mr. Todd (W).

161. Design of Hydraulic Structures. (3) Two hours of lecture and three hours of laboratory per week. Prerequisite: course 165C. Not open to credit for students who completed course 165B or 166C. Design of small hydraulic structures, such as dams, weirs, sluices, flood control elements, control and transition structures. Use of hydraulic models as an aid in design. Mr. Harder, Mr. Fischer (Sp).

GRADUATE COURSES

191A. Physical Oceanology. (3) Three hours of lecture per week. Prerequisite: Geology 105, course 121A, or consent of instructor. Topics: distribution of salinity, temperature, and oxygen in the ocean. Mr. Todd (F).

191B. Chemical Oceanology. (3) Three hours of lecture per week. Prerequisite: course 145 or equivalent or consent of instructor. Chemistry of sea water examined with respect to (1) its interaction with the atmosphere, lithosphere, and biosphere; (2) the origin and evolution of sea water; and (3) the application of marine chemistry to engineering problems in related areas of oceanology. Mr. Humberger (W).

192. The Art and Science of Civil Engineering Practice. (4) Three hours of lecture and demonstration periods per week. Prerequisite: course 166. An introduction to the problems of the practicing engineer. Mr. Monismith in charge (F, W).

192A. Introduction to Traffic Engineering. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: course 120. Street and highway traffic problems: principles of design of thoroughfares on the basis of operational characteristics: traffic regulation and control. Mr. Humberger (Sp).

192B. Hydrology. (3) Two 1 1/2-hours of lecture per week. Prerequisite: course 165B or consent of instructor. The basic dynamics of open oceanic circulation with investigations of wind-driven and density-driven currents, water masses, and the major oceanic gyres. Laboratory investigations of pertinent models. The Staff, Mr. Monismith in charge (F, W, Sp).

192C. Coastal Engineering. (3) Three hours of lecture per week. Prerequisite: course 165B or consent of instructor. Ocean wave theories and their verification through naturally occurring porous materials, hydraulic of cliffs, fluctuations in ground water elevations, and stability of underwater structures. Mr. Todd (W).

193A. Advanced Hydrology. (3) Three 1 1/2-hours of lecture per week. Prerequisite: course 203A or 203B. Application of principles of hydrology in solution of practical engineering problems such as artificial recharge, sea water intrusion, flood forecasting, and hydro-electric development. Mr. Todd (F).

193B. Coastal Engineering. (3) Three 1-hour lectures per week. Prerequisite: course 203A or 203B. Application of principles of hydrology in solution of practical engineering problems such as artificial recharge, sea water intrusion, flood forecasting, and hydro-electric development. Mr. Todd (F).

194. Geosciences and Engineering. (3) Three 1-hour lectures per week. Prerequisite: course 165B. Principles of fluid mechanics applied to the statics and dynamics of incompressible fluids. Mr. Harder (W).

195A. Elementary Fluid Mechanics. (3) Three 1-hour lectures per week. Prerequisite: course 165B (may be taken concurrently). Principles of mechanics applied to the statics and dynamics of incompressible fluids. Mr. Harder (F).

195B. Elementary Fluid Mechanics for Civil Engineers. (3) Two 1-hour lectures and one 3-hour laboratory per week. Prerequisite: course 165B. Principles of fluid mechanics applied to open channel flows, nonuniform flows, models for forces on submerged objects. Principles are illustrated by laboratory experiments conducted by the student. Mr. Fischer (W, Sp).

196. Open Channel Hydraulics. (3) Three 1-hour lectures per week. Prerequisite: course 165B. Steady flow friction formulas, nonuniform flow, model laws for distorted models, elements of sediment transport, surges in open channels. Mr. Harder (F).

197. Hydrodynamics. (3) Two 1-hour lectures per week. Principles of fluid mechanics applied to the plastic deformation of water and ice, seepage, friction formulas, nonuniform flow, model laws for uniform flows, and forces on submerged objects. Principles are illustrated by laboratory experiments conducted by the student. Mr. Fischer (W, Sp).

198. Direct Group Study for Advanced Undergraduates. (1-5) Prerequisite: senior standing in engineering. Group study of a selected topic or topics in civil engineering. Mr. Monismith in charge (F, W, Sp).

199. Supervised Independent Study and Research. (1-5) Enrollment is restricted by regulations listed on page 34. For students in good standing who wish to undertake a program of self-directed research under the joint guidance of the student and a professor. There are no other formal prerequisites, but the supervising professor must be convinced that it will be of profit to the student. Must be taken on a passed/not passed basis. Mr. Monismith in charge (F, W, Sp).

200A-200B-200C. Hydrologic Mixing Processes
220A. Statistically Indeterminate Structures, (4) Three 1 1/2-hour lectures per week. Prerequisite: course 123. Analysis of indeterminate structures by methods of least squares; determination of stiffness functions, one and several variables. Gaussian distribution. Mr. Penzien (Sp)

227. Structural Design for Dynamic Loads, (3) Two 1 1/2-hour lectures per week. Prerequisite: course 225A. Considers design of structural systems in which dynamic load effects are of major importance. Special emphasis will be given to the design of earthquake-resistant structures and the methods for determining wind and moving load problems and machine vibration isolation problems will also be considered. Mr. Bertero (Sp)

228. Advanced Study of Comestitutive Materials, (4) Four 1-hour lectures per week. Prerequisite: course 111 or equivalent. Composition of different types of Portland cements, chemistry of hydration, interaction of hydration products on strength, shrinkage, and durability. Chemistry of expanding cements, aluminum composites and special portland cements. Mr. Mehta (F)


230A. Advanced Mechanics of Materials. (4) Four and one-half hour lectures per week. Prerequisite: course 123 and course 130 or equivalent. Stress-strain relations for elastic and plastic materials. Extremum principles and variational methods. Application to problems of beams (including beams on elastic foundation and beam-columns), torsion, and elementary two-dimensional problems (thick-walled cylinders, etc.) in elastic and plastic materials. Mr. Popov, Mr. Pister, Mr. Taylor (F)

230B. Advanced Mechanics of Materials. (4) Four and one-half hour lectures per week. Prerequisite: course 123 and course 130 or equivalent. Stress-strain relations for elastic and plastic materials. Extremum principles and variational methods. Application to problems of beams (including beams on elastic foundation and beam-columns), torsion, and elementary two-dimensional problems (thick-walled cylinders, etc.) in elastic and plastic materials. Mr. Popov, Mr. Pister, Mr. Taylor (F)

**234. Analysis of Flight Structures. (3) Three 1-hour lectures per week. Prerequisite: course 138. Material properties, buckling of composite structures; utili- zation of effective stiffness, fatigue, nonlinear creep, influ- ence coefficients. Mr. Kelly (Sp)

**235. Two-Dimensional Problems in Linear Solids. (4) Three 1 1/2-hour lectures per week. Prerequisite: course 220B and Engineering course 230A. Extension, flexure and buckling of thin plates, linear and nonlinear behavior, refined theories; vari- ational solutions, complex variables, integral equations, trans- forms, singularities, approximate methods; applications to viscoelastic, anisotropic and nonhomogeneous plates; thermal stress problems. Mr. Pister, Mr. Taylor (Sp)

**236. Theory of Thin Shells. (4) Three 1 1/2-hour lectures per week. Prerequisite: course 231 and Engi- neering 230A. General theory of thin shells; cylindrical shells, shells having the form of a surface revolution, hyperbolic paraboloids and other shells of double cur- vature. Considertas, anisotropic shells; buckling and vibration, limit analysis. Mr. Popov (Sp)

**237. Three-Dimensional Static Problems In Lin- ear Solids. (3) Three 1-hour lectures per week. Prerequisite: course 231 and Engineering 230A. Study of the rudiments of potential theory. Development of the potentials of thin shells; displacement po- tentials. Solutions of problems in the infinite and semi-infinite domains. Uniqueness and completeness of so- lutions. Mr. McNiven (Sp)

**238. Three-Dimensional Dynamic Problems In Linear Solids. (3) Three 1-hour lectures per week. Prerequisite: course 231 and Engineering 230A. Study of the dynamic properties of thin shells and the Hertz- holtz displacement potentials. Diatational and rot- tational waves in an infinite domain, wave reflection, wave transmission, Rayleigh waves, Love waves. Waves in granular and viscoelastic media. Mr. McNiven (F)

NOTE: For key to symbols, see page 34.

240A–240B–240C. Mechanics of Solids (3–3–3) Three hours of lecture per week. Prerequisite: any of courses 235, 237, 239. Elementary principles of stress analysis; deformation and stress; behavior of physical nonlinear solids. Dyadic and tensor analysis; strain; plasticity; coordinate transformation; deformation and stress; balance equations; constitutive equation of plastic; thin-walled structures; thin shells; railroad track; design of concrete and metallic structures. Mr. Lubliner, and Mr. Jackman. Three-quarter sequence beginning Fall.


244. Advanced Prestressed Concrete. (4) Four and one-half hours of lecture per week. Prerequisite: course 135 or equivalent. Structural behavior and prestressed concrete elements and systems—continuous beams, frames, slabs, members under combined axial loads and flexure, torsion, fatigue, strength, stability and serviceability. Mr. Lin (W)

245. Design of Concrete Shells. (4) Three 1 1/2-hour lectures per week. Prerequisite: basic courses in reinforced concrete and in statically indeterminate structures. Application of shear theory, approximate methods, and computers to the design of shell and folded plate structures. Determination of reinforcement of prestressed concrete shells. Design of existing experimental results including ultimate strength tests. Design problems involving shell structures. Mr. Scordelli (Sp)

246. Design of Steel Structures. (4) Three 1 1/2-hour lectures per week. Design of advanced bridge systems, plate girders, composite design, orthotropic decks, prestressed concrete systems, tubular systems, domes and tubular structures. Mr. Bouwkamp (So)

247. Analysis and Design of Concrete Dams. (4) Three hours of lecture per week. Prerequisite: course 140. Selection of location and type; stability analysis; stress analysis of gravity, arch, multipurpose dams—principles of dam problems imposed by construction conditions and use of mass concrete. Mr. Raphael (Sp)

248A. Inelastic Design of Structures. (3) Three hours of lecture per week. Prerequisite: course 220A; course 232 is desirable. Inelastic behavior of structures. Simplified plastic theory. Inelastic analysis of frames subjected to a wide range of earthquake actions; estimation of deflections; minimum weight design. Effects of generalized actions; stability problems. Factors affecting bending carrying capacity. Mr. Bertoro (W)

248B. Inelastic Design of Structures. (4) Four hours of lecture per week. Prerequisite: course 246A. Inelastic analysis and design of structural members subjected to combined stresses due to bending, shear and axial forces and bending and torsion. Design of concrete and metallic structures. Frames and grids. Limit analysis and design of plates and shells. Mr. Bertoro (F)

249. Advanced Concrete Technology. (3) Three 1-hour lectures per week. Prerequisite: course 240A or equivalent. Composition and properties of concrete materials; cements, aggregates, admixtures. Properties of fresh and hardened concretes, environmental and special. Mr. Polivka (W)

250. Transportation Policy and Administration. (3) Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Demand and supply in contemporary economic, social, political, and legal settings. Comparative analysis of transportation systems. Topics include: transportation policy and instruments of social and environmental guidance. Problems and processes of administering activities unique to transportation planning. Mr. Kelly, Mr. Pister, Mr. Newell (F)

251. Traffic Stream Characteristics. (3) Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Study of traffic reaches and planning problems for urban areas; the analysis and design of streets and highways. Stream characteristics include flow, speed, density and headways. Flow in plazas, public faces, headway distributions, traffic performance at intersections, and capacity investigations. Mr. May (F)

252S. Systems Analysis in Transportation. (3) Two 1 1/2-hour lectures per week. Prerequisite: graduate standing in related fields. A discussion of the systems approach and its application to transportation problems. Survey of current research in systems analysis techniques with emphasis on systems modeling, optimization, evaluation, and decision areas. Application of optimization analysis techniques to selected transportation problems. Mr. Kanafani (F)

253. Transportation Engineering. (4) Four hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Technical characteristics of air, highway, rail, and other modes of transportation. Development of modal organization of transportation systems; terminal requirements for individual modes and interface problems among modes; forecasting and planning studies; techniques for evaluation of alternative plans. Mr. Homburger (W)

254A. Transportation Demand Analysis and Forecasting. (3) Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Application of transportation science to transportation planning problems. Use of demand forecasting techniques, problems of choice, mode of efficient and serviceable transport services. Mr. Kanafani (W)

255. Traffic Engineering. (3) Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Analysis of human and vehicular characteristics as they affect highway traffic flow; traffic regulations; accident causes and techniques for facilitating and increasing flow on existing traffic systems; planning new traffic systems; parking and other terminal problems. Mr. May (F)

256. Transportation Optimization Techniques. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 252 and 253 or equivalent. A course which covers optimization techniques and computer programs as applied specifically to the solution of selected ground and air transportation problems. These problems include terminal design, schedule improvement, movement control, passenger services and freight handling. Mr. May (W)

257. Applications of Queuing Theory to Transportation. (3) Two 1/2-hour lectures per week. Prerequisite: Statistics 134A or 200A. Deterministic queuing models. Strategy for design and control of transportation systems with emphasis on the modeling and computer simulation of transportation systems. Mr. May (W)

260. Air Transport Engineering. (3) Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Nature of civil aviation; aircraft characteristics and performance related to planning of terminal facilities. Air traffic control and its related to planning terminal facilities. Factors to be considered in selection of airport sites. Mr. Homburger (W)

260A. Air Transport Engineering. (3) Three hours of lecture per week. Prerequisite: course 260A or consent of instructor. Planning of the airport complex; factors affecting airport capacity; models for airport and port capacity; geometric design of runways and taxways. Analysis of facilities for passengers and cargo, noise and control. Mr. Horonjeff (Sp)

261. Feasibility Analysis of Transportation Systems. (3) Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Objectives and criteria for choice of transportation investments. Problems of estimating benefits and costs; treatment of intangibles and uncertainty; selection of discount rates. Transportation investment planning in developing countries. Mr. May (F)

262. Simulation of Transportation Systems. (3) Formerly 256. Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Development of computer simulation models for the analysis of the performance of complex, multivariable, time-dependent transportation systems, with application to a transportation problem of choice. Mr. Kanafani (F)

263. Highway Traffic Control. (3) Three hours of lecture per week. Prerequisite: courses 251 and 257. Traffic dynamics and delay at isolated fixed-cycle and vehicle-actuated traffic signals. Traffic signal characteristics for single highways. Network control of urban streets, ramp control of freeways, route control. Mr. May, Mr. Newell (Sp)

264. Traffic Flow on Transportation Networks. (3) Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Elementary theory of transportation networks. Shortest pathing, network cost, and equilibrium models. Application to trip distribution and traffic assignments. Mr. Newell (Sp)

265. Pavement Design. (4) Two 1 1/2-hour lectures perweek. Prerequisite: graduate standing or consent of instructor. Analysis of alternative transportation techniques. Economic demand theory applied to transportation services. Use of demand forecasting techniques, peak problems, choice of mode, and efficient prices for transport services. Mr. Kanafani (W)

266. Traffic Engineering. (3) Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Analysis of human and vehicular characteristics as they affect highway traffic flow; traffic regulations; accident causes and techniques for facilitating and increasing flow on existing traffic systems; parking and other terminal problems. Mr. May (F)

267. Transportation Demand Analysis and Forecasting. (3) Three hours of lecture per week. Prerequisite: graduate standing in related fields. A discussion of the systems approach and its application to transportation problems. Survey of current research in systems analysis techniques with emphasis on systems modeling, optimization, evaluation, and decision areas. Application of optimization analysis techniques to selected transportation problems. Mr. Kanafani (F)

268. Construction Scheduling and Resource Allocation. (3) Three hours of lecture per week. Planning, scheduling, and allocation of resources for construction projects. Mathe-
278E. Applications of Operation Research to Construction. (2) Two hours lecture per week. Prerequisite: course 260A. Application of risk relating to bid strategy, optimization of scheduling costs, aggregate and borrow optimization and decision theory. Systems from the construction industry will be reviewed. Mr. Crandall (Sp)

287A. Advanced Foundation Construction. (3) Three hours of lecture per week. Prerequisite: course 121, 133, and 134. Evaluation of soil and structural problems connected with construction of deep foundations for major high-rise buildings and subways. Integration of engineering, political, environmental, and management factors. Application to current major projects in urban environments. Mr. McWick (F)

287B. Advanced Concrete Construction. (3) Three hours of lecture per week. Prerequisite: course 121 and 130. Selection and evaluation of construction methods and planning for pre- and post-tensioned concrete, lightweight, high strength, and architectural concrete, precasting and segmental construction. Application to buildings, bridges, pressure vessels, pollution control structures, ocean structures, and cryogenic containment. Mr. Merkowitz (W)

287C. Construction of Harbor, Coastal, and Ocean Structures. (4) Four hours of lecture per week. Prerequisite: course 121, 133, and 134. Construction methods and equipment for construction of cofferdams, caissons, wharves, marine terminals, outfall sewers, piers and bridges, submarine oil pipelines, and gas pipelines, dredging, offshore platforms, Arctic Ocean structures, sub-sea and deep ocean facilities. Mr. Ogilvie (Sp)

287D. Advanced Construction Estimating. (3) Three hours of lecture per week. Prerequisite: course 181. Estimates used by heavy, engineering, building, and contracting industries. Preparation of bidding and estimating forms including planning of methods and program evaluation of labor, material equipment, subcontract, and indirect costs. Rational assessment of risk and profit margins. Value engineering. Mr. Merkowitz (W)

288. Asphalt Pavement Mixtures—Design, Construction, and Performance. (3) Three hours of lecture and two 1-hour laboratory periods per week. Prerequisite: course 121 and 114, or equivalent. Advanced topics on mechanics including stress, strain, constitutive relations and strain rate, consolidation, settlement analysis, stress distribution, lateral pressures, bearing capacity, and their application in foundation engineering, and highway design. Mr. Chickel (F)

288B. Advanced Soil Mechanics and Foundation Engineering. (3) Three hours of lecture per week. Prerequisite: course 121 and 114, or equivalent. Advanced aspects on soil mechanics including classification, stress-strain relations, consolidation, strength determining factors, methods for strength measurement, slope stability and stability analysis techniques. Mr. Duncan (W)

289. Soil and Site Improvement. (4) Four hours of lecture and two 3-hour laboratory periods per week. Prerequisite: course 121 and 114 or equivalent. Design of anchored bulkheads; supporting structures for tunnelling and installation of pile and pier foundations; mat foundations; cofferdams. Mr. Houston, Mr. Duncan (Sp)

290. Advanced Soil Mechanics and Foundation Engineering. (3) Three hours of lecture per week. Prerequisite: course 121 and 114 or equivalent. Design of anchored bulkheads; supporting structures for tunnelling and installation of pile and pier foundations; mat foundations; cofferdams. Mr. Houston, Mr. Duncan (Sp)

291. Geoprocessing Through Soils. (2) Two 1-hour lectures per week. Prerequisites: course 121 and two 3-hour laboratory periods per week. Prerequisite: course 270A, 270B. Lectures and individual experimental studies of advanced aspects of soil mechanics, including stress-strain relations, consolidation, testing, pore water pressure measurement, dynamic soil tests, field strength and pile load testing, design procedures for advanced instrumentation and measurement techniques. Mr. Houston (Sp)

292. Soil and Site Improvement. (4) Four hours of lecture and two 3-hour laboratory periods per week. Prerequisite: course 121 and 114 or equivalent. Design of anchored bulkheads; supporting structures for tunnelling and installation of pile and pier foundations; mat foundations; cofferdams. Mr. Houston, Mr. Duncan (Sp)

293. Seepage Through Soils. (2) Two 1-hour lectures per week. Prerequisites: course 121 and two 3-hour laboratory periods per week. Prerequisite: course 270A, 270B. Lectures and individual experimental studies of advanced aspects of soil mechanics, including stress-strain relations, consolidation, testing, pore water pressure measurement, dynamic soil tests, field strength and pile load testing, design procedures for advanced instrumentation and measurement techniques. Mr. Houston (Sp)

294. Soil and Site Improvement. (4) Four hours of lecture and two 3-hour laboratory periods per week. Prerequisite: course 121 and 114 or equivalent. Design of anchored bulkheads; supporting structures for tunnelling and installation of pile and pier foundations; mat foundations; cofferdams. Mr. Houston, Mr. Duncan (Sp)

295. Fundamentals of Fluids. (3) Three hours lecture plus one 3-hour laboratory per week. Prerequisite: course 270A, 270B. Analysis of conservation equations for fluids, transient flow, wave propagation, complications and laboratory demonstrations. Mr. Brekke (F)

296. Fluid of Porous Media—Analytical Methods. (3) Formerly 296A—296B. Four hours of lecture per week. Prerequisite: Engineering 230A or equivalent. Analytical solution of the general partial differential equation of transboundary water resources and debris. Mr. Brekke (F)

297. Soil Behavior. (4) Three hours of lecture per week and one 3-hour laboratory/demonstration per week. Prerequisite: course 121 or consent of instructor. Soil behavior is the behavior of soils under dynamic and static loading, determination of strength, deformation, and stress-strain characteristics. Mr. Mitchell (W)

298. Introduction to Soil Dynamics. (3) Two 1-hour lectures and one 3-hour laboratory per week. Prerequisite: knowledge of FORTRAN programming. However, the students need not be experienced programmers. The simple damped oscillator. Wave propagation in elastic media. Dynamic field and laboratory tests. Dynamic soil properties. Dynamic foundations. Numerical solutions of wave propagation equations. Analysis. Mr. Lysmer, Mr. Seed (W)

299. Soil Dynamics—Earthquake Engineering. (3) Three 1-hour lectures and one 1/2-hour computational laboratory per week. Prerequisite: course 274 or equivalent course in dynamics. Faulting, rock movements, influences of soils on ground motion characteristic, measurement of ground and soil mass, finite element and wave propagation analysis. Causes of soil failure during earthquakes: soil liquefaction, soil settlement; consolidation, abnormal lateral pressures during earthquakes; slope stability problems. Mr. Seed, Lysmer (Sp)

300. Earth Dams. (2) Two 1-hour lectures per week. Prerequisite: course 271 and 270B or consent of instructor. Dams are the primary method for the control of water. Types of structures, their uses, failures; design procedures; practical considerations in design and construction. Mr. Seed (Sp)

301. Theoretical Soil Mechanics. (4) Three 1-hour lectures and one 3-hour laboratory period per week. Prerequisite: knowledge of FORTRAN programming. Graduate standing in geotechnical engineering. Theories and numerical method of analysis of soil behavior and load settlement problems, analysis of loaded piles. Stress analysis by the finite element method. Limit analysis by the theory of perfect plasticity. Mr. Goodman (W)

302. Advanced Rock Mechanics. (3) Three hours of lecture per week plus some laboratory demonstrations. Rock properties and behavior; theory of failure for brittle, discontinuous and anisotropic rocks. Determination of in-situ stresses; laboratory and field testing techniques. Mr. Goodman (W)

303. Applied Rock Mechanics. (3) Three hours of lecture per week plus some laboratory demonstrations. Rock properties and behavior; theory of failure for brittle, discontinuous and anisotropic rocks. Determination of in-situ stresses; laboratory and field testing techniques. Mr. Goodman (W)

304. Engineering Geology. (3) Two hours of lecture and three hours of laboratory per week. Prerequisite: course 270A, 270B. Environmental and nonlinear mechanics of rocks; subsurface exploration; geotechnical factors bearing on construction. Mr. Goodman, Mr. Brekke (F)

305. Flow of Fluids in Porous Media—Applications. (4) Formerly 295A—295B. Four hours of lecture per week. Prerequisites: Engineering 230A or equivalent. Analytical methods of solving steady state and non-steady state flow of fluids in porous media; matrix methods, calculus of variations, differential equations, Fourier series, and Fourier integrals. Mr. Taylor (F)

306. Methods of Analysis of Structural Systems. (3) Three 1 1/2-hour lectures per week. Prerequisite: course 133 or 134. Evaluation of structural systems and solutions for major high-rise buildings and subways. Integration of engineering, political, environmental, and management factors. Application to current major projects in urban environments. Mr. Anderson (Sp)

307. Three hours of lecture per week. Prerequisite: course 220A and course in FORTRAN programming. Introduction to numerical methods and computer programming appropriate to the solution of problems in Structural Engineering. Computer programs are developed for matrix operations, iterative equations, numerical integration, least square techniques, and the analysis of frames and systems. Mr. Wilson (W)

309. Water Resources Development. (2) One 2-hour lecture per week. Prerequisite: graduate standing. The engineering, legal, political, and social factors underlying major decisions in water resources development. Mr. Todd (Sp)

310. Limnology and Plankton Ecology. (3) Three hours of lecture per week. Prerequisite: consent of instructor. Theoretical and practical study of the physical/chemical dynamics and biological productivity of planktonic communities. Resulting interactions discussed using actual examples of lakes and reservoirs throughout the world. Mr. Horne (Sp)

311. Current Topics in Geomorphology. (1, 2, or 3) One to three hours lecture per week. Prerequisite: consent of instructor. Detailed discussion of topics of particular interest or too recent to have been incorporated into other courses. Content will change from year to year and course can be repeated. Mr. Goodman, Mr. Witherspoon, Mr. Brekke (F, W, Sp)

312. Transportation Planning. (3) Three hours of lecture per week. Prerequisite: graduate standing. Some of the factors, techniques used in transportation planning; planning institutions. Mr. Garrison (F)

313. Advanced Topics in Transportation Theory. (3) Three hours of lecture per week. Prerequisite: consent of instructor. Selected topics in transportation or traffic flow theory with emphasis on advanced mathematical techniques. Recent developments in transportation science. Mr. Newell (F)

314. Traffic Flow Theory. (3) Three hours of lecture per week. Prerequisite: Statistics 134A or 202A, course 251, or consent of instructor. Linear foundations and mathematical representation of traffic flow; interaction between microscopic and macroscopic equations, the relation between density and fundamental properties of traffic at low and moderate densities. Car-following and fluid theories of traffic flow at high densities. Mr. Newell (W)

315. Design of Mass Transit Facilities. (2) Two hours of lecture per week. Prerequisite: course 259. Design elements of rail transit systems and of fixed guideway systems. Design and operation of trains, and how they affect the design of tracks and roadways. Mr. Homburger (Sp)

316. Models Related to Air Transportation. (2) Two hours of lecture per week. Prerequisite: course 259. Principles of air transportation, and the factors affecting the design of airports. Models for passenger and baggage movement in airport terminals. Current developments in air traffic theory. Mr. Horonjeff, Mr. Kanafani (Sp)

317. Group Studies, Seminars, or Group Research. (1-8) Advanced study in various subjects, including problems of air transportation theory and traffic flow with emphasis on advanced mathematical techniques. Content will change from year to year, informal group studies of special problems.

Note: For key to symbols, see page 34.
Electrical Engineering and Computer Sciences

LOWER DIVISION COURSE

90. Topics in Electrical Engineering and Computer Sciences. (1) Formerly 91A. Prerequisite: consent of instructor. Enrollment preference will be given to freshmen electrical engineering and computer science students in the "cluster" advising program. Offered on a pass/no pass basis. May be repeated twice for credit. Presentation of topics of interest to Electrical Engineering and Computer Science freshmen on the activities of professionals in this field. The Staff (F, W, Sp)

UPPER DIVISION COURSE

100A-100B. Electrical Circuits, Electronics, and Instrumentation. (3-2) Two hours of lecture and one 3-hour laboratory per week. Prerequisite: course 100A is prerequisite to 100B. Course 100A is prerequisite to 100B. This course is not for students in Electrical Engineering.

104A-104B. Electric Circuits. (4-4) Three hours of lecture and 2 hours of discussion per week. Prerequisite: course 104A (may be taken concurrently) and 112L, must be taken concurrently. Study of basic principles and the use of electronic transformers and energy conversion devices, including d.c. and a.c. converters and generators. Mr. Hopkin (F)

112L. Electric Power Devices Laboratory. (1) Three laboratory hours per week. Prerequisite: course 104A (may be taken concurrently). Simple laboratory experiments to illustrate methods of measuring power, to demonstrate the operating principles and characteristics of electric power devices. Mr. Hopkin (F)

114A–114B. Power Systems Analysis. (3-3) Three hours of lecture per week. Prerequisite: course 114A, course 100B or course 104B; course 114B, course 114A. An introduction to electric power systems with emphasis on the transmission network. Analysis of steady-state load flow and optimization. Synchronous machine modeling. 114B: The control problem. Transient stability analysis including effects of last-acting excitors and governors. Short circuit analysis by method of symmetrical components. Mr. Bergen (sequence beginning F)

115. Semiconductor Circuits Laboratory. (2) One 4-hour laboratory per week. Prerequisite: course 105, 105L. Experimental study of bipolar and field-effect transistors, computer-aided design and project activity with cascaded, low-pass amplifiers, feedback amplifiers, frequency and temperature relaxation oscillators, operational amplifiers. Mr. Meyer, Mr. Pederson (F, W, Sp)

116. Microwave Communication Systems. (4) Two 1 1/2-hour lectures and one 2-hour laboratory per week. Prerequisite: course 117A. Systems concepts, electromagnetic fields and power flow, microwave amplifiers and oscillators, principal components and solid state devices, propagation of radio waves, noise and specific microwave communications systems. Mr. Angelakos (Sp)


119. Linear Systems Analysis. (4) Two 1 1/2-hour lectures and one 1 hour of recitation per week. Prerequisite: course 104A. Introduction to electrical, mechanical and electrical systems. Description of state variables, determinant equations and analysis of system behavior. Concept of state. Fourier and Laplace transform methods of analysis. Consideration of linear, time invariant feedback systems. Mr. Polak, Mr. Wong, Mr. Sakrison (F, W, Sp)

123. Circuit Theory and Design. (4) Four hours of lecture per week. Prerequisite: course 104A. Advanced topics in circuit network analysis, synthesis, and design. Passivity and positive real functions. Continuous (passive and active) and digital filters. Computer-aided circuit analysis and design. Mr. Deseo (F, Sp)


130. Electronics of Solids. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: Physics 4D, 4E, 137A; Mathematics 51C. Description of solid state electronic devices and properties of semiconductors and metals, dielectric properties of insulators. Optical effects. Mr. Muller, Mr. Wang (F, Sp)

131A. Semiconductor Devices. (4) Three hours of lecture and one hour of recitation per week. Prerequisite: course 105, Physics 5E, Engineering 17, 45. Overview of basic semiconductor physical mechanisms. The electronics of pn junctions and point contact devices, and of junction and MOS field-effect transistors. Mr. Muller, Mr. Wang (F, W, Sp)


132A–132B. Communications Systems Laboratory. (2-3) Formerly 132. One 4-hour laboratory per week. Prerequisite: course 130. Preparation and interpretation of frequency spectra. Measurement of frequency AM and FM. PCM systems. 132B: Effects of noise on system performance. Power flow, bandwidth expansion and threshold phenomena. Mr. Turin, Mr. Sakrison (F, W, Sp)

133A. Power System Laboratory. (2) One 4-hour laboratory per week. Prerequisite: course 117A. Preparatory work for design and testing of a power system by small-scale model simulations. Demonstration of a steady-state stability of a synchronous generator and load. Study of series and parallel capacitors. Interaction of several machines. Transient stability improvement using switched capacitors, switched loads, excitation forcing from shaft angle, velocity, and acceleration signals, and supplementary governor signals. Mr. Bergen, Mr. Smith (W)

133B. Power Control Laboratory. (2) One 4-hour laboratory per week. Prerequisite: course 114A (is not prerequisite to 133B). Demonstration of power system state, including nodal frequency and power flow, and generator shaft angle, velocity and acceleration. Nonlinear functions, digital computer code for optimal control of actuators, including governors, exciters and regulators. Mr. Smith, Mr. Bergen (Sp)

134. Solid-State Electronics Laboratory. (2) One 4-hour laboratory per week. Prerequisite: course 130 and course 133A. Techniques for measuring physical parameters and observing and interpreting the fundamental phenomena of solid-state materials and devices. Mr. Muller, Mr. Oldham, Mr. Van Duzer (F, Sp)

135. Microwave Laboratory. (2) One 4-hour laboratory per week. Prerequisite: course 130. Techniques and apparatus for measuring physical parameters and special techniques which must be employed at microwave and optical frequencies. Mr. Angelakos, Mr. Wang (F, W, Sp)

136. Introduction to Quantum Electronics. (3) Three hours of lecture per week. Prerequisite: Physics 4, 5E, 6
SE. The laser principle and survey of basic laser systems; optical resonators; interactions between atomic systems and resonators; modulation and detection of lasers; other applications. Mr. Whinnery (Sp)

138. Supersonic Electrocurrents. (3) Three hours of lecture per week. Prerequisite: course 117A. Development of nonlinear circuit models of electronic devices: pn junction diodes, bipolar junction transistors, field effect transistors; effects of modeling complexity and accuracy of performance prediction; charge storage in devices. Application of the electronic circuit simulation and study of the regenerative and nongenerative transistor circuits. Mr. Pederson, Mr. Meyer (F)

141. Linear Integrated Circuits. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: courses 104B and 105. Integrated circuit elements and devices; the design of IC operational amplifiers, bipolar transistor circuits, tunnel diodes, analog to digital converters; analysis of bandgap frequency response; feedback amplifier theory and design; noise performance; frequency selectivity circuits; potential and active instability. Mr. Meyer, Mr. Gray (F, W, Sp)

145. Digital Integrated Circuits. (4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 104B, 105. Analysis and design of digital integrated logic circuits with emphasis on speed, fan-in, fan-out, logic levels and power. Both bipolar and MOS circuit families are treated. The organization of these circuits into MSI and LSI arrays for logic and memory application is discussed. Mr. Jackson, Mr. Meyer, Mr. Gray (F, W, Sp)

147. Processing and Design of Integrated Circuits. (4) Four hours of lecture and one 3-hour laboratory per week. Prerequisite: course 105, 105L, 131A. Fabrication of integrated circuits, mask layout and diffusion, epitaxial growth, photolithography, device structure characterization, parasitic effects. Design of integrated circuits with emphasis on device-circuit interaction. Bipolar and CMOS interconnects will be fabricated and evaluated in the laboratory. Mr. Neureuther, Mr. Oldham (F, Sp)

160. Communication Theory and Analysis. (4) Four hours of lecture per week. Prerequisite: course 124, Statistics 134A. In-depth analysis of communication in the presence of noise, based on concepts presented in course 110A-B. Digital and analog communication systems, noise channels: optimum demodulators and signal sets. Pulse modulation: geometric interpretation of noise. Probability of error, exchange of bandwidth for signal-to-noise ratio. Optimum linear filtering. Mr. Särkisian, Mr. Turn, Mr. Wong (Sp)

170. Plasma and Beam Dynamics. (3) Three hours of lecture per week. Prerequisite: courses 105, 105L, 131A. Basic concepts of plasma and beams. Single particle motion in electric and magnetic fields; guiding center drift motion, invariants; applications to plasma confinement, beam focusing, electron and ion guns. Fluid approximations; applications to fusion. Waves in magnetized plasmas. Mr. Birdsall, Mr. Lieberman, Mr. Lichtenberg (W)

171. Properties of Plasmas. (2) One hour of lecture and four hours of laboratory per week. Prerequisite: course 170. A laboratory course in the study of the physical and electromagnetic properties of ionized gases, techniques of measurement of temperatures, densities, and properties of charged and neutral plasmas. Mr. Birdsall, Mr. Lieberman, Mr. Lichtenberg (Sp)

175. Applied Electron and Ion Optics. (4) Three hours of lecture per week. Prerequisite: course 105. Application of SE basic concepts to plasma and beam systems. Single particle motion in electric and magnetic fields; guiding center drift motion, invariants; applications to plasma confinement, beam focusing, electron and ion guns. Fluid approximations; applications to fusion. Waves in magnetized plasmas. Mr. Birdsall, Mr. Lieberman, Mr. Lichtenberg (W)

180. Dynamic Networks in Biology. (4) Three hours of lecture per week. Prerequisite: courses 105 and 105L. Electrical circuit analogs to study of biological systems; oscillations and electronic models for the study of fields. Mr. Miller (F, W, Sp)

181. Dynamic Networks in Biology. (4) Three hours of lecture per week. Prerequisite: courses 104B and 105. Prerequisites provide an excellent background for the course, but ability and confidence with the elementary methods of analysis, as introduced in Mathematics 51A and 51C, should be quite adequate. Open to students who have received credit for Physics 67. Fall 75 with consent of instructor. Introduction to the application of engineering modeling and analysis methods to continuous and discrete, deterministic and stochastic biological phenomena and noise with emphasis on cellular, organismal, and population phenomena. Mr. Lewis (W)

183A. Laboratory in Biomedical Signals and Transducers. (2) Two hours of lecture and one 2-hour laboratory per week. Prerequisite: Concurrent or previous enrollment in course 187. Experimental investigations of transduction processes, their properties, and their applications in various biological systems. Mr. Kelly (F)

183B. Laboratory in Electronic Biomedical Signal Processing. (2) Six hours of laboratory per week. Prerequisite: Concurrent or previous enrollment in course 188. Experimental investigation of performance of electronic modules in biological instrumentation systems, including A/D and D/A, bipolar, and MOS operational amplifiers, sample and hold circuits, and microprocessors. Mr. Singer (W)

184. Introduction to Ecological Systems. (3) Three hours of lecture and one hour of discussion per week. Prerequisite: course 104A-104B, or consent of instructor. Introduction to physical ecology and population biology based on mathematical models. Emphasis on physical and chemical mechanisms in the environment, modeling and analysis of ecosystems, focusing on the impact of man. Mr. Lewis (Sp)

185. Electrical Hazards and Safety. (2) Two hours of lecture. Prerequisite: course 104A-104B. Occupational and environmental hazards associated with electronic equipment, and basic principles of safety administration and technical measures for minimizing dangers. Mr. Suskind (Sp)

186*. Neural Integration of Sensory Information. (3) Three hours of lecture per week. Prerequisite: course 101B. Course in fundamentals of cell physiology or neurophysiology, such as EEC 161A, 165A or Physiology 104, 105. General mechanisms, random processes that abstract sensory information and encode for neural transmission to the higher centers. Focus on neurophysiological flow, parallel processing, neural mechanisms, and techniques of measuring neural activity. Mr. Lewis (F)

188. Electronic Signal Processing in Biology and Medicine. (4) Three hours of lecture and one hour of discussion per week. Prerequisites: courses 105 and 105L. Introduction to basic digital processing, the fundamental principles of their sources and significance, and their detection and measurement. Passive measurement and distributed systems. Engineering problems. Microscopic and macroscopic Maxwell's equations, fundamental theorems, waves in dispersive and anisotropic media, interaction of fields and structures with solid and fluid boundaries, coupled waves, boundary value and source problems, models of dielectrics and other physical systems. Mr. Silver, Mr. Whinnery, Mr. Neureuther 210A: F 10B: (F) 210C: (Sp)

210A–210B–210C. Applied Electromagnetic Theory. (3–3–3) Three hours of lecture per week. Prerequisite: course 117A–117B or Physics 110A–110B, 110C. 210A is prerequisite to 210B, 210C. Advanced treatment of classical electromagnetic theory and its application to engineering problems. Mr. T. D. Lee, Mr. Sinai, Mr. Wellman's equations, fundamental theorems, waves in dispersive and anisotropic media, interaction of fields and structures with solid and fluid boundaries, coupled waves, boundary value and source problems, models of dielectrics and other physical systems. Mr. Silver, Mr. Whinnery, Mr. Neureuther 210A: F 10B: (F) 210C: (Sp)

212A–212B. Physics of the Upper Atmosphere. (4–4) Three hours of lecture per week. Prerequisite: course 114A–114B or equivalent. Digital integrated circuits and devices of large interconnected power systems. Computer methods will be emphasized, with applications to systems planning, monitoring, and control. The large scale systems aspect will be included. Mr. Wu (Sp)

216. Microwave Antennas. (4) Three 1-hour lectures per week. Prerequisite: course 210A. Application of the fundamental properties of electromagnetic waves to design of microwave antennas and arrays used in transmission and reception of radio waves. Classical technique and numerical methods are emphasized. Mr. Mei (W)

217. Microwave and Optical Distributed Networks. (4) Three hours of lecture per week. Prerequisite: course 114A–114B or equivalent. Introduction to microwave and optical distributed network theories and the measurement techniques to microwave guides, cavity resonators, filters and ferrite devices; optical waveguides, resonators and other circuit elements; other important distributed systems. Mr. Neureuther, Mr. Whinnery (W)


222. Techniques of Linear System Theory. (4) Four hours of lecture per week. Prerequisite: course 119. Mathematics 112 recommended. To be taken concurrently. Basic system concepts: models, representations; dynamical system representation. State, equality, linearity, time-invariance. Linear systems and their properties. Stability: Controllability, Observability, Minimal representation. State and output feedback. Examples from circuits, control and other fields. Mr. Desoer (F, W)

230. Network Theory. (3) Formerly 230A. Three hours of lecture per week. Prerequisite: course 104B. Topological matrices, Tellegen's Theorem. Clas-


227A. Optimization and Control. (3) Three hours of lecture per week. Prerequisite: advanced calculus and familiarity with notion of state-transition matrix and initial-value problems in differential equations, or course 222, which may be taken concurrently. Discrete-time optimization techniques including linear and nonlinear programming and applications. Dynamic programming and Pontryagin's principle. Stochastic optimization. Graphs and digraphs. Applications of dynamic programming to control. Mr. Thomasian, Mr. Desoer, Mr. Varaiya (W)


228B. Identification and Optimization. (3) Three hours of lecture per week. Prerequisite: courses 222 (may be taken concurrently). Analysis and design of nonlinear and time-varying feedback systems. Linear feedback near the equilibrium points and input-output behavior are studied by Liapunov functions. Applications to control systems. Mr. Hopkin (F)

230. Solid-State Electronics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 130; Physics 137B. Crystal structure and symmetries. Energy bands and density of states. Shockley effective mass. Statistics of electronic state population. Recombination and diffusion. Derivation and application of Boltzmann transport equation. Optical properties and processes. Mr. Muller, Mr. Oldham, Mr. Smith (F)


243. MOS Integrated Circuits. (3) Three hours of lecture per week. Prerequisite: course 145 or 131A-131B or 147. Technology and design of metal-oxide-semiconductor (MOS) integrated circuit devices. Device characteristics, fabrication processes, static and dynamic circuit design; logic design, memories and analog circuits with design using MOS LSI. Mr. Hodges, Mr. Jackson (W, Sp)


270B. Introduction to the Theory of Signals and Noise. (4) Four hours of lecture per week. Prerequisite: course 122 or 240A or 240B. Second order stochastic processes. Correlation and linear operations. Wide sense stationary and spectral density. Spectrum of Gaussian processes. Stochastic differential equations. Applications. Mr. Sakrison, Mr. Wong (W)

280B. Stochastic Processes. (3) Two hours of lecture per week. Prerequisite: course 280A: Mathematics 104A. Extension of limited dimensional distribution, function space and processes. Markov processes, Gaussian processes. Stochastic differential equations. Applications. Mr. Wong (Sp)

290A. System Theory. (2) Two hours lecture per week. Prerequisite: courses 183A-183B recommended. State-of-the-art techniques in medical instrumentation to measure parameters of direct clinical significance, nuclear magnetic resonance, electron spin resonance, viscosity determination. Transducer, rf, data processing with necessary for implementation of these techniques. The human as an element within instrumental feedback systems. Mr. Zadeh (Sp)

290B. Advanced Graduate Study in Electrical Engineering. Current and advanced topics in electrical engineering primarily for advanced graduate study. Examples of courses which may or may not be offered during 1976-77.

290C. Advanced Circuit Theory. (1-3) One to three hours of lecture per week. Prerequisite: course 225. Current research topics in circuit theory for advanced study and systems. Typical subjects include feedback theory and sensitivity, computer-aided circuit design, modeling of digital and analog systems, advanced control theory, computer-aided circuit design, state-space analysis, linear systems, nonlinear n-ports, and synthesis of nonlinear networks. To be taken on a passed/not passed basis. Mr. Polak (W)

291. Statistical Communication Theory. (4) Four hours of lecture per week. Prerequisite: course 222. Statistical formulation of digital and analog communication systems. Communication rates. Non-linear and Gaussian sources. Mr. White, Mr. Neureuther (Sp)

295A. Introduction to Information Theory. (3) Three hours of lecture per week. Prerequisite: Statistics 134G or Statistics 200F, or equivalent. Applications of Shannon information theory. Information rate of stochastic sources; capacity and proof of coding theorem; probabilistic fluctuation of code; convergence of discrete and continuous quantities; quantization. Mr. Sakrison, Mr. Turin (Sp)

295A. Introduction to Information Theory. (3) Three hours of lecture per week. Prerequisite: course 265A. Introduction to Information Theory. Information rate of stochastic sources; capacity and proof of coding theorem; probabilistic fluctuation of code; convergence of discrete and continuous quantities; quantization. Mr. Sakrison, Mr. Turin (Sp)

290H. The Computer-Aided Analysis and Design of Integrated Circuits. (3) Three hours of lecture per week. Prerequisites: courses 141 or 145. The review and development of computer-aided circuit analysis programs; effective active device modeling; sparse matrix techniques; basic components and performance of automated design packages for integrated circuits. Mr. Pederson (W).

290P. Topics in Solid-State Electronics. (3) Three hours of lecture per week. Prerequisites: courses 130, 230 or 231, and a course in electrical engineering. Advanced treatment of topics chosen from research areas such as: space-charge effects in solids, high electric-field effects, quantum phenomena, elastic wave interactions, surface effects on semiconductors. Mr. White.

290Q. Plasma Computational Physics. (3) Three hours of lecture per week. Prerequisite course 170 or Physics 142, some computer skills. Theory and design of plasma simulation using many-particle and fluid models on computers. Applications to extension of linear and non-linear theory and to laboratory experiments on oscillations, waves, and hot electron behavior. Mr. Brodersen (Sp).

290S. Topics in Quantum Electronics. (4) Three hours of lecture per week. Prerequisite: course 117A and Physics 115, or the equivalent, and graduate standing. Topics in nuclear and electron magnetic spin resonance phenomena. Nuclear and electron spin resonance description, resonance instrumentation, spin echo, optical spin echo (with lasers). Problems of detecting and analyzing resonance phenomena, including detection, signal averaging, computer processing of periodic signals. Mr. Singer (Sp).

290T. Measurement and Identification Systems. (3) Three hours of lecture per week. Prerequisite: Statistics 200A and course 229A or equivalent. Adaptive, control and measurement systems responsive to changes in commands, disturbances, components and models. One-hour laboratory per week. Mr. Smith (Sp).


299. Group Studies, Seminars, or Group Research. (1–8) Advanced study in various subjects through special seminars on topics to be selected each year, informal group studies of special problems, group participation in comprehensive design problems. Prerequisite: consent of the instructor. Mr. Gill, Mr. Tuttle (F, W, Sp).

300. Individual Research. (1–12) Investigation of problems drawn from various fields with emphasis on application and analysis and examination. The Staff (F, W, Sp).

302. Individual Study for Doctoral Students. (1–8) Independent study under the direction of one or more higher-level language instructors, intended to provide an opportunity for qualified students to prepare themselves for the various examinations for the Ph.D. and other doctoral degrees). May not be used for unit or resident requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp).

3180. Economic and Biological Feedback Systems. (3) See Interdepartmental Studies for the complete description of this course.

3181. Cellular Mechanism Underlying Nervous Activity. (3) See Interdepartmental Studies for the complete description of this course.

3181L. Laboratory in Cellular Mechanisms Underlying Nervous Activity. (3) See Interdepartmental Studies for the complete description of this course.

3202. Neural Integration and Coordination. (4) See Interdepartmental Studies for the complete description of this course.

3202L. Advanced Laboratory in Neural Integration and Coordination. (4) See Interdepartmental Studies for the complete description of this course.

3203. Neural and Telecommunication Systems. (1) Three hours of lecture per week. Prerequisite: Statistics 200A and course 229A or equivalent. Adaptive, control and measurement systems responsive to changes in commands, disturbances, components and models. One-hour laboratory per week. Mr. Wong.


340. Programming Style. (3) Two hours of lecture and one hour of discussion per week. Prerequisite: course 170 or Physics 142, some computer skills. Theory and design of plasma simulation using many-particle and fluid models on computers. Applications to extension of linear and non-linear theory and to laboratory experiments on oscillations, waves, and hot electron behavior. Mr. Brodersen (Sp).

347. Introduction to Programming. (4) Two hours of lecture and one hour of discussion per week and scheduled consulting. Prerequisite: None. Only one of the courses 1, 1S, 3, 35, 101, 101S, 103, 103S can be taken for credit. Not open to students in engineering. Introductory programming course for lower division non-engineering non-physical science students. Algorithms, programs, and computers. Extensive practice with one or more higher-level languages. Mostly non-numerical applications. Mr. McEntyre (F, W, Sp).

3S8. Self-Paced Introduction to Programming. (1–4) Two hours of meetings with staff and two hours of programming laboratory per week. Prerequisite: none. Only one of the courses 1, 1S, 3, 35, 101, 101S, 103, 103S can be taken for credit. Not open to students in engineering. The same material as course 3 but in a self-paced format. Units assigned depend on number of study units and program assignments completed. Algorithms, programs, and computers. Computer solution of problems drawn from various fields. May be repeated for a total of 4 units. Mr. White.

400. Programming Style. (3) Two hours of lecture and scheduled consulting per week. Prerequisites: course 2 and either 1, 1S, or 3S. A systematic approach to the design and construction of computer programs. Course objective: to teach the student to write clear, efficient, and easily modifiable programs. Introduction to the PASCAL programming language. Programming exercises illustrating advanced programming techniques. Mr. Fateman.

411. Machine Structures. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 1 or equivalent. Students who received credit for course 103, Electrical Engineering and Computer Science 108, Engineering 41, or Electrical Engineering and Computer Science 153 prior to September 1973 may not receive credit for this course. Characteristics of stored-program computers, number representations, machine-oriented programming techniques, assembly languages, macros, loaders, use of operating systems. Mr. Gill, Mr. Stonebraker (F, W, Sp).

99. Individual Study and Research for Undergraduates. (1–2) Prerequisite: course 1 or equivalent. A course for lower division students in good standing who wish to undertake a program of individual inquiry initiated jointly by the student and a professor. There are no formal prerequisites, but the supervising professor must be convinced that the student is able to profit by the program. Must be taken on a passed/not passed basis. Mr. Berlekeym in charge (F, W, Sp).
101. Introduction to Computing for Engineering and Physical Sciences. (4) Two hours of lecture and one hour of discussion per week. Prerequisite: Mathematics 1C. Only one of the courses 1, 3, 5, 10, 101, 103, 105, 1013, 103 can be taken for credit. Only one of the courses 1, 5, 10, 101, 103, 105, 1013 can be taken for credit. The same material as CS 107. Self-paced introduction to computing for upper division engineering and physical science students. Algorithms, programs, and computing. Computer solution of problems drawn from various fields with emphasis on applications. May be repeated for credit up to a total of 4 units. Mr. White, Mr. Gill (F, W, Sp).

105. Self-Paced Introduction to Computing for Engineering and Physical Sciences. (1–4) Two hours of meeting with staff and two hours of programming lab per week. Prerequisite: Mathematics 14, 15, 16. Matlab course 1. Upper division standing. Yet to be developed. Mr. Hoffman (F).

106. Introduction to Logic and Discrete Mathematics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: Mathematics 1C or 5A. Introduction to logic and an axiom-based theory such as group theory, Boolean algebra, semigroups, combinatorics, graph theory, formal languages, etc. will serve to illustrate the variety and depth of mathematical methods in computing. Mr. Stonebraker (W, Sp).

120A–120B. Computers in the Humanities. (4–4) Three hours of lecture and one hour 1/2 hour problem session per week. Prerequisite: upper division standing or consent of instructor. Upper division standing or consent of instructor. Open to students who have taken Mathematics 1C or other courses in mathematical induction and other mathematical techniques. Introduction to logic and an axiom-based theory such as group theory, Boolean algebras, semigroups, combinatorics, graph theory, formal languages, etc. will serve to illustrate the variety and depth of mathematical methods in computing. Mr. Berlekamp (W, Sp).

151A. Computer Memory and Storage Devices. (4) Three hours of lecture per week. Prerequisite: course 150 or equivalent. Upper division standing required. The central processor: instruction set, arithmetic unit, control unit. Storage hierarchy: cache, main memory. Introduction to design and evaluation of algorithms for manipulating data structures (e.g. searching, sorting, hash addressing, recursive techniques). Data structures in programming languages. Course work includes programming using an ALGOL-like language. Mr. Fateman, Mr. A. J. Smith (F, W, Sp).

154. Compilers and Programming Languages. (4) Replaces course 106 and Electrical Engineering and Computer Science 154. Three hours of lecture and one hour problem session per week. Prerequisite: course 153. Programming language design and description: comparative study of several languages and concepts in programming or string-processing language implementation. Mr. Hoffman (W).

155. Operating Systems for Digital Computers. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 153 and either course 107 or 152A. Basic concepts of operating systems: the notion of a process, scheduling, communication and synchronization, main memory allocation, segmentation, paging, loading and linking, scheduling, design and implementation of file system, protection, privacy. Mr. Fabry, Mr. Wasserman, A. J. Smith (F, W, Sp).

156. Finite-State Machines. (3) Replaces course 150 and Electrical Engineering and Computer Science 156. Three hours of lecture per week. Prerequisite: Mathematics 113A or course 118. Analysis and synthesis of finite state acceptors, transducers and generators. State equivalence and minimization. Regular sets. Decision problems. Non-deterministic automata. Applications to discrete nets, formal languages. Topics from among: homing experiments, the semi-group of an automaton, decompositions, special families of automata. Mr. Giil, Mr. Harrison (F, W).

157. Graph Theory. (3) Formerly course 142. Three hours of lecture per week. Prerequisite: Mathematics 113A or 118. Graph theory and associated algorithmic problems. Elementary connectivity concepts; Euler graphs, maze problems; Hamilton circuits; enumeration of trees; incidence matrices; planar graphs; coloring problems and 4-color conjecture; Ramsey's theorem. Mr. Karp, Mr. Lawler, Mr. Prenner, Mr. Fateman (F, W, Sp).

158. Introduction to Information Processing. (3) Formerly course 1 and 2 or equivalent. Three hours of lecture per week. Prerequisite: course 150S taken concurrently or Engineering 17. Characteristics of components for and methods of design and analysis of digital systems, switching circuit algebra, graphical methods and introduction to minimization: experiments with pulse trains, sampling, state diagrams, systems from standard high-speed components. Mr. Blum, Mr. Ramamooorthy (F, W, Sp).

159. Electronic Logic Circuits. (1) Formerly Electrical Engineering and Computer Science 159. Three hours of lecture per week. Prerequisite: course 150 must be taken concurrently. A student may not receive credit for both 150S and 159. An introductory study of electronic logic circuits for students unfamiliar with large-signal transistor techniques. Mr. Blum, Mr. Ramamooorthy (F, W, Sp).

160. Computer Organization. (3) Formerly Electrical Engineering and Computer Science 160. Three hours of lecture per week. Prerequisite: course 152A. Organization and design of computer systems. The central processor: instruction set, arithmetic unit, control unit; decoding, addressing, hardware and microprogrammed control. Primary and secondary memory organization. 1/0 processing: programmed 1/0, interrupt, direct memory access. Mr. Despain, Mr. Lee, Mr. Ramamooorthy (F, W, Sp).

161. Input-Output Devices and Microprocessors. (3) Three hours of lecture and one three-hour laboratory per week. Prerequisite: course 152A. Three hours of lecture per week. Prerequisite: course 152A. Organization and design of stored-program computers. Computer components. The central processor: instruction set, arithmetic unit. The control unit: decoding, addressing, hardware and microprogrammed control. Primary and secondary memory organization. 1/0 processing: programmed 1/0, interrupt, direct memory access. Mr. Despain (F), Mr. Ramamooorthy (F, W, Sp).

162. Introduction to Computer Organization. (3) Three hours of lecture per week. Prerequisite: courses 41 and 150. Students will not receive credit for both courses 107 and 152A. Organization and design of stored-program computers. Computer components. The central processor: instruction set, arithmetic unit. The control unit: decoding, addressing, hardware and microprogrammed control. Primary and secondary memory organization. 1/0 processing: programmed 1/0, interrupt, direct memory access. Mr. Baskin (F, W, Sp).

166. Models of Computation. (3) Formerly course 152 and Electrical Engineering and Computer Science 164. Three hours of lecture per week. Prerequisite: course 152A. Models of computation. Automata, Turing machines, recursive functions, recursive sets, the recursive hierarchy. Mr. Karp, Mr. Lawler, Mr. Partett (F).

167. Graph Theory. (3) Formerly course 142. Three hours of lecture per week. Prerequisite: Mathematics 113A or 118. Graph theory and associated algorithmic problems. Elementary connectivity concepts; Euler graphs, maze problems; Hamilton circuits; enumeration of trees; incidence matrices; planar graphs; coloring problems and 4-color conjecture; Ramsey's theorem. Mr. Karp, Mr. Lawler, Mr. Prenner, Mr. Fateman (F, W, Sp).

168. Directed Group Studies for Advanced Undergraduates. (2–5) Prerequisite: course 1 or equivalent. Group study of selected topics in Computer Science. Mr. White (F, W, Sp).

120. Principles of Engineering Economy. (3) Three 1 1/2-hour meetings per week. Prerequisite: completion of 90 units of an approved engineering curriculum. Credit cannot be received for both course 120 and Civil Engineering 194. Economic analysis for engineering decision-making: economics of the firm; capital sources and their effect on study models; alternative, replacement and future-demand investments; risk and uncertainty; income-tax effects; capital budgeting and program evaluation; alternative program evaluation. The Staff (W, Sp, F)

130. Modelling and Simulation of Dynamic Systems. (4) Three hours of lecture and one hour discussion per week. Prerequisites: Mathematics 51C. Concepts of dynamic feedback systems, including stability, and characteristics of linear and nonlinear systems. Practice in modeling and analysis of systems of moderate complexity; simulation of nonlinear and stochastic systems. Mr. Golovin (W)

150. Production Systems Analysis. (4) Three hours of lecture and two hours of laboratory per week. Prerequisite: Engineering 102, courses 120 and 162. Operations analysis of integrated production systems; use of operational models and quantitative methods for operations research. The Staff (F, W, Sp)

153. Facilities Planning and Design. (4) Two 1 1/2-hour lectures and one 2-hour discussion per week. Prerequisite: course 150. Consideration of mathematical models for layout, line balancing and conveyor systems. Analysis of integrated materials control systems involving functions of delivery, inventory, and computer control. Design of automated warehouse and order-picking systems and system testing. Computer simulation. Mr. Shephard (F)

154. Industrial Data Processing Systems. (4) Two 1 1/2-hour lectures and one hour of laboratory session per week. Prerequisite: Engineering 102. Introduction to data acquisition, real-time processing, and information pertinent to the design, analysis, and operation of industrial systems. Students will elect a term project for development of a data processing application, computer time available. The Staff (F)

160. Operations Research I. (4) Three hours of lecture and two hours of discussion per week. Prerequisite: Mathematics 14A or equivalent. Fundamentals of operations research including linear programming, network analysis, and system optimization. The Staff (F, W, Sp)

161. Operations Research II. (4) Three hours of lecture and two hours of discussion per week. Prerequisite: Statistics 134A or equivalent. A survey of methods and techniques useful in operations research. Mr. Jewell, The Staff (F, W, Sp)

164. Introduction to Inventory Theory. (3) Two 1-hour lectures and one 1-hour problem session per week. Prerequisite: Statistics 134B (may be taken concurrently) or 100A or 133. Introduction to deterministic and stochastic models of inventory, with emphasis on computational methods and optimization. The Staff (Sp)

165. Reliability and Quality Control. (4) Three hours of lecture and 1 hour of discussion per week. Prerequisite: Mathematics 51A or equivalent. Topics covered will be: fractions of the total population, sampling, and computational methods; analysis of steady-state results. Mr. Ross (Sp)

166. Network Flow Models and Critical Path Scheduling. (4) Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisites: Mathematics 51A or 14A. Network flow models with emphasis on formulation and industrial application. Topics covered will be: flows in directed graphs and optimal network flows; shortest and longest routes; formulations, time only and cost-time critical, randomized algorithms, computer solutions, and execution interpretations. Mr. Jewell (W, Sp)

167. Introduction to Queueing Theory. (4) Two 1 1/2-hour lectures and one 1-hour discussion per week. Prerequisite: One of Statistics 134B (may be taken concurrently) or 100A or 133. Introduction to determin-

172. Work Methods and Measurement. (3) Two 1-hour lectures and one 2-hour laboratory per week. Prerequisite: course 170. Statistics 134A, or permission of instructor. Estimation and analysis of production and work systems analysis, design and standardization. Plant layout, motion- time systems, work sampling, and statistical quality control. The Staff (W, Sp)

176. Work, Incentives, and Organization. (4) Two 2-hour meetings per week. Theory and design of jobs and corresponding organizations, with emphasis on motivation and selection to the currently changing structure of our industrial society. Lecture, cases and discussion. Topics include influence of technology, socialization, specific aspects of work organization, job satisfaction, safety, health. The Staff (F)

178. Health and Safety. (3) Two 1 1/2-hour meetings per week. Prerequisite: any of course 170, 171, 172, or 176. Emphasis on health and safety of workers. Man-machine, socio-technical, and economic considerations, including physical conditions, work organization, machine and human factors in health and safety of workers. The Staff (W)

179. In-Plant Laboratory (1) One 4-hour plant visit on every other week. Prerequisite: course 170 may be taken concurrently. Industrial plant inspections to supplement course 178. Health and Safety. Bi-weekly sessions supplemented by analyses and reports. The Staff (F)

180. Synthesis and Design of Industrial Systems. (4) Two 2-hour lectures per week. Prerequisite: course 150 and completion of courses 154 and 162. Design and analysis of production systems. Consideration of technical and economic aspects of equipment and process design. Students work in teams under faculty supervision. Topics vary. The Staff (W, Sp)

199. Supervised Independent Study and Research. (1–5) Prerequisite: senior standing. Group studies of selected topics and corresponding organizations, with emphasis on motivation and selection to the currently changing structure of our industrial society. Lecture, cases and discussion. Topics include influence of technology, socialization, specific aspects of work organization, job satisfaction, safety, health. The Staff (W)

210. Bi-directional Courses. (2) Two 1 1/2-hour lectures and one and one-half hours of discussion per week. Prerequisite: Math 104A recommended. Econometric and programming activity analysis. The Staff (Sp)


251. Production Systems and Facilities. (4) Two 1 1/2-hour lectures and one 1-hour laboratory per week.
26A. Introduction to Mathematical Optimization. (4) Three hours of lecture and one 2-hour laboratory per week. Prerequisite: Computer Science 101, Mathematics 11A or 111, Computer Science 101. Non-linear programming, unconstrained optimization, Kuhn-Tucker theory, feasible directions and penalty function algorithms. Dynamic programming, shortest path problems, resource allocation, integer models. Mr. Glassy (F).

26B. Introduction to Mathematical Optimization. (4) Three hours of lecture and one 2-hour laboratory per week. Prerequisite: course 260A or 162, Mathematics 51A or 111, Computer Science 101. Non-linear programming, unconstrained optimization, Kuhn-Tucker theory, feasible directions and penalty function algorithms. Dynamic programming, shortest path problems, resource allocation, integer models. Mr. Glassy (F).

26A. Stochastic Models of Operations Research I. (4) Two 1 1/2-hour lectures and one hour of laboratory per week. Prerequisite: course 260A or 162. Mathematics 51A or 111, Computer Science 101. Non-linear programming, unconstrained optimization, Kuhn-Tucker theory, feasible directions and penalty function algorithms. Dynamic programming, shortest path problems, resource allocation, integer models. Mr. Glassy (F).

26B. Stochastic Models of Operations Research II. (4) Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisite: course 260A or 162. Mathematics 51A or 111, Computer Science 101. Non-linear programming, unconstrained optimization, Kuhn-Tucker theory, feasible directions and penalty function algorithms. Dynamic programming, shortest path problems, resource allocation, integer models. Mr. Glassy (F).

26C. Linear Programming. (4) Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisite: Mathematics 111. Basic graduate course in linear programming. The simplex method and its variants. Convergence properties. Duality theory. Geometry of linear programs. Parametric programming. Special structures and parametric problems. Upper and lower bounds on variables. Introduction to matrix games and quadratic programming. Mr. Adler (F).

26D. Nonlinear Programming. (4) Two 1 1/2-hour lectures and one 1-hour discussion per week. Prerequisite: course 262A or 162 or a course in linear algebra. Basic concept and theoretical results of the course in nonlinear programming. Properties of convex sets and functions, unconstrained minimization, Kuhn-Tucker theory, dual problems and duality. Applications and algorithms, with emphasis on methods for which convergence proofs exist and computational experiments have been favorable. Mr. Adl (Sp).
Materials Science and Engineering

UPPER DIVISION COURSES

100. Field Trips. (2) One 4-hour laboratory per week. Prerequisite: junior standing in ceramics or metallurgy. Selected plant visitations, lectures by practicing materials scientists and engineers of trial organizations engaged in the manufacture or use of ceramic and metallurgical products. The Staff (Sp)

101. Crystal Chemistry and Diffraction. (3) Three hours of lecture per week. Prediction of crystal structures and properties on the basis of atomic sizes and bonding characteristics. Introduction to X-ray, neutron, and electron diffraction techniques for the characterization of crystalline materials.
Mr. Thomas (F)

101L. Crystal Chemistry and Diffraction Laboratory. (1) Three 1-hour periods per week. Laboratory work on applications of powder and single crystal diffraction techniques.
Mr. Thomas (W)

102. Thermodynamics. (4) Four hours of lecture per week. Prerequisite: Chemistry 1B. The thermodynamics of equilibrium, with emphasis on the phases of multiphase systems. Mr. Fuerstenau. Mr. Washburn (W)

103. Phase Equilibria and Transformations. (4) Three hours of lecture and 12 hours of laboratory per week. Prerequisite: course 102 or Chemistry 14. Principles and mechanisms determining material microstructure. Multiple equilibria and phase diagrams. Phase transformations: nucleation; diffusion and diffusionless growth processes. Mr. Fuerstenau (Sp)

107. Chemical Metallurgy. (4) Four hours of lecture per week. Prerequisite: course 102 or Chemistry 14. Chemical properties of metals and metallic compounds; interaction with one another, with gases, slags, and refractories, with the environment; production and refining of metals and nonmetals.
Mr. Evans (W)

Mr. Bragg (W)

109. Physical Metallurgy. (3) Three hours of lecture per week. Prerequisite: Engineering 45; senior standing in engineering or a physical science. Relations between microstructure and engineering properties of alloys. Nature and origin of nonequilibrium microstructures. Control of microstructure in metals and ceramics. Microstructural effects on properties. Laboratory work on properties of castings. Mr. Parker (Sp)

109L. Physical Metallurgy Laboratory. (1) One 3-hour laboratory per week. Prerequisite: Engineering 45. Laboratory work for course 109. Preparation of specimens for optical and electron microscopy; metallography and X-ray diffraction; electron probe microanalysis. Laboratory assignments on control properties; effects of microstructural changes on mechanical, electrical, and chemical properties; microstructures and properties of castings. Laboratory exercises on fracture modes. Mr. Parker (Sp)

121. Glass and Ceramics. (3) Three hours of lecture per week. Prerequisite: Engineering 45. Crystallochemistry of glasses and ceramics. Relations between structure and function. Properties of glassy materials: strengthening of glass; glass coating of metals; and ceramic corrosion and failure. Laboratory work on structural application. Special ceramics for electronics, nuclear and aerospace applications.
Mr. Washburn (Sp)

121L. Glass and Ceramics Laboratory. (1) One 3-hour laboratory per week. Prerequisite: course 121 is a prerequisite and must be taken concurrently. Laboratory exercises to supplement lectures. Composting and metting, softening points and annealing of glass. Strength of glass, glass-ceramics, and alumina ceramics. Electronic ceramics. Adhesions of glass to metals.
Mr. Fulrath (W)

122. Ceramic and Metal Powder Processing. (3) Three hours of lecture per week. Principles of forming methods and nature of materials response in slip casting, extrusion, dry powder forming, and plastic massing. Sintering and vitrification. Relation of processing steps to microstructure development. Mr. Pask (Sp)

122L. Ceramic and Metal Powder Processing Laboratory. (1) One 3-hour laboratory per week. Prerequisite: course 122 is a prerequisite and may be taken concurrently. Preparation and forming by slip casting, extrusion, and pressing forming methods. Sintering and vitrification. Hot pressing. Correlation of microstructure with processing parameters. Experiments with ceramic material and metal powders.
Mr. Pask (Sp)

130. Materials Engineering. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: senior standing in ceramics or metallurgy. Students who have taken Engineering 45 may not receive credit for course 130. Structure and properties of metallic, ceramic and polymeric materials. Application of materials to engineering problems. Topics covered include heat treatment of steel, design limitations of structures with respect to fatigue and fracture, and influence of chemical environment on mechanical properties of materials.
Mr. Zuckay (F)

141. Particulate Materials. (3) Three 1-hour lectures per week. Prerequisite: graduate standing in engineering or a physical science. Characterization of solid particulate and particulate systems. Size distributions, rheology and calorimetry of particulate systems. Surface properties of particulates, principles of size reduction, size separations, unit operations in solid-liquid and solid-solid separations, mixing, agglomeration of particles.
Mr. Sastry (F)

141L. Particulate Materials Laboratory. (1) One 3-hour laboratory per week. Prerequisite: course 141 is a prerequisite and must be taken concurrently. Experiments in the measurement of particle size, surface area, size distributions, the packing of powder, size reduction, mixing, agglomeration, and rheology of particulate systems.
Mr. Sastry (F)

142. Materials Processing Engineering. (4) Four hours of lecture per week. Material and energy balances; fuels and combustion, corrosion, heat transfer in metallurgical and ceramic systems.
Mr. Evans (F)

188. Directed Group Studies for Advanced Undergraduates. (1–5) Prerequisite: course 101 and 103. Group study of selected topics. The Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations listed on page 34. For students in good standing who wish to undertake a project that is not related jointly by the student and a professor. There are no other formal prerequisites, but the supervising professor must be convinced that the student is capable to profit by the program. Must be taken on a passed/not passed basis.
Mr. Fuerstenau in charge (F, W, Sp)

GRADUATE COURSES

200A–200B. Principles of Materials Science and Engineering. (200A) (200B) Three hours of lecture per week. Prerequisites: graduate standing in Engineering or Natural Sciences. Crystallography, lattice defects, modern imaging and diffraction methods, solid state phase relations, thermodynamics, kinetics, transport phenomena, phase transitions, and characterization of solid materials. Mr. Thomas (W)

200L. Diffraction and Crystallography Laboratory. (1) One 3-hour laboratory period per week. Prerequisite: graduate standing in Engineering or Natural Sciences. Laboratory work for course 200A. Experiments on applications of powder, single crystal, and electron diffraction techniques. Debye-Scherrer, diffractometer, and Laue methods: x-ray qualitative and quantitative analysis, orientation of single crystals, electron diffraction, indexing of patterns, crystal size determinations.
Mr. Thomas (F, W)

201. Applications of Chemical Thermodynamics. (4) Four hours of lecture per week. Prerequisite: course 200 or 200A. Prediction and analysis of thermodynamic behavior of inorganic compounds and alloys. Limitations of the models are discussed.
Mr. Searcy (W)

203. Classical Thermodynamics. (4) Four hours of lecture per week. Prerequisite: familiarity with vector calculus and partial differential equations. Principles of classical thermodynamics, entropy, the second law, and methods important in materials science: alloy theory, crystal imperfections, atom migration in crystals.
Mr. Morris (F)

Mr. Thomas (W)

230. Distillation Theory. (3) Three hours of lecture per week. Concept and properties of perfect and imperfect distillation columns, their mutual interaction, relation to point defects and stacking faults, theories of glide and climb motion, distillation multiphase and cross-ethereal columns on the quantum level and in dislocations in important crystal structures.
Mr. Washburn (F)

280. Distillation Engineering. (3 or 4) Three hours of lecture per week. Prerequisite: students who have taken course 207 or equivalent should register for units 3 or 4. Application of distillation theory to provide a basic understanding of mechanical properties of crystalline solids, including those of coating, sliding and sliding friction, twinning, creep, recovery, superplasticity, fracture, and effects of radiation damage. Mr. Washburn (Sp)

210. Surface Properties of Materials. (3) Three hours of lecture per week. Principles of surface and interfaces, surface and phase boundaries, surface tension of solids and liquids, surface activity, adsorption, phase equilibrium and contact angle, double layers at interfaces. theory and applications.
Mr. Fuertenstein (W)

211. Thermal and Optical Properties of Materials. (4) Three hours of lecture per week. Prerequisite: any undergraduate course in solid-state physics or physics of materials, e.g., Physics 140, 141. Electrical Engineering and Computer Sciences 130 or course 108. This prerequisite will be waived for students with undergraduate degrees in physics or chemistry. Application solid-state physics of materials and materials science of engineering importance, especially nonmetallic materials. Dielectrics, ferro and piezo-electrics, crystal optics and diffraction, nonlinear effects, crystal optics, and conductivity and thermal expansion.
Mr. Merriam (W)

212. Electrical and Magnetic Properties of Materials. (4) Three hours of lecture per week. Prerequisite: any undergraduate course in solid-state physics or physics of materials, e.g., Physics 140, 141. Electrical Engineering and Computer Sciences 130 or course 108. This prerequisite will be waived for students with undergraduate degrees in physics or chemistry. Application solid-state physics of metals, especially electronic phenomena. Metals as a free electron gas, energy bands and Fermi surfaces, magnetic materials, thermoelectric materials.
Odd years only. Mr. Merriam (Sp)

213A. Electron Diffraction and Microscopy. (3) Three hours of lecture and laboratory per week. Prerequisites: course 201 or 204A or 214. Crystallography, reciprocal lattice concepts and kinematical theory of diffraction and imaging, electron microscopes, and fast Fourier transforms. Kikuchi diffraction high resolution; scanning electron microscopy; applications to modern research projects in Materials Science and Engineering. Mr. Washburn (W)

213B. Electron Diffraction and Microscopy. (3) Two hours of lecture and three hours of laboratory per week. Prerequisite: 213A. A combination of fundamental and modern theory, absorption, diffraction patterns, image contrast strain analysis, e.g., small defects (radiation damage, precipitates); special topographic problems, many beam effects, non-conventional techniques; lattice imaging; spectroscopy. Laboratory: advanced research in the areas of detection and selection of defects. Mr. Washburn (W)

213L. Electron Microscopy and Diffraction Laboratory. (2) Six hours of laboratory per week. Prerequisite: course 213A, may be taken concurrently: limited to 12 students (W and Sp). Operation of Electron Microscopes, dark field, selected area diffraction techniques, specimen preparation, replicas foils, pho-
19. Supervised Independent Study and Research. (1-6) Enrollment is restricted by regulations listed on page 34. Additional limitations; enrollment is limited to students who have demonstrated by achievement of a B average that they have a capacity for independent work. Special prerequisites will be established by the instructor guiding the work. Must be taken on a pass/failed basis.

Mr. Morrison (F, W, Sp)

Graduate Courses


201A-201B. Potential Field Methods In Applied Geophysics. (4-6) Three hours of lecture and one hour of discussion per week. Prerequisites: Physics 110A-110B, or equivalent, and upper division course in partial differential equations. The physical basis of gravity and magnetic surveying. Reduction of gravity and magnetic data. Students to prepare themselves for the various examination requirements in consultation with the major field adviser. Must be taken on a satisfactory/unsatisfactory basis.

Mr. Minson (W, Sp, odd years)

202A-202B. Electromagnetic Methods In Applied Geophysics. (4-6) Three hours of lecture and one hour of discussion per week. Prerequisites: Physics 110A-110B, or equivalent, and upper division course in partial differential equations. The design and interpretation of electromagnetic surveys in mineral, geophysical and geologic surveys. Plane wave and finite source fields above and within layered earth models; fields scattered from inhomogeneities in dissipative media; computation of these fields. Students to prepare themselves for the various examination requirements in consultation with the major field adviser. Must be taken on a satisfactory/unsatisfactory basis.

Mr. Minson (W, Sp, odd years)

203A-203B. Electrical Methods In Applied Geophysics. (4-4) Formerly 205A-205B. Three hours of lecture and one hour of discussion per week. Prerequisites: Physics 110A-110B, or equivalent, and upper division course in partial differential equations. The design and interpretation of electromagnetic surveys in mineral, geophysical and geologic surveys. Plane wave and finite source fields above and within layered earth models; fields scattered from inhomogeneities in dissipative media; computation of these fields. Students to prepare themselves for the various examination requirements in consultation with the major field adviser. Must be taken on a satisfactory/unsatisfactory basis.

Mr. Minson (W, Sp, odd years)

204A-204B. Seismic Methods In Applied Geophysics. (4-4) Formerly 207A-207B. Three hours of lecture and one hour of discussion per week. Prerequisites: Physics 110A-110B, or equivalent, and upper division course in partial differential equations. The design and interpretation of electromagnetic surveys in mineral, geophysical and geologic surveys. Plane wave and finite source fields above and within layered earth models; fields scattered from inhomogeneities in dissipative media; computation of these fields. Students to prepare themselves for the various examination requirements in consultation with the major field adviser. Must be taken on a satisfactory/unsatisfactory basis.

Mr. Minson (W, Sp, odd years)
Mechanical Engineering

UPPER DIVISION COURSES

101. Manufacturing Processes and Systems. (4) Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisite: Engineering 45. Fundamentals of manufacturing processes; use of case study method to describe the design and selection of modern manufacturing systems. Mr. Kobayashi (W)

102A. Mechanical Behavior and Processing of Materials. (4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: Engineering 34A, 34B, or Civil Engineering 130. Elastic and plastic deformation under static and dynamic load conditions. Prediction, and prevention of cracks, buckling, fracture, and fatigue, creep, and wear. Environmental influences, residual stress effects. Selection, forming, cutting, heat treatment processes for wrought and cast materials. Mr. Brown, Mr. Finnin, Mr. Kobayashi (F, Sp)

102B. Mechanical Engineering Design. (4) Two 1 1/2-hour lectures and three hours of laboratory per week. Prerequisite: course 102A. 104B (104B may be taken concurrently). Application of principles of mechanics, material science, and manufacturing processes to the design of components and complete machines which must meet prescribed functional requirements. Synthesis and analysis of a major design project. Mr. Hauser, Mr. Cunningham, Mr. Frisch (F, W)

103. Dynamics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: Physics 5A, 5B, 5C. The course covers the theoretical principles and experimental techniques used in contemporary seismic exploration, including surface wave, refraction and reflection methods. The use of explosive and non-explosive sources in continuous reflection profiling is treated, as well as the processing of data to elucidate geological structure from the seismic data. Mr. Farrell (W, Sp)

205. Electronic Instrumentation in Applied Geophysics. (4-4) Formerly 205A. Three hours of lecture and three hours of laboratory per week. Formerly Electrical Engineering 117A-117B or equivalent; Mathematics 120A-120B-120C or equivalent. The course covers analog and digital methods for processing and recording signals from geophysical transducers. Laboratory experiments involve analog filters, analog to digital converters and elementary digital signal processing. Mr. Farrell (F)

206A-206B: Digital Signal Processing in Applied Geophysics. (4-4) Formerly 215A-215B. Three hours of lecture and one hour of discussion per week. Prerequisite: Engineering 36, 45, and 50E or equivalent. The course covers analog and digital methods for processing and recording signals from geophysical transducers. Laboratory experiments involve analog filters, analog to digital converters and elementary digital signal processing. Mr. Goldsmith, Mr. Rosenburg, Mr. Leitmann, Mr. Brown, Mr. Bogy (F, W)

104B. Engineering Mechanics—III. (3) Three 1-hour lectures per week. Prerequisite: course 104A. Three-dimensional and two-dimensional problems. Two-dimensional and two-dimensional motions. Two-dimensional dynamics of rigid bodies. Methods of impulse and momentum, work and energy. Mr. Goldsmith (F)

105A-105B. Thermodynamics. (4-3) Four and one-half hours of lecture per week for 105A and three hours of lecture for 105B. Prerequisite: course 104A. First and second laws of thermodynamics, thermodynamic properties, available energy, irreversible processes, kinetic theory and microscopic properties, properties conversion systems. Mr. Daily, Mr. Miller, Mr. Leidt, Mr. Schaff for 105A; Mr. Daily, Mr. Oppenheim, Mr. Seban for 105B (F, W)

106A-106B. Fluid Mechanics and Transport Processes. (4-3) Four and one-half hours of lecture for 106A and three hours of lecture for 106B per week. Prerequisites: course 105A, 104A or 103. Mr. Talbot, Mr. Willis (W)

106B: Conductive and convective transfer of materials and energy in the single phase; thermal radiation and interchange. Mr. Tien, Mr. Pagli (F)

107A-107B. Mechanical Engineering Laboratory. (6) Six 1-hour lectures per week for 107A and three hours of lecture for 107B per week. Prerequisite: courses 105B, 106B, Experimental investigation and analysis of the steady-state and transient behavior of mechanical engineering systems and of their thermal and dynamic processes. The Staff (Mr. Hurburt in charge) 107A (W)

108A-108B. Fluid Mechanics and Transport Processes. (4-3) Four and one-half hours of lecture per week for 108A and three hours of lecture per week for 108B. Applications of the first and second laws; elements of heat transfer. Mr. Cornet (W)

121. Plasticity and Metal Forming. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 105B. Three-dimensional solutions and solidification problems by elementary methods of analysis. Topics such as plastic instability, solidification, and ductile fracture in forming. Mr. Kobayashi (F)

123. Design of Welded and Cast Structures. (4) Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisite: course 102B. Review of elastic, plastic, and creep behavior of materials and introduction to low-creep and low-cycle fatigue. Mr. Finnin (F)

127. Advanced Methods in Mechanical Design. (3) Three 1-hour lectures per week. Prerequisite: course 102B. Application of engineering principles to the synthesis and analysis of complete machines. Concepts of structural analysis, optimization, and functional requirements. Introduction to optimization and reliability considerations in machine design. Mr. Frisch (Sp)

129. Applied Stress Analysis. (3) Three 1-hour lectures per week. Prerequisite: Civil Engineering 130, Mathematics 51C. Solution of practical stress analysis problems related to the design of static and dynamic machine elements. Classical theoretical elasticity solutions and various experimental techniques will be brought to bear on real problems. Mr. Cunningham (W)

131. Kinematics of Mechanism. (3) Three 1-hour lectures and one 3-hour laboratory per week. Prerequisite: course 105B. Kinematic analysis and synthesis of typical elements of mechanism. Velocity and acceleration analysis of linkages, kinematics of cam driven mechanisms. Mr. Radcliffe (W)

132. Dynamics of Machinery. (3) Three 1-hour lectures per week. Prerequisite: course 103 or 104A. Kinematic and dynamic analysis of rigid body mechanisms using rigid and flexible analytical models and computer simulation of dynamic systems of cam driven systems. Dynamics of rotating systems. Balancing of rotors. Dynamic response of rigid body systems. Design applications. Mr. Radcliffe (W)

133. Mechanical Vibrations. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 103 or 104A. An introduction to the theory of mechanical vibrations including the topics of harmonic motion, Rayleigh's principle, damping, mechanical resonance, transient and steady state excitation. Mr. Steidel, Mr. Lieber (Sp)

134. Automatic Control Systems. (4) Two 1 1/2-hour and one 1-hour lectures per week. Prerequisites: Mathematics 51C, Physics 5D. Formulation of dynamic systems, control analyses, transfer functions, design specifications, stability. Feedback control systems and stability. Design and analysis in the Laplace domain; use of Laplace transforms. Mr. Tomizuka. Mr. and chemical engineering. Mr. Tomizuka (F, W)

135. Control Instrumentation and Switching Logic. (4) Three 1-hour lectures per week. Prerequisite: course 103 or 104A. Use of digital logic for digital signal processing. Applications to switching control systems. Mr. Takahashi (Sp)

136. Cryogenics. (4) Three 1-hour lectures and 1 1/2-hour discussion section per week. Prerequisite: courses 105B, 106B. Production and control of atmospheric and thermal environments for cryogenic applications. Topics covered include heat transfer, conditioning and psychrometric processes, and air pollution control. Ms. Miller (W)

137. Combustion Processes. (4) Three 1-hour lectures and one hour of discussion per week. Prerequisite: course 105B, 106B, or equivalent. Fundamentals of combustion, flame structure, flame speed, flammability, ignition, stirred reaction, kinetics and nonequilibrium processes, pollutant formation, fuel cells, and nuclear power sources. Mr. Sawyer (F)

138. Gas Turbine Combustion. (4) Three 1-hour lectures and one hour of discussion per week. Prerequisite: course 105B, 106B. Application of combustion principles to gas turbine systems. Emphasis on direct energy conversion including thermoelectric, photovoltaic, thermionic, magnetostrictive, and electric. Mr. Sawyer (F)

140. Condensation Processes. (4-4) Three 1-hour lectures per week. Prerequisite: course 105B, 106B. Production and control of atmospheric and thermal environments for cryogenic applications. Topics covered include heat transfer, conditioning and psychrometric processes, and air pollution control. Ms. Miller (W)

146. Energy Conversion Principles. (4) Three 1 1/2-hour lectures per week. Prerequisite: courses 105B, 106B. Application of thermodynamic principles to energy conversion systems. Mr. Tien (Sp)

147. Combustion Engines. (4) Four and one-half hours of lecture per week. Prerequisite: course 105B, 106B, or equivalent. Fundamentals of combustion, flame structure, flame speed, flammability, ignition, stirred reaction, kinetics and nonequilibrium processes, pollutant formation, fuel cells, and nuclear power sources. Mr. Oppenheim (W)

148. Petroleum Development Engineering. (4) Formerly 146A. Three 1 1/2-hour lectures per week. Prerequisite: course 105B. Application of engineering principles to the synthesis and analysis of complete machines. Concepts of structural analysis, optimization, and functional requirements. Introduction to optimization and reliability considerations in machine design. Mr. Somerton (W)

149. Petroleum Reservoir Engineering. (4) Formerly 146B. Three 1 1/2-hour lectures per week. Prerequisite: course 105B. Emphasis on standing in engineering, reservoirs, driving low temperature fluids and regions and their application in system. Mr. Tien (Sp)

150. Atmospheric and Thermal Environmental Control. (4) Three 1-hour lectures per week. Prerequisite: courses 105B, 106B. Production and control of atmospheric and thermal environments for cryogenic applications. Topics covered include heat transfer, conditioning and psychrometric processes, and air pollution control. Ms. Miller (W)

151. Heat Transfer. (4) Three 1-hour lectures, one 1-hour discussion period per week. Prerequisite: courses 105B, 106B. Basic principles of heat transfer and their application. Subject areas include steady-state and transient system analyses for conduction,
free and forced convection, boiling, condensation, and thermal radiation. Mr. Pagni, Mr. Trezek (F, W)

153. Introduction to Bioengineering. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 106A, Mathematics 51C. Objective is to show how the analytical techniques used by engineers can be applied to the study of biological systems. Heat, mass and momentum transfer, thermodynamic, electrical and thermal field modeling, control systems, human performance, and modeling of various bioengineering problems. Mr. Trezek (Sp)

155. Statistical Thermodynamics. (4) Three 1-hour lectures and one hour of discussion per week. Prerequisites: course 106A, Mathematics 51C. Theoretical and empirical bases of statistical mechanics and applications. Mr. Pagni (F)

156. Fresh Water from the Seas. (4) Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisite: none; can be taken by engineering students by arrangement with instructor and petition. A one-semester course on physical, chemical, biological, and ecological aspects of the oceans and their influence on land. For students in any department. Mr. Steidel (W)

160. An Introduction to the Oceans. (3) Three hours of lecture per week. Prerequisite: none; can be taken by engineering students by arrangement with instructor and petition. A first course on the physical, dynamical, chemical, climatological, and biological aspects of the oceans and their influence on land and their shores. For students in any department. The dynamics are dealt with on two technical levels to accommodate students of differing scientific backgrounds. Mr. Sherman (F)

165. Viscous Flow. (4) Three 1-hour lectures and one hour of discussion per week. Prerequisite: course 106A, Mathematics 51C. Theoretical and empirical bases of laminar and turbulent flows. Mr. Berger (F, W)

166. Engineering Aero- and Hydrodynamics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 106A. Calculation of the forces and moments acting on various types of solid bodies moving either through the atmosphere, or under water, or through a fluid. An attempt to evaluate the required, the stability, and the control forces for various maneuvers. Mr. Latoine (Sp)

172. Application of Analog Computers. (3) Two hours of lecture and two 1 1/2-hour laboratory per week. Prerequisite: course 106A. Introductory course on application of analog computers to the simulation of systems of ordinary differential equations. Applications in vibration studies, control systems, certain partial differential equations, biomedical studies. Use of electronic analog computer in computer laboratory. Mr. Atkinson (F)


174. Acoustical Environment Control. (3) Two 1 1/2-hour lectures per week and one 3-hour laboratory. Prerequisite: course 104A or 103, or Architecture 110. Principles of sound generation and propagation. Reverberation and diffusion. Design criteria for sound control. Prediction of noise environments, annoyance, control of noise interferences, and effective noise abatement. Interrelationships between noise and vibration. Noise control in mechanical systems. Laboratory noise measurement and analysis. Mr. Carroll (F)

175. Intermediate Dynamics. (4) Three 1-hour lectures and one 1-hour discussion period per week. Prerequisite: course 103 or 104B. Lagrangian mechanics. Transformation of coordinates, motion of rigid bodies, velocities; generalised coordinates; Lagrangian function, Hamilton's principle and Lagrange's equations of motion and analysis. Mr. Carroll (F)

203. Theory of Relativity. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 121 or 126. Theoretical application of the principles of special and general relativity. Mr. Kobayashi (W)

204. Structure and Properties of Engineering Materials. (3) Two 1 1/2-hour lectures per week. Principles governing structure and behavior of materials, application to plasticity, creep, fatigue, and fracture. Mr. Hauser (Sp)

225A. Mechanical Behavior of Engineering Materi-
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requisite: basic knowledge of economics. Physical and economic implications of the appraisal of gas reserves. Estimation and evaluation of oil and gas reserves. Profitability analysis, optimization of expenditure. Mr. Somerton (W).

247. Rock Mechanics. (3) Two 1 1/2-hour lectures per week. Prerequisite: basic geology and a course in mechanics of materials. Fundamentals of rock behavior, strength, strain, failure, load, stress, strain under confining stress and pore pressure; thermal, stress-thermochemical behavior; applications to reservoir behavior in hydrocarbon transport and rock drilling. Mr. Somerton (W).

248. Advanced Reservoir Engineering. (4) Three 1 1/2-hour lectures per week. Prerequisite: course 105B or 149. Study of the detailed behavior of petroleum reservoirs using as a basis the thermal and phase behavior of the fluids and the mechanics of multi-phase flow through porous media. Mr. Somerton (W).

249. Experimental Methods in Mechanical Engineering. (3) One and one-half hours of lecture and one and one-half hours of laboratory per week plus term project. Emphasis on the design and execution of experiments. Laboratory experience in the design and use of contemporary measurement systems. Mr. Hurbit (F).

251. Heat Conduction. (4) Three 1-hour lectures and one hour of discussion per week. Prerequisite: Engineering 117 and course 151. Analytical and numerical methods for the determination of the conduction of heat in solids. Mr. Sherman (Sp).

252. Heat Convection. (4) Three 1-hour lectures, one 1-hour discussion per week. Prerequisite: Engineering 117, 151. Theory and application of gas dynamics and fluids; the calculation of radiant energy transfer. Mr. Seban (Sp).

254. Equilibrium Thermodynamics. (4) Three 1-hour lectures, one 1-hour discussion per week. Prerequisite: course 155 or equivalent. Axiom of the thermodynamics of ideal gaseous systems. Statistical mechanics of pure substances and of mixtures. Mr. Savory (W).

255. High Temperature Thermodynamics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 155. Chemical thermodynamics, statistical thermodynamics, applications to chemical systems, review of quantum mechanics, molecular spectroscopy and reaction kinetics. Mr. Daily (Sp).


257. Introduction to Non-Equilibrium Thermodynamics. (4) Three hours of lecture and one hour discussion per week. Prerequisite: course 155 or equivalent. General formulation of coupled transport phenomena. Detailed application to diffusion processes, electrokinetic phenomena, heat and electricity, membrane processes, thermal diffusion, and others. Mr. Spiegler (W).


261. Compressible Fluid Flow. (4) Formerly 261A. Three hours of lecture and one hour of discussion per week. Prerequisite: course 159 or 162. An introduction to the thermodynamics and mechanics of compressible flow of an unsteady compressible flow. Mr. Holt (F).

262. Theoretical Hydrodynamics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 159 or 162. An introduction to the thermodynamics and mechanics of compressible flow of an unsteady compressible flow. Mr. Holt (F).

263A–263B. Viscous Fluid Flow. (4–4) Three hours of lecture and one hour of discussion per week. Prerequisite: Engineering 230A, course 159 or 162. Course 263B is a prerequisite to 263A. Laminar and turbulent flow of homogeneous Newtonian fluids. Exact solutions of Navier-Stokes equations. Low Reynolds numbers and low-Reynolds numbers boundary layers. Stability and turbulence. Mr. Sherman (W). Mr. Sherman (Sp).

264. Wing Theory. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 263A or course 162. Incompressible airflow theory for steady flow in two and three dimensions. Cavitating flow and the use of airfoils in compressible flow, in and out of steady motion. Mr. Laitone (W).

265. Magnetohydrodynamics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 261A or consent of instructor. Either 270A or 270B is a prerequisite for 270C. Both 270A and 270B are prerequisites for 270C. The dynamics of rotating fluids, general properties of rotating fluids, study of models of atmospheric and oceanic motions, steady and unsteady flows. The dynamical properties of stratified fluids, study of models of atmospheric and oceanic motions and waves, diffusive fluxes. 270C: Oceanographic and meteorological problems. Interactions, stability, turbulence; some representative problems in dynamics of rotating stratified fluids; theoretical models for turbulence and chaotic waves; turbulence in oceans and atmospheres. Mr. Cocos, Mr. Sherman (sequence beginning F).


274. Random Oscillations. (Formerly 272B) Three 1-hour lectures per week. Prerequisite: course 104A and 105B. Theory and applications of random processes, including reflection and diffraction; Shock Dynamics. Dispersion and dissipation. Analysis with surface wave theories. Mr. Brown (F).

275. Advanced Dynamics. (4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 175. Topics in mechanics, statics of constrained systems, constrained dynamics, statics, stationarity, and energy methods. Applications to discrete and continuous dynamical systems. Advanced fluid mechanics. Mr. Brown (F).

276. Dynamics of Reactive Fluids. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 161A. Study of processes involving mutual interaction between fluid-dynamic, chemical-kinetic, heat- and mass-transfer mechanisms. Mr. Oppenheim (F).

278. Foundations of the Theory of Continuous Media. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: Engineering 115 or consent of instructor. Applications of the basic field equations in terms of displacement potentials and (stress) functions. Three-dimensional problems of elasticity and hydrodynamics. Mr. Bogy (F).


282. Fluid Dynamics I. (3) Three hours of lecture and one hour of discussion per week. Prerequisite: course 185. General theories including variational theorems and application of the basic field equations in terms of displacement potentials and (stress) functions. Three-dimensional problems of elasticity and hydrodynamics. Mr. Bogy (F).


287. Impact. (4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 185. Collision geometry, motion and interaction, contact processes produced in plastic, elastic, and visco-plastic media by impulsive or impact loading. Penetration, contact of rigid bodies, elastic-plastic impact. Response of materials to impact. Application to spheres, rods, bars, beams, plates and shells. Mr. Goldsmith (W).

288. Theory of Elastic Stability. (3) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 185. Stability of elastic systems and its connection with eigenvalue problems. Special topics such as postbuckling behavior, stability of non-linear systems, dynamical stability. Stability theory based upon the work of Trefitz, Goodier, Pearson, Hill and others. Mr. Hsu (Sp).
290A. Topics in Nonlinear Oscillations. (3) Three 1-hour lectures and one 1-hour discussion period per week. Prerequisite: course 227. Oscillations in nonlinear systems; methods of phase plane analysis; stability; perturbation methods; Hamiltonian systems; bifurcation and chaos. Mr. Nagdhi (W)

290B. Topics in Nonlinear Continuum Mechanics. (3) Three hours of lecture per week. Prerequisite: course 265. Selected topics from recent developments in continuum mechanics, e.g., a general theory of oriented or directed media, non-linear theory of diffusion, theory of electret and magnetorheological materials. Mr. Nagdh (W)

290C. Topics in Dynamic Games. (3) Three 1-hour lectures per week. Prerequisite: course 271 or equivalent. Introduction to theory and application of dynamic games. Mr. Lieber (F)

290D. Relativistic Mechanics. (4) Three 1-hour lectures and one 1-hour discussion period per week. Prerequisite: courses 175 and 185. Qualitative examination of the special and general theory of relativity and bearing on theether concept. Tracing relativistic evolution of mechanics and development of important concepts in modern mechanics based on generalization of Hamilton's Principle. Mr. Lieber (F)

290E. Variational Principles of Fluid Dynamics and Thermodynamics. (4) Three 1-hour lectures and one 1-hour discussion period per week. Prerequisite: course 175. 185 is recommended. Formulation of variational principles of fluid dynamics and thermodynamics. Their application to selected theoretical and boundary value problems concerning motion of dispersive flows. Mr. Lieber (Sp)

290F. Turbulence. (3) Three hours of lecture per week. Prerequisite: course 263B. An introduction to turbulent flows. Description, empirical generalizations, language, and statistical description. Theoretical investigations. Mr. Bogy (W)

290G. Aircraft Stability and Control. (3) Three 1-hour lectures per week. Prerequisite: course 262B. Selected topics from recent developments in linear continuum theories, for example, linear elasticity and fluid mechanics, bearing on modern concepts of material behavior. Topics may change from year to year. Mr. Bogy (Sp)

290H. Aircraft Stability and Control (3) Three 1-hour lectures and one 1-hour discussion period per week. Prerequisite: course 175. Advanced theory of aircraft stability and control for hovering and forward flight. Mr. Laitone (Sp)

290I. Corrosion. (3) Three 1-hour lectures and one 1-hour discussion period per week. Prerequisite: graduate standing. Types of corrosion, corrosion inhibition, cathodic protection, corrosion prevention by design. Corrosion and mass transfer. Mr. Cornet (Sp)

290J. Bolling Heat Transfer. (3) Three 1-hour lectures and one 1-hour discussion period per week. Prerequisite: course 260A. Study of phase flow bubble growth models and analysis methods in boiling heat transfer. Mr. Gaitonde (W)

290K. Numerical Methods for Heat and Mass Transfer Calculations. (3) Three hours of lecture per week. Prerequisite: course 252. The application of numerical methods for boundary layer calculation, for heat and mass transfer in jets, and flows in conduits, accounting for radiative, rotation, and chemical reaction. Some consideration of the numerical calculation of instabilities and complex flow phenomena. Mr. Seban (F)

290L. Engineering Applications of On-Line Mini-Computers. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: graduate standing in engineering. Small computers, operating in real time, have become important components in many engineering systems. The course is intended to provide students with the tools necessary for the design of effective control systems. Mr. Auslander (W)

290M. Natural Gas Engineering. (3) Two 1.5-hour lectures per week. Prerequisite: consent of instructor. Advanced problems in phase behavior of natural gas systems including water-hydrocarbon systems, vapor-liquid equilibria, steady and nonsteady state flow of gas, operation of gas fields, underground storage of natural gas. Mr. Somerton (W)

290N. Group Studies, Seminars, or Group Research. (1-5) Three hours of lecture per week. Prerequisite: consent of instructor. Intended to provide an opportunity for qualified students to pursue their own studies. Mr. Pickus (Sp)

290P. Special Topics in Ship Hydrodynamics. (3-3) Three 1-hour lectures per week. Prerequisite: course 241A-241B-241C. Hydrodynamics of Ships. (3-3-3) Three 1-hour lectures per week. Prerequisite: Mechanical Engineering 159 and 162 and course 152A-152B-152C. Approximation methods in ship hydrodynamics. Boundary-layer theory and frictional resistance. Mr. Webster (F)

290Q. Advanced Ship Design. (3) One 1-hour conference plus one 4-hour laboratory period per week. Prerequisite: course 240A-240B-240C, 24A-24B-24C. Each student will execute a design project involving the whole of a ship. Instead of the traditional standard and codified methods, advanced (more speculative) techniques of rational mechanics, derived from the analyses of Naval Architecture 240 and 241 will be applied. Mr. Webster (F)

290R. Advanced Graduate Study in Naval Architecture. Current and advanced topics in theory and design of screw propellers, hydrodynamics of free surface flows, vibrations, and associated studies in related areas of naval architecture. Mr. Webster (F)

290S. Special Topics in Ship Hydrodynamics. (3) Three 1-hour lectures per week. Prerequisite: course 241A-241B-241C. Approximation methods in ship hydrodynamics, formulation of solution of special boundary-value problems, theoretical description of motion in an irregular seas, topics from current literature. Mr. Wehausen (W)

290T. Dynamics of Marine Structures. (3) Three 1-hour lectures per week. Prerequisite: course 241A-241B-241C. Behavior of ships and other mobile marine structures in response to externally or internally generated forces. Topics include motions of ships and stable platforms in waves, steering and control of surface ships and submarines, behavior of moored and towed bodies. Mr. Pauling (Sp)

290U. Analysis of Ship Systems. (3) Three hours of lecture per week. Prerequisite: course 154A-154B (or consent of instructor). Introduction to ship systems analysis, reliability, and optimization. Applications of techniques to problems of ship routing, construction cost, fleet selection, and cargo handling problems. Mr. Webster (Sp)

290V. Vehicles for Ocean Engineering. (3) Three hours of lecture per week. Prerequisite: graduate standing in naval architecture. The design of vehicles for performing engineering functions in the ocean. Topics include environment, deep ocean tasks, vehicle design, performance requirements, motion simulation, structural problems. Mr. Pauling (Sp)

290W. Group Studies, Seminars, or Group Research. (1-8) Advanced study in various subjects in Naval Architecture. The Staff may select groups of students each year, informal group studies of special problems, group participation in comprehensive design projects, selection of an optimal design, analysis and experimentation. The Staff (W, Sp)

NOTE: For key to symbols, see page 34.
is also considered a sufficient prerequisite. Engineering analysis in the design of nuclear fission power reactors and systems. Emphasizes thermal and structural design of nuclear reactors and steam-turbine cyclic plants. Energy conversion. Safety evaluation, design of engineered safeguards. Introduction to economics of nuclear power.

Mr. Schrock (F, W)

182. Radiation Protection and Control. 4 hours of lecture per week. Prerequisite: course 101 or upper division course in nuclear physics or nuclear chemistry. Communicative therapy of radiation through material, dose distribution, occupational exposure, handling and treatment of radioactive materials. Elements of dosimetry and radiation effects. Regulations affecting radiation exposure. Meteorological dispersion of fission products, radiation transport and attenuation in various geometries.

Mr. Kaplan (W)

199. Supervised Independent Study and Research. (1-5) Prerequisite: upper division standing. Group studies of selected topics directed by the major field adviser. Units may not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (Mr. Wehausen in charge) (F, W, Sp)

UPPER DIVISION COURSES

101. Nuclear Reactions and Radiation. (4) Four hours of lecture per week. Prerequisite: Physics 4E. Nuclear properties, elements of nuclear structure, radioactivity, interactions of radiation in matter, neutrino reactions, fission, fission, practical consequences and applications. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (Mr. Wehausen in charge) (F, W, Sp)

201A–201B. Nuclear Reactors and Interaction of Radiation with Matter. (3–3) Three hours of lecture per week. Prerequisites: Physics 137A–137B–137C. Interaction of gamma rays, neutrons and charged particles with matter. Effects of radioactive decay; cross sections and energetics of nuclear reactions; nuclear fission and the fission products; fission and fission reactions as energy sources. Mr. Prusin (F, Sp)

202A–202B. Radiation Effects in Nuclear Materials. (4–4) Four hours of lecture per week. Prerequisite: upper division course in thermodynamics. Emphasis is on analysis of the single and two-component gas-solid and liquid systems. Stress analysis of solids and liquids. Analytical techniques, time-varying reactivity changes; reactor parameter calculations, behavior of nuclear systems in a reactor environment. Radiation damage to solids and liquids. Chemical effects of fission products, swelling and structural changes, differences in chemical properties of irradiated and unirradiated materials. Production of uranium and fabrication of nuclear fuel elements; uranium enrichment; spent fuel reprocessing and nuclear waste management. Mr. Schrock (Sp)

240. Biomedical Effects of Radiation and Radiation Safety. 4 hours of lecture per week. Prerequisite: consent of instructor. Safety criteria. Effects of charged particle and gamma radiation on cells and tissues. Radiation and radiation hazards. Mr. Grossman (F, W)

250A–250B. Nuclear Reactor Theory. (4–4) Four hours of lecture per week. Prerequisite: Engineering 117, course 101. Neutron transport theory; slowing down of neutrons; reactivity functions; neutron fission and fission theory; reactivity coefficients; reactor kinetics; fuel depletion and cycling.

Mr. Glander (F)

255. Numerical Methods of Reactor Analysis. 4 hours of lecture per week. Prerequisite: course 240 or equivalent. Computational methods of the numerical analysis of various approximations to the neutron transport equations in simple and complex reactor systems. Mr. Marks (F)


Mr. Amster (F, W)


Mr. Schrock (F, W)

262. Radiation Shielding and Environmental Effects. 4 hours of lecture per week. Prerequisite: course 250A–250B or equivalent. Response of reactor systems to time-varying sources and time-varying reactivity changes; reactivity parameter calculations, behavior of nuclear systems in a reactor environment.

Mr. Schrock (F, W)

268. Nuclear Instrumentation Laboratory. (3) One hour of lecture and four hours of laboratory per week. Prerequisite: consent of instructor. Principles and techniques of electronic analysis to determine capital and operating costs; fuel management, nuclear power economics. Mr. Piglord (Sp)

270. Nuclear Power Engineering. (3-3) Three hours of lecture per week. Prerequisite: Physics 137A–137B–137C. Nuclear physics or nuclear chemistry. A survey of the science of nuclear energy. Mr. Prusin (Sp)

275. Nuclear Reactor Analysis Laboratory. (1-5) Prerequisite: upper division standing. Group studies of selected topics directed by the major field adviser. Units may not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (Mr. Wehausen in charge) (F, W, Sp)

280B. Topics in Controlled Fusion Engineering. (1-5) Three hours of lecture per week. Prerequisite: course 240 or equivalent. Discussion of the current status of controlled fusion reactors, with special emphasis on engineering aspects. Efficiency of magnetic containment devices ion injection and heating, breeding, plasma stability, equilibrium, direct conversion, materials problems, radioactivity and fuel cycle considerations.

Mr. Pyke (Sp)

299. Group Studies, Seminars, or Group Research. (1–8) Advanced study in various subjects through special seminars on topics to be selected each year. Advanced special topics in nuclear engineering. Group participation in comprehensive design problems or group research on complete problems for analysis or experimental evaluation.

The Staff (Mr. Piglord in charge) (F, W, Sp)

299. Group Studies, Seminars, or Group Research. (1–8) Advanced study in various subjects through special seminars on topics to be selected each year. Advanced special topics in nuclear engineering. Group participation in comprehensive design problems or group research on complete problems for analysis or experimental evaluation.

The Staff (Mr. Piglord in charge) (F, W, Sp)

301. Individual Study for Master’s Candidates. (1–8) Individual study for the comprehensive or language requirements in connection with the master’s degree. Units may not be used to meet either unit or residence requirements for a master’s degree. Must be taken on a satisfactory or unsatisfactory basis.

The Staff (Mr. Piglord in charge) (F, W, Sp)

302. Individual Study for Doctoral Students. (1–8) Individual study in consultation with the major field adviser. Units may not be used to provide students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (Mr. Piglord in charge) (F, W, Sp)
IDS 124. Chemical Methods In Nuclear Technology. (3) See Interdepartmental Studies for the complete description of this course.

The College of Environmental Design is comprised of the departments of Architecture, City and Regional Planning, and Landscape Architecture. Courses offered by the respective departments and courses offered by the Program in Visual Design are to be found immediately following the listing of Environmental Design courses. Courses whose content, philosophy, or method provide a common base of knowledge for the several disciplines within the College of Environmental Design are taught at both the undergraduate and graduate levels as Environmental Design (ED) or Interdepartmental Studies (IDS) courses.

Undergraduates entering the College will enroll in a four-year curriculum leading to the academic degree of Bachelor of Arts with a major in either architecture or landscape architecture. Individual majors and a limited program in visual design are available for continuing students. On the graduate level the College presently offers curricula leading to the Master of Architecture, Master of Landscape Architecture, Master of City Planning, and Master of Arts in Design; and the Doctor of Philosophy in Architecture, Landscape Architecture, and in City and Regional Planning. The Master of Architecture degree fulfills the first professional degree applicable to requirement for state registration in architecture. The Master of Landscape Architecture degree is similarly applicable to the registration of landscape architects.

It is recommended that high school preparation for the College include mathematics through trigonometry, one year of freehand drawing, and one year each in two of the physical or natural sciences.

The A.B. degree programs in the College require the completion of 180 units. A minimum of 40 units in the major must be completed at Berkeley as well as 24 units of environmental studies in the College. Breadth requirements consist of completing 60 units in course work offered in colleges other than Environmental Design. The remaining 56 units are elective. No more than 60 units may be completed in upper division courses in any one department for degree credit.

Procedures for undergraduate admission, registration, and enrollment are identical to those of the University in general. However, students who have credit for more than 105 quarter units of university-level work are encouraged to complete the A.B. degree in their current major and apply for admission to the professional programs at the graduate level. An undergraduate major in architecture or landscape architecture is not prerequisite for admission to graduate study in these fields. Enrollment in the College beyond 195 quarter units is subject to approval of the Dean. Consequently, a transfer student who has credit for more than 130 quarter units, is not normally admitted to the undergraduate program. Students who are interested in graduate study should obtain from the Dean of the Graduate Division the Circular Admission to Graduate Study, which outlines general University requirements for admission. Application is made directly to the Graduate Division of the University.

For general information concerning the College of Environmental Design, see Index. Information on the degree programs can be found in the Architecture, City and Regional Planning, Landscape Architecture and Visual Design sections of this catalog, as well as in the Announcement of the College of Environmental Design.

Environmental Design

LOWER DIVISION COURSES

3. Introduction to Environmental Design. (5) Two 1-hour seminars and two 3-hour laboratories per week. Prerequisite: course 4 or 6 or consent of instructor. Problems in design and applied problems of graphic communication. Mr. Stoller (F, W, Sp)

4. Man and Environment. (4) Two 1 1/2-hour lectures and one 1-hour discussion per week. Man and environment: an overview of the field of design and its relationship to other disciplines. The undesign and designed environments, and the design professions. Presentation by instructor and guests. Mr. Pastier (F), Mr. Alexander (W), Mr. Stoller (Sp)

15. Energy, Resources and Environmental Design. (5) Two 1 1/2-hour lectures and one 3-hour laboratory per week. An overview of interconnections among energy systems, social and technological variables, and their relation to the design of the built environment. Assessment of present and future implications of resource use on environmental design. (Sponsored by the Department of Architecture.) Mr. Schaefer (Sp)

6. Graphic Communication Media and Techniques for Environmental Design. (5) Two hours of lecture and six hours of laboratory per week. Prerequisite: course 4 or consent of instructor. An introduction and overview of graphic communication techniques for environmental design, including some work in freehand, but primarily mechanical drawing systems. Mr. Treb (F), Mr. Dubovsky (Sp)

7. History of the Environment. (4) Three 1-hour lectures per week, and four 8-hour field trips per quarter. Prerequisite: sophomore standing. The study of the development and change in the natural and constructed environment of California from Spanish Colonial times to the present. Emphasis will be on existing architectural forms and urban patterns of the San Francisco Bay Region. Mr. Cardwell (F)

UPPER DIVISION COURSES

169A. History of the Man-Made Environment of the U.S.A., 1800-1970. (4) Four hours of lecture and discussion per week. Prerequisite: upper division standing and consent of instructor. Geography 152 or equivalent geography course strongly recommended. Enrollment limited. Evolution of the American landscape 1800-1970, with emphasis on dwellings, highways, farms and recreation. Mr. Jackson (W)

169B. History of the Man-Made Environment of the U.S.A., 1900-1970. (4) Four hours of lecture and discussion per week. Prerequisite: E.D. 169A or Geography 152 and consent of instructor. Enrollment limited. A more detailed study of the American landscape, 1900-1970, with emphasis on urban and industrial aspects. Mr. Jackson (W)

170. Architecture and Urbanism of Antiquity and the Middle Ages. (4) Three hours of lecture and one 1-hour discussion per week. Ancient and medieval architecture studied in its social and historical context. A selective survey of major building types and a few specific sites and monuments treated in detail. Mr. Tobriner (F)

171. Architecture and Urbanism from the Renaissance to the Modern Period. (4) Three hours of lecture and one 1-hour discussion per week. Architecture and urban design since 1400 considered in social and historical context. Mr. Kostof (W)

172. History of the Environment. (4) Three 1-hour lectures per week. The theory and practice of design from preindustrial handcrafts to mechanical production and the evolution of a machine aesthetic. Mr. Schaefer (Sp)

175. Great Cities. (4) Two 1 1/2-hour lectures per week. Prerequisite: courses 170 and 171 or consent of instructor. A study of the major monuments of a great city and its changing character from its founding to the present. Course may be repeated for credit. Mr. Kostof (W)

177. Survey of Urban Design. (4) Two 1 1/2-hour lectures and one 1-hour discussion per week. Prerequisite: courses 170 and 171 or consent of instructor. The evolution of urban form, civic design, and planning theory with emphasis on the development of the modern city. Ms. Evenson (Sp)

NOTE: For key to symbols, see page 34.
Architecture

Department Office, 232 Wurster Hall

Professors:
Christopher Alexander, Ph.D.
Richard Bender, M.Arch.

(Chairman)

E. Michael Caze, M.Arch.
Joseph Costick, B.Arch., F.A.I.A.

Herman D. Evenson, Ph.D.
Donald Y. Hasalt, B.S.

Sandfor Hirshen, B.Arch.
Spire Koedt, M.Arch.

Henry J. Lagorio, M.A.
Robert Lindheim, B.Arch.

H. Donn Logan, M.Arch.
Richard L. Mater, Ph.D.

Roger Montgomery, M.Arch.
Donald E. Olsen, M.Arch.

F.A.I.A.

Richard C. Peters, M.F.A.
Donato P. Raw, M.Sci.

Jesse Reichert
Horst W.J. Rittel

Associate Professors:
Gary R. Brown, M.Arch.
Kenneth H. Cardwell, A.B.
Margaret P. Dzigarei (Hasser Hasegawa, M.A., F.A.I.A.)
W. Russell Ellis, Jr., Ph.D.

Assistant Professors:
Carr C. Anthony, B.Arch.
Galen Cramer, Ph.D.
Sam Davis, M.E.D.
Anthony Dubovoy, M.A.
Sara S. Ishikawa, B.Arch.

Lurs G. Lerup, M.A.

UNDERGRADUATE PROGRAMS

The four-year program leading to the degree of Bachelor of Arts with a major in architecture requires the completion of course work in study areas ranging over a diversity of subjects. These may include mathematics, physics, engineering, courses in design, graphics and architectural history, in aspects of architecture as a profession and finally, in the social sciences and humanities.

GRADUATE PROGRAMS

The Department offers the professional degree Master of Architecture and the academic degree Doctor of Philosophy. The professional degree, Master of Architecture, will be awarded to students who successfully complete a program of studies from one to three years duration depending upon previous education and experience. The department makes no restriction as to undergraduate preparation. In Architecture, the length of the required residence period, the number of required quarter course units, and the specific list of required courses will vary depending upon undergraduate major, professional and other work experience, and previous graduate study, if any.

The basic course leading to the M.Arch. degree takes three academic years and requires the completion of at least 108 units during that period of residence. Persons who hold a B.A. or B.S. degree with a major in architecture are granted up to one year of advanced standing. The Graduate Studies Committee of the department will determine the specific amount of advanced standing individually for each student at the time she or he registers for graduate study in the department. Persons holding the five-year, professional undergraduate degree, Bachelor of Architecture from an accredited school, or comparable five-year degrees from foreign universities and technical institutes, may receive the M.Arch. degree after one academic year in residence and completion of at least 36 units of coursework.

For additional information contact the departmental graduate secretary.

Doctor of Philosophy Degree in Architecture. The Ph.D. program in architecture is open to exceptionally qualified persons who present outstanding academic records along with clear evidence of commitment and ability in architectural research and scholarship. Graduate Division
212. Environmental Control Systems. (3) Two 1-hour and two 2-hour laboratory periods per week. Prerequisite: course 120 or consent of instructor. Development of laboratory exercises, the design of particular building types associated with the stated courses. Consideration of lighting, acoustics, and thermal environment and control through both natural and artificial measures. May be repeated twice for credit.

219. Seminar in Environmental Control Systems. Two 1-1/2 hour seminars per week. Prerequisite: consent of instructor. Combined course must be taken concurrently with 210, 211, 212.

21A. Lighting in Architectural Design. (4) Mr. Peters (F).

21B. Acoustics in Architectural Design. (4) Mr. Dean (Sp).

21C. Environmental Control Systems Related to Architectural Design. (3 Sp). Mr. Rittel (F). Mr. Protzen (Sp).

21D. Fire Safety in Buildings. (4) Mr. Hassid (Sp).

21E. Environmental Control Systems Related to Urban Design. (4) Mr. Meier (W).

21F. Energy Conservation as a Design Strategy. (4) Mr. Dean (Sp).

STUDY AREA C—STRUCTURE AND PRODUCTION

120. Structural Systems for Buildings. (6) Two 1-1/2 hour lectures and one 3-hour laboratory per week. Prerequisite: courses 110, 121, 210, 211, 212, concurrent enrollment in Group I design course and consent of instructor. Introduction to the structure of buildings, structural constraints and the forces which act on buildings. Mr. Schierle (F, Sp).

121. Principles of Construction. (4) Two 1-1/2 hour lectures per week. Prerequisite: Architecture 120 or consent of instructor. An exploration of the functional and design aspects of building systems: their requirements, construction, and interactions. Mr. Arnold (W).

122. Building Materials. (4) One 4-hour lecture per week, with field trips. Properties and application of building materials. Specification sources, presentation and information retrieval. Mr. Arnold (Sp).

129A. Special Problems in Structure (4) (May be repeated for credit)

129B. Introduction to Building Production. (4)

222. Design Problems in Structure and Production. Two 1-1/2 hour seminars per week. Prerequisite: course 121 or consent of instructor. Development of laboratory exercises, the design of particular building types associated with the stated courses. Consideration of lighting, acoustics, and thermal environment and control through both natural and artificial measures. May be repeated twice for credit.


223A. Architectural Design for Seismic Forces. (4) Two 1-hour and one 2-hour laboratory periods per week. Prerequisite: courses 110, 121, 122, 128A, 128B, 128C, and 210. Development of structural considerations, seismic factors, and relation to architectural design. Mr. Steinbrugge (Sp).

224. Advanced Building Methods and Processes. (4) Two 2-hour seminars per week. Prerequisite: Architectural Design for Seismic Forces. Changing patterns in the industry: management techniques, systems, performance definition and levels of industrialization. Mr. Arnold (Sp).

225A. Seminar, Structure and Production in Architecture. Two 2-hour seminars per week. Prerequisite: course 121 and 222, or course 120 and Civil Engineering 128A, 128B, 128C, or consent of the instructor. Advanced study in structure and production in Architecture.

225B. Light Weight Tension Structures. (4) Mr. Schierle (W).

226. Industry and Technology. (4) Mr. Bender (F).

*229C. Modern Shell Design. (4)

229D. Experimental Structures. (4) Mr. Lagorio (Sp).

229E. Special Problems in Structure and Production. May be repeated for credit. (4) Mr. Elsasser (W).

STUDY AREA D—DESIGN THEORIES AND METHODS

130. Design Theories and Methods. (6) Two 1 1/2-hour lectures and one 2-hour seminar per week. Comparison through case-study analysis of architectural theories as well as pro- ronmental design, and development and testing of various methods, tools, and techniques available for environmental design. Emphasis lies on the difficulties of architectural design and related fields. Mr. Rittel (F), Mr. Prozen (W).

*132. Computer Applications in Design. (4) Two 2-hour seminars per week. The course develops a theoretical framework for application of digital computers in design. Survey of existing applications and future potential and limitations. Models of numerical problems in design and their utility.

134. Freehand Drawing for Architecture. (4) One 1-hour lecture and one 2-hour laboratory per week. Prerequisite: Environmental Design 6. Freehand drawing for (Architecture majors) for the development and communication of architectural ideas. Emphasis on drawing as communication as well as building skills in describing form, judging proportion and graphic discipline. Mr. Dubovsky (F).

135. Advanced Graphics for Architecture. (4) One 1-hour lecture and two 3-hour laboratories per week. Prerequisite: Environmental Design 6. Advanced practice and theory in the presentation of architectural ideas. Emphasis on systems of drawing rather than individual drawing types. Communication of ideas through alternative methods such as computer-aided graphics, verified images. Photography as a communication medium and systems of graphic reproduction.

136. Theory and Methods of Graphic Communication in Architecture. (4) Two 1-hour lectures and two 2-hour laboratories per week. Prerequisite: upper division standing or consent of the instructor. Development of graphic drawing techniques and methods of organizing two- and three-dimensional visual information dealing with architectural space, volume, and form in method of graphic presentation. Explorative work may be initiated by the student with the consent of the instructor.

137. Architectural Research, Documentation (3) Mr. Treit (W).

140. Social and Cultural Factors in Architectural and Urban Design. (5) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: course 130 or consent of instructor. Consideration of the role played by social values in the design, allocation, and utilization of space.

141. Form Determinants of the Dwelling. (3) Three 1-hour lectures per week. Interaction of technological and aesthetic innovation in dwellings and the physical environment of the residential community.

145. Design Consequences of Public, Technological, and Social Change. (4) Two 2-hour meetings per week. Prerequisite: consent of the instructor.

145A: Design Consequences of Public Policy Change. (F)

145B: Design Consequences of Technological Change. (W)

145C: Design Consequences of Social Change. (Sp)

240. Advanced Study in Social and Cultural Factors in Architecture and Urban Design. (4) One 1 1/2-hour lecture and one 1 1/2-hour seminar per week. Prerequisite: graduate standing or consent of the instructor. Intensive study of relations of social and institutional functions to environmental forms.

241. Major Problems of Architecture. (4) Two 3-hour seminars per week. Prerequisite: enrollment in Option I. Identification of major problems of architectural research and development of approaches to solutions. Problems proposed by the instructor or the student.

242. Seminar in Architecture. (4) Two 2-hour seminars per week. Prerequisite: course 232 or consent of instructor. Relation of architectural research to the discipline of architecture. Critical investigation of topics related to theory and practice.

243. Sociology of Space. (4) Two 1 1/2-hour seminars per week. Prerequisite: graduate standing. Consideration of the role played by social values in the design, allocation, and utilization of space.

244. Architectural and Environmental Program and Evaluation. (4) One 1 1/2-hour lecture and one 1 1/2-hour seminar per week. Prerequisites: courses 130, 140 or 240 and/or consent of instructor. Formulation of pre-design decisions affecting architectural ideas. Topics include the nature of institutional size, growth, and change, determination of diverse user needs; values and value systems. Specific projects will be evaluated relative to diverse criteria.

*245. Group Relations and Environmental De-
190. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis. Studies developed to meet individual needs.

298. Special Group Study. (1–4) Studies developed to meet needs. No more than 4 units are allowed in any one quarter.

299. Individual Study and Research for Master's and Doctoral Students. (1–9) Individual studies including reading and individual research under the supervision of a faculty adviser and designed to reinforce the student's background in areas related to his proposed dissertation topic. To be offered each quarter. Candidates for the master's program are limited to 4 units each quarter.

401. Field Study. (8) Thirty-six hours of field work per week. Prerequisite: course 160, enrollment in Option 1 or 2 or 3rd year of Option 3. Undergraduate seniors pending interview with instructor. All students must be concurrently enrolled in Arch. 298. An intensive and structured exposure to the professional practice of architecture utilizing the resources of a practicing architect's office as the "laboratory".

602. Individual Study for Doctoral Students. (1–9) Individual study in consultation with the major field advisor, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. This course may not be used for units or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

City and Regional Planning

Department Office, 228 Wurster Hall

Professors:

William Alonso,^ Ph.D.
Donald Akervill, M.C.P., F.A.I.P.
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Donald L. Foley, Ph.D.
(Mothership)
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Allan B. Jacobs, M.C.P.
Richard L. Meier, Ph.D.
Harlan Montgomery, M.C.P.

Michael B. Teitz, Ph.D.
Melvin W. Webber, M.A., M.C.P.
William L. C. Wheater, Ph.D.
T. J. Kent, Jr., M.C.P.
(Emeritus)
Corren H. Mochon, B.S.
(Emeritus)
Francis Violin, B.S.

Roger Montgomery, M.C.P.

Associate Professor:

Stephen S. Cohen, Ph.D.

Assistant Professors:

Frederick C. Collignon, Ph.D.
Janice E. Perlman, Ph.D.
G. Dicker, M.L.A., M.C.P.

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Merlin B. Teitz, Ph.D.

Melvin W. Webber, M.A., M.C.P.
ural resources development, education, and health. A significant fraction of the profession engages in consulting, to city planning and other governmental agencies, and to private firms of various sorts.

The Department of City and Regional Planning offers a two-year graduate program of professional education in the field of city and regional planning leading to the Master of City Planning degree. The department also offers a Ph.D. degree in city and regional planning. The departments of Architecture, Landscape Architecture, and City Planning have established concurrent programs in Urban and Regional Development enabling students to take two master’s degrees in less time than is required in separate pursuit of those degrees. In addition the department has established concurrent programs with the School of Law and the School of Public Health.

These programs reflect the expanding concern of city planners with a wide variety of urban and regional problems, and the search for the empirical and theoretical understanding necessary to attack those problems. Courses in planning theory and practice are supplemented both within and outside the department by courses in the basic structure and functioning of the urban system from many viewpoints. Some of these courses are open to qualified undergraduate and graduate students in related fields. For more detailed information, consult the Announcement of the College of Environmental Design or the Department of City and Regional Planning, Room 228 Wurster Hall.

Undergraduate Course Work. There is no undergraduate major offered in the Department of City and Regional Planning. All undergraduate courses in city and regional planning are included in the Letters and Science List of Courses. For regulations governing this list, see the Announcement of the College of Letters and Science.

107. The Urban Planning Process. (5) Four hours of lecture and two hours of discussion per week. Prerequisite: upper division standing. An introduction to documentary laboratory case studies of urban planning problems designed especially for this course. Lectures and readings supplement and extend the techniques and concepts introduced in the problem sets. Final examination required. Mr. Montgomery (F).

110. Introduction to City Planning. (4) Three 1 1/2-hour lectures per week. Prerequisite: open to majors in all fields. Survey of city planning as it has evolved in the United States since 1800 in response to physical, social, and economic problems; major concepts and processes required. Mr. Montgomery (W).

112. The Idea of Planning. (4) Three hours of lecture per week. Prerequisite: CP 110 or consent of instructor. Planning is often called for in response to seemingly complex social, physical, or economic problems. This course surveys the planning idea, appropriateness of planning, sources of legitimacy for and justification of planning, styles of planning, and appropriate definitions of city planning. Mr. Montgomery (F).

113. Urbanization and Community. (4) Four hours of class meetings per week. Prerequisite: Course CP 110 or permission of instructor. An examination of the processes of urbanization and its social consequences. The search for community and participation. Prospects of urban and regional development in the contemporary American city. Mr. Montgomery (W).

122. The Black Ghetto in Urban Structure. (4) Two 1 1/2-hour lectures per week. Prerequisite: consent of instructor. Study of the planning, physical form, and functions of cities in developed and developing countries. Mr. Wheaton and Staff (F).

200A–200B. The Evolution of Cities. (4) Three hours of meetings per week. The role of cities in civilization. The historical origins of their institutions and physical characteristics. Functions of cities in developed and developing countries. Mr. Wheaton and Staff (Sp).

201. Introduction to City Planning. (4) Two 1 1/2-hour lectures per week. 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. Mr. Wheaton and Staff (F).

202. Introduction Studio-Laboratory: Plan Preparations. (3) Three 3-hour sessions per week. Three 3-hour meetings per week. An introductory laboratory experience in urban plan preparation, including the use of computer programs applied to city planning and involving individual and collaborative student group efforts in formulating planning policies and project development. Mr. Wheaton and Staff (F).

203. Planning and Governmental Decision-Making. (4) Two 1 1/2-hour lectures per week. Prerequisite: graduate standing in city and regional planning, or consent of instructor. Origins and evolution of the idea of planning. Values hierarchies, ends-means continua, and the nature of social action. Rationalities for governmental intervention in self-regulating social systems. Problems of prediction and choice under conditions of uncertainty. Alternative planning strategies. Mr. Wheaton and Staff (F).

204. Introduction to Planning Analysis. (4) Two one-hour lectures and one 1 1/2-hour laboratory per week. Prerequisite: consent of instructor. Survey of data sources and types, card handling equipment, computer packages mapping, and information systems. Survey of survey and analysis techniques used in the analysis of urban problems. Mr. Dodson (F).

204B. Urban Data Processing. (1) One 1 1/2-hour laboratory per week. Prerequisite: consent of instructor. Survey of data sources and types, card handling equipment, computer packages mapping, and information systems. Prerequisite: consent of instructor. Examination of the use of computer programs applied to city planning and involving individual and collaborative student group efforts in formulating planning policies and project development. Mr. Wheaton and Staff (F).

205. Methods of Planning Analysis. (4) Four hours of lecture per week. Prerequisite: courses 204A, 204B, and 211, or the equivalent. Analysis of the urban environment: emphasis on general planning and decision-making techniques. Problems. Mr. Dodson (F).

206. City Planning Legislation and Governmental Organization. (4) Three hours of meetings per week. Prerequisite: courses 201 or consent of instructor. Duties and role of the planning agency in municipally and metropolitan governments; major alternative definitions of city planning; relationship of long-range planning to land use and urban development agencies; significance of city planning legislation in reorganization of local government. Mr. Jacobs (F).

207. Economic Analysis for Social Planning. (4) Three hours of meetings per week. Prerequisite: consent of instructor. An introduction to the economic analysis of public and private action in housing, urban redevelopment and rehabilitation particularly in older, central cities. Mr. Montgomery (W).

208. Studio: Urban District and Physical System Plans. (6) Eighteen hours of studio work per week. Prerequisite: consent of instructor. Continuation of planning course 207. Role of planning practice in examining the processes through which changes in economic activities generate changes in social structures and in the political economy. Mr. Montgomery (W).

209. Special Study for Advanced Undergraduates. (1–5) Prerequisite: consent of instructor. Must be taken on a passed or not passed basis. Mr. Wheyton and Staff (F, W, Sp).

210A. The Analysis of Urban Livability. (4) Three hours of meetings per week. Prerequisite: consent of instructor. Focuses on the measurement of satisfac-

210B. The Analysis of Urban Livability. (4) Three hours of meetings per week. Prerequisite: consent of instructor. Focuses on the measurement of satisfac-

211. Location Theory and Spatial Interaction Models. (4) Three hours of meetings per week. Prerequisite: courses 210A or equivalent. Examination of the role of cities and regions in urban systems. Prerequisite: consent of instructor. Focuses on the measurement of satisfac-

212. Introduction to Economics of Public Enterprise. (4) Four hours of meetings per week. Prerequisite: economics 100A or equivalent. An introduction to the role of economic decision-making and the role of governmental agencies as producers of urban services in nonmarket setting. Measurement of benefits and costs. Crite-

213. Studio: Community General Plan and Development Studies. (5) Formerly course 202. Two 4-hour studios and one 2-hour studio per week. Prerequisite: Courses 204A, 204B, and 211, or the equivalent. Examination of the role of cities and regions in urban systems. Prerequisite: consent of instructor. Focuses on the measurement of satisfac-

214. Zoning, Subdivision Control, Capital Improvement Programming. (4) One 2-hour seminar and one 3-hour studio per week. Methods of effectuating general-plan policies, particularly in the economic development of new communities. Mr. Jacobs (W).

215. Transportation and Land Use. (4) Four lecture hours per week. Prerequisite: Economics 200A and 200B, courses 205A, 211, and 212, or the equivalent. An introduction to the basic principles used in analyzing transportation policies and services. Mr. Odum (F).

216. Studio-Laboratory: Plan Preparation I. Ten hours of studio per week. Prerequisite: courses 210A and 210B, or equivalent. Examination of the role of cities and regions in urban systems. Prerequisite: consent of instructor. Focuses on the measurement of satisfac-

217. Community Development. (4) Three hours of meetings per week. Prerequisite: courses 210A and 210B, or equivalent. Examination of the role of cities and regions in urban systems. Prerequisite: consent of instructor. Focuses on the measurement of satisfac-

218. The Urban Economy. (4) Two 1 1/2-hour lectures per week. Prerequisite: consent of instructor. Structure of the housing industry, finance, public policies, technology. Planning for neighborhoods, new development, urban renewal. Role of the market in urban economic development and housing. Mr. Montgomery (W).

219. The Urban Economy. (4) Two 1 1/2-hour lectures per week. Prerequisite: Economics 100A–100B, or equivalent, or consent of instructor. Analysis of the urban and metropolitan economy for planning. Eco-

NOTE: For key to symbols, see page 34.
nominal base and other urban macro-economic models. Impact analysis and projection of changing labor force and industrial structure. Demographic-economic interaction. Issues in growth, income distribution, and migration controls. Mr. Teitz (F)

220. Comparative Urbanization. (4) Three hours of meetings per week. Prerequisite: consent of instructor. Problems of urbanization in modern cities, including ancient, indigenous, and postcolonial urban centers. Emphasis on the processes of urbanization and the role of social, political, economic, and cultural factors. Mrs. Perlman (F)

221. Urban Problems and the Legal Process. (4) Two 2-hour meetings per week. Introduction to the legal framework relevant to urban planning problems, stressing the law surrounding intergovernmental and interjurisdictional issues in metropolitan areas. Legal restraints on the use of available tools, codes, and policies to impact upon the process and procedures of distinctive "vandal" character. Mr. Cohen (W)

227. The Futures of Urbanism and Cities. (4) Two 1 1/2-hour lectures-discussions per week. Alternative paths into the future for urban society, transitional and catastrophic. Theorems, designs for source-conserving cities, particularly for less developed regions. Models for future urban ecosystems. Explorations of feasible futures via gaming simulations. Mr. Meier (Sp)

228. Seminar on Urban Planning in Latin America. (4) Two 2-hour lectures per week. Prerequisite: knowledge of Spanish. Problems of urban development in Latin America; policies and programs to alleviate them; regional and national political, economic, and social forces; dimensions of the problems are considered in relation to policy alternatives and future scenarios. Ms. Perlman (F)

*224. Rural Poverty and the Urban Ghetto. (4) Two 1 1/2-hour seminars per week. Prerequisite: consent of instructor. Analysis of the linkage between rural and urban poverty. Appraisal of alternative development strategies and public policies for coping with geographical and social disparities. Mr. Foley (F)

226. The Metropolitan Region. (4) Three hours of meetings per week. The social organization and spatial patterns of the large metropolitan area. Physical development problems and policies. Mr. Foley (F)

227. The Futures of Urbanism and Cities. (4) Two 1 1/2-hour lectures-discussions per week. Alternative paths into the future for urban society, transitional and catastrophic. Theorems, designs for source-conserving cities, particularly for less developed regions. Models for future urban ecosystems. Explorations of feasible futures via gaming simulations. Mr. Meier (Sp)

228. Seminar on Urban Planning in Latin America. (4) Two 2-hour lectures per week. Prerequisite: knowledge of Spanish. Problems of urban development in Latin America; policies and programs to alleviate them; regional and national political, economic, and social forces; dimensions of the problems are considered in relation to policy alternatives and future scenarios. Ms. Perlman (F)

232. Urban Politics and Planning. (4) Three hours of meetings per week. Prerequisite: consent of instructor. Basic concepts of urban politics essential to planners and policy makers; power and influence, elitism vs. pluralism, public and private coalitions, and community mobilization and participation in the political process. Mr. Jacobs (Sp)

233. Introduction to Regional Analysis and Planning. (4) One 2-hour seminar and one 1-hour, one-period lecture per week. Prerequisite: consent of instructor. The concept of region and methods of regional analysis; regional problems and objectives; emerging views of regional planning. Regional models as planning tools. Inter- and interregional investment allocation during the development process. Review of current regional planning activity. Mr. Perlman (Sp)

235. Political Economy and Planning. (4) One 2-hour seminar per week. A seminar for students interested in learning about the political process and the decision-making process in urban and regional planning. The French planning process and the U.S. planning process will be used as examples. Mr. Cohen (W)

236. Urban Probioma and the Legal Process. (4) Three hours of meetings per week. Prerequisite: consent of instructor. The social organization and spatial patterns of the large metropolitan area. Physical development problems and policies. Mr. Foley (F)

242. Housing and Urban Development. (4) Two 1 1/2-hour lectures per week. Prerequisite: course 209

243. Methods of Program Planning. (4) Two 2-hour lectures per week. Prerequisite: courses 205 and 211, or consent of instructor. The theoretical analysis of program planning. The development of program planning models; evaluation of program planning systems. Mr. Teitz (W)

247. Theories of the Planning Process. (4) Three hours of meetings per week. Prerequisite: courses 203 and 212, or consent of instructor. An exploration of the effectiveness of different organizational models in program planning.

250. Theories of the Planning Process. (4) Three hours of meetings per week. Prerequisite: course 203 or 212, or consent of instructor. An exploration of the effectiveness of different organizational models in program planning.

253. Research Seminar in Regional Development. (4) One 3-hour seminar per week. Prerequisite: consent of instructor. An exploration of issues in policy, methods and patterns of regional development, both current and recent, and the role of researchers in influencing change. Mr. Ritte (W)

255. Seminar on the Urban General Plan. (4) Three hours of meetings per week. The legislative and administrative processes in defining urban plans; the general plan as a comprehensive statement of policy; the role of the master plan and the detailed plan in urban planning. Mr. Dukkman (F)

260. National Social Policy and Urban Social Change. (3) One 2-hour lecture per week. Prerequisite: consent of instructor. Social policy for doctrinal students in fields of urban social policy or consent of instructor. A series of case studies analyzing the development, implementation and impact of urban social policy and the role of local government in the implementation and administration of social policy. Mr. Kent (Sp)

263. Deliberate Social Change in the City. (3) One 2-hour seminar per week. Prerequisite: courses 260 or 261 and consent of instructor. Theories of the behavioral and sociopolitical dynamics of social and political change; the structures and processes of a series of case studies of efforts to effect social change in the city. The case studies will be prepared in a course 260 with the assistance of the professor. Mr. Cohen (F)

264. Social Indicators. (3) One 2-hour seminar per week; tutorial sessions. Prerequisite: advanced graduate students with consent of instructor. The seminar will examine selected content in the area of social indicators, seeking to design sensitive indicators of social well-being that are effective for planning and social accounting systems that measure payoffs from investments in public services. Students are expected to contribute to the search for new indicators. Mr. Foley (Sp)

265. Patterns of Response to Social Change. (4) Three hours of meetings per week. Prerequisite: consent of instructor. Offered on a pass/no pass basis. Students will be introduced to the research that governs social change, how which people or institutions face radical changes in their lives, and try to develop from these examples some general arguments about patterns of responses to change, and their implications for policy and the handling of conflict. Mr. Collignon (F)

266. Workshop in Social Program Evaluation and Policy Analysis. (5) One 3-hour seminar and six hours of project work per week. Prerequisite: course 268A or 268B or 267 or equivalent; some defined or in-progress piece of student research; and consent of instructor. A close examination of social policy issues and methodological problems in analysis and evaluation through student and faculty research. Mr. Jacobs, Mr. Appleyard (W)

267. Issues in Urban Environmental Planning. (2) One 2-hour seminar per week. Prerequisite: consent of instructor and standing/permission of instructor. A seminar that will attempt to define anticipated major environmental problems and planning initiatives for the next ten years in the U.S. and elsewhere, to outline appropriate professional roles in the field, and to define educational programs for the field. To be offered 1977-78 only. Mr. Jacobs, Ms. Perlman (W)

268. Group Studies. (1-12) Prerequisite: consent of instructor. Topics to be announced at time of registration. No more than 5 students may be taken in each section. Mr. Foley (F, Sp)

269. Individual Study or Research. (1-12) Prerequisite: consent of instructor. Advanced interdisciplinary research seminar for individual study of topics in urban social policy and urban studies in post-war U.S.A. Focus on issues, and outcomes in different types of cities, and on present and potential impact of social changes. Ms. Perlman (W)

*280. Metropolitan Social Policy and Urban Social Change. (3) One 2-hour lecture per week. Prerequisite: consent of instructor. Social policy for doctoral students in fields of urban social policy or consent of instructor. A series of case studies analyzing the development, implementation and impacts upon local urban communities. Visiting lecturers from federal, state, and local government will outline the general characteristics, specifications, and strategies of social policy. Mr. Kent (Sp)

290. Seminar. (3) Prerequisite: consent of instructor. An exploratory seminar for advanced inter disciplinary research seminar. In consultation with the major field advisor. Analysis of the linkages between urban social policy and social work. Conceptual Issues in problem formulation. (F)

291. Cities and Transport Services. (4) Three hours of meetings per week. Prerequisite: courses 205 or equivalent, course 212 or equivalent; consent of instructor. Analysis and evaluation of transport systems in major cities, and urban transport in post-war U.S.A. Focus on city planning and management of urban transport services. Urban transport policies providing adequate transport services within urban areas and increasing urban quality of life, and relying on existing infrastructures and existing technologies. Implementation of these policies. Examples from N. America, Europe and less developed countries. Ms. Perlman (W)

Special Studies

601. Individual Study for Master's Students. (1-6) Individual study for master's students. Consent of instructor. Advanced interdisciplinary research seminar for individual study of topics in urban social policy and urban studies in post-war U.S.A. Focus on issues, and outcomes in different types of cities, and on present and potential impact of social changes. Must be taken on a satisfactory/unsatisfactory basis. Ms. Perlman (W)

602. Individual Study for Doctoral Students. (1-8) Individual study for doctoral students. Consent of instructor. Advanced interdisciplinary research seminar for individual study of topics in urban social policy and urban studies in post-war U.S.A. Focus on issues, and outcomes in different types of cities, and on present and potential impact of social changes. Must be taken on a satisfactory/unsatisfactory basis. Ms. Perlman (W)

IDS 175. A Non-technical Introduction to Operations Research. (4) See Interdepartmental Studies for the complete description of this course.
IDS 207A-207B-207C. Integrating Case Conferences and Seminars. (3–3–3) See Interdepartmental Studies for the complete description of this course.

IDS 219A–219B. Multidisciplinary Design. (3–4) See Interdepartmental Studies for the complete description of this course.

IDS 220. Cooperative Research Workshop in Transportation Economics (3) See Interdepartmental Studies for the complete description of this course.

IDS 223A–223B. Legislation, Administrative Regulation, and Land Planning (4) See Interdepartmental Studies for the complete description of this course.

IDS 241. The Urban Environment. (3–4) See Interdepartmental Studies for the complete description of this course.

IDS 242. Environmental Psychology. (4) See Interdepartmental Studies for the complete description of this course.

Landscape Architecture

Department Office, 202 Wurster Hall

Professors: Donald A. Antonyard, M.C.P., Garrett Eddy, M.L.A. William Garnett

Luna B. Leopold, Ph.D. R. Burton Litton, Jr., M.L.A. Richard D. Miller, Ph.D. Edward G. Stone, Ph.D.

Associate Professors: Michael M. Laurie, M.L.A. Clare Cooper Marcus, M.A., M.C.P.


Professor: J. B. Jackson, B.A. (Adjunct)

Lecturer: Russell A. Beatty, M.L.A.

Departmental Major Advisers: Undergraduate, Mr. Tetlow. Graduate, Mr. Twiss.

THE PROFESSION

The profession of Landscape Architecture plays an important role in identifying and solving environmental problems at the levels of planning and design. Professional practice includes planning for conservation of open space and natural amenities, land management and development, design of parks and recreation areas, schools, housing, and urban redevelopment projects. Landscape Architects are involved in the assessment of the impact which projects and proposals may make on environmental quality, and in designing such projects to be compatible with the landscape in which they are to be located. Because of the increasing complexity of the problems, Landscape Architects collaborate with Architects, City Planners, Ecologists, and Sociologists.

UNDERGRADUATE PROGRAM

The four-year curriculum leading to the A.B. degree in Landscape Architecture is structured to give the student an opportunity for a broad general education as well as an introduction to the fundamentals of professional practice. Required core courses represent a minimum basic emphasis in theory, design, and technology, but the program provides an opportunity to study, more intensively, all aspects of Landscape Architecture, including landscape analysis and planning, urban design, recreation, site design and development, graphics, construction, and planting design.

For more complete information, see the Announcement of the College of Environmental Design. For courses offered in Summer Session, see the Summer Session Bulletin.

GRADUATE PROGRAM

The Master of Landscape Architecture Degree program is designed to offer advanced work in the broadening fields of landscape design and environmental planning. Students enroll in both design and non-design fields may apply. The normal program is two years, but additional course work is required for students from non-design fields.

Within the graduate program it is possible to pursue a general course of study or to specialize in landscape design or environmental planning. Landscape design concentrates on project planning and programming and on the detailed design of public and private exterior spaces. It covers natural and behavioral factors of open space design, plants, materials, site construction, and community recreation projects, and explores new fields such as community participation in local open space design.

Environmental planning is concerned with the long-term context of natural and urban environments. The program brings together the study of ecology, conservation planning, environmental law, resource development, recreation planning, urban open space, and highway systems. Current faculty research human factors and design, environmental simulation and landscape assessment, enriches the study of these topics.

The undergraduate and professional graduate curriculum offered by the Department of Landscape Architecture are accredited by the American Society of Landscape Architects.

Joint Program in Urban Design. The departments of Landscape Architecture and City and Regional Planning jointly offer a program of studies in urban design leading to the Master of Landscape Architecture and the Master of City Planning degrees. Applicants must be admitted separately by both the Department of Landscape Architecture and the Department of City and Regional Planning.

The Ph.D. Degree in Environmental Planning. The Doctor of Philosophy program in Environmental Planning will have a core field of "environmental planning and design" with "natural" and "social" minor fields. It is aimed toward the education of teachers, researchers, and advanced professionals in the fields of landscape and environmental planning. Applicants may be from landscape architecture or other fields. They must present outstanding academic records. It is anticipated that most students will have completed a professional degree or other master's degrees before entering. Students with only a bachelor's degree should apply to the M.L.A. program first, or otherwise complete an appropriate Master's degree before application.

For information about this program please consult directly with the Graduate Secretary, Department of Landscape Architecture, Room 202 Wurster Hall.

For more detailed information about the graduate program, consult the Announcement of the College of Environmental Design and the graduate advisors in the Department of Landscape Architecture.

LOWER DIVISION COURSES

3. Freshman Seminar. (1) One 1-hour discussion per week. Introduction to the major for freshmen and sophomores. Discussion of the profession of Landscape Architecture and its place in landscape design, and the curriculum at Berkeley. Must be taken on a pass/fail basis only. Mr. Laurie (Sp)

10. Ecological Analysis. (3) Three 1-hour lectures and one 5-hour laboratory per week. Prerequisite: consent of instructor. Open to non-majors. Enrollment limited. Analysis of environmental factors, ecosystem functions, and ecosystem dynamics, as they relate to decision-making for landscape planning and design. Mr. McBride (Sp)

11. Introduction to Plant Materials. (4) Two 4-hour laboratories and field study per week. Plant identification and classification. Common plants suitable for California. Mr. Beatty (F)

30. Introductory Graphics for Landscape Architects. (4) Two 4-hour laboratories per week. Introductory professional graphics. Instrument drawing and sketching, tools, methods, standards. Line drawings for reproduction in pencil and ink. Mr. Tetlow (F)

UPPER DIVISION COURSES

100. Introduction to the Principles of Landscape Architecture. (4) Two 4-hour studies per week. Investigation of the design process and sources of form in Landscape Architecture. Preference given to majors in Landscape Architecture. Mr. Gates, (F)

101. Landscape Design. (4) Formerly 103. Two 4-hour studios per week. Landscape Architecture 101. Process-oriented design in the community setting. Landscape projects of limited scale: parks, recreation areas, housing, and community facilities. Mr. Gates, (W)

102. The Urban Landscape. Two 4-hour studios per week. Prerequisite: Landscape Architecture 100. Designs for specific contexts in collaboration with public and private spaces. Landscape rehabilitation and improvement. Mr. Pati (Sp)

103. Landscape Planning. (4) Formerly 101. Two 4-hour studios per week. Landscape Architecture 102. Environmental Planning 101 and Landscape Architecture 100. The relationship of physiography, cultural factors, and aesthetic criteria to land use planning and community form. Mr. Pati (Sp)

104. Site Planning. (4) Two 4-hour studios per week. Prerequisite: Landscape Architecture 101 or advanced standing in Architecture. Integration of landscape site and architectural structure. Problems of three-dimensional form and the resolution of technical site problems: grading, drainage, and planting. Mr. Dillingham (Sp)

105. Intensive Design. (4) Two 4-hour studios per week. Landscape Architecture 102 and Landscape Architecture 121. Comprehensive treatment of landscape projects of limited scale, such as gardens, small parks, or plazas, including details and the selection of specific materials. Mr. McBride (W)

106. Community Participation in Design and Neighborhood Recreation Projects. (4) Two 4-hour laboratories per week. Prerequisite: course 11 or equivalent. Application of fundamental, technical, and aesthetic principles in planning design to landscape problems. Mr. Beatty (W)

112. Landscape Horticulture. (4) Two 2-hour class meetings and one laboratory demonstration per week using Personalized System of Instruction method. Prerequisites: Landscape Architecture 11 and Botany 51. Principles of landscape design, installation and management of plant growth forms (microclimatic influences, soil management, pruning, planting techniques and other planting and maintenance factors. Mr. Beatty (F)

120. Topographic Form and Design. (4) Two 4-hour laboratories per week. Prerequisite: course 11 or equivalent. Application of fundamental, technical, and aesthetic principles in planning design to landscape problems. Mr. Beatty (W)

121. Landscape Structures and Materials. (4) Two 4-hour laboratories per week. Prerequisite: course 11 and course 21. Materials in construction: wood, metals, plastics, glass, masonry, and stone. Mr. Teglovitz (F)

123. Landscape Site Engineering. (4) Two 4-hour laboratories per week. 120 or equivalent. Design and...
120. Problems in Environmental Planning. (4) Two 1 1/2-hour lectures per week. An introduction to the history, theory, and materials of landscape architecture; contemporary application and practice of landscape architecture.

Prerequisite: Upper division standing and consent of instructor. The Staff (F, W, Sp)

130. Survey of Landscape Architecture. (3) Two 1 1/2-hour meetings per week. Each 1 1/2-hour meeting will include a lecture and a group discussion of a reading or related activity. Emphasis will be upon the function and meaning of selected historic, contemporary, and current landscape architecture and planning projects.

Prerequisite: upper division standing and consent of instructor. Mr. Lau (Sp)

131. Landscape Analysis and Problem Organization. (3) Two 1 1/2-hour meetings per week. Theories and methods in landscape analysis, emphasizing natural factors and design problem organization.

Prerequisite: Upper division standing and consent of instructor. The Staff (W)

132. Recreation and Open Space Systems. (4) Two 2-hour lecture and visitor-presentation sessions; plus one discussion session. Prerequisite: consent of instructor. Emphasis will be upon the function and meaning of selected historic, contemporary, and current landscape architecture and planning projects.

Prerequisite: upper division standing and consent of instructor. Mr. Lau (Sp)

133. Design Implications in Forestry and Resource Management. (3) Two 1-hour lectures of one 3-hour laboratory per week. Prerequisite: completion of the first quarter of residence in the MLA program. Discussion of the theory of site planning through case studies. Emphasis will be upon professional perceptual form applied to a complex design problem.

Prerequisite: upper division standing and consent of instructor. The Staff (F, W, Sp)

134. Presentation Graphics for Landscape Architects. Form Design. (3) Two 1 1/2-hour laboratories per week. Prerequisite: Landscape Architecture 230 or Environmental Design 6. Freehand and formal perspective approaches to graphic representation of landscape architecture concepts. Pencil, ink, and color media. Mr. Tetlow (Sp)

140. Social and Psychological Factors in Open Space Design. (4) Two 1 1/2-hour lectures and 3 hours of field observation per week. Theories of home, neighborhood, territory, communication, public behavior, and play. Feedback research on user-behavior in existing household units, parks, urban open spaces, and playgrounds. Observation and evaluation of local open spaces; programs for redesign.

Prerequisite: Consent of instructor. Mr. Litton (F)

160. Professional Practice Seminar. (2) One 2-hour seminar per week. Seminars with active practitioners from public agencies and private offices. Consideration of the present state and future potential of the profession.

Prerequisite: Consent of instructor. The Staff (F, W, Sp)

170. History and Literature of Landscape Architecture. (4) Two 2-hour lectures per week. Developmental history of design practice; relationships to society, climate, and topography.

Prerequisite: Consent of instructor. Mr. Brown (F)

197. Field Study in Landscape Architecture. (1-4) To be arranged. Prerequisite: upper division standing and consent of instructor and sponsor. See departmental information sheet for limitations. Supervised experience in field study of landscape architecture. Regular individual meetings with faculty and outside sponsor. Reports required. Must be taken on a passed/not passed basis only.

Prerequisite: Consent of instructor. The Staff (F, W, Sp)

198. Directed Group Study. (1-6) To be arranged. Prerequisite: consent of the instructor.

Prerequisite: Consent of instructor. The Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1-5) Enrollment restricted by regulations listed on page 34. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

See Environmental Design course listings for description of required environmental design courses for landscape architecture major.

200A. Landscape Design and Graphics. (4) Two 4-hour studios per week. Prerequisite: Landscape Architecture 120 and Landscape Architecture 200A. Problems in landscape design and graphics, including planning and drainage on topographically complex sites.

Prerequisite: Landscape Architecture 120 and Landscape Architecture 200A. Ms. Laurie (Sp)

201. Problems in Environmental Planning. (4) Two 4-hour laboratories per week. Prerequisite: Landscape Architecture 103 or consent of instructor. Problems in planning and design of natural and physical landscape of urbanizing regions.

Prerequisite: Landscape Architecture 103 or consent of instructor. Mr. Appleyard, Mr. Twiss (W)

202A. Landscape Analysis for Site Planning. (4) Two 4-hour studios per week. Prerequisite: Landscape Architecture 200A and 200B. The direct use of process in the determination of form through comprehensive analysis of the site. To be taken in conjunction with Landscape Architecture 202B.

Prerequisite: Completion of the first year of the MLA program. Mr. Gates (F)

202B. Landscape Design. (4) Two 4-hour studios per week. Prerequisite: Landscape Architecture 200A and 200B. Principles and determinants of three-dimensional perceptual form applied to a complex design program. To be taken in conjunction with Landscape Architecture 202A.

Prerequisite: Consent of instructor. Mr. Beck (F)

203A. Landscape Design Construction. (4) Two 4-hour studios per week. Prerequisite: Landscape Architecture 200A and 200B. Advanced problems in design investigated in terms of plant selection, detailing, land form and implementation on specific sites. To be taken in conjunction with Landscape Architecture 202A.

Prerequisite: Consent of instructor. Mr. Tettow (W)

203B. Landscape Design and Planting. (4) Two 4-hour studios per week. Prerequisite: Landscape Architecture 202A and 202B. Advanced problems in design investigated in terms of plant selection, planting design, and implementation on specific sites. To be taken in conjunction with Landscape Architecture 202A.

Prerequisite: Consent of instructor. Mr. Tettow (W)

204. Advanced Problems in Landscape Design. (4) Two 4-hour studios per week. Prerequisite: Landscape Architecture 230A and 230B. Problems in design and working drawings for a project selected by the student with faculty approval.

Prerequisite: Consent of instructor. Mr. Tettow (Sp)

205. Environmental Simulation. (Variable 2-4) Prerequisites: Communications in Landscape Architecture and two hours of laboratory per week. Prerequisite: consent of instructor. An experimental workshop using the Environmental Simulator. Emphasis is placed on model-building and video presentation; assessment of alternative simulation techniques; comparative behavioral studies of simulations and the real world; new methods of urban planning; and design.

Prerequisite: Consent of instructor. Mr. Appleyard (F, W, Sp)

210. Vegetation Analysis for Environmental Planners. (4) Two 4-hour laboratories per week. Prerequisite: Forestry and Conservation 120, and/or consent of the instructor. Vegetation development is treated as an ecosystem process. The steps required to control this process in order to achieve specific environmental objectives are examined in a case study framework.

Enrollment limited. Mr. Stone (W)

220. Natural Factors in Planning and Design. (3-4) Two hours of lecture and three to six hours of laboratory per week. Prerequisite: consent of instructor. Geophysical and biological factors and influences in landscape planning, such as climate, soils, vegetation, hydrology, climate and wildlife; linkage with visual aspects, synthesis for planning.

Prerequisite: Consent of instructor. Mr. Twiss (F)

221. Quantitative Methods in Environmental Planning and Design. (4) Two 2-hour lectures per week. Prerequisite: consent of instructor. Discussion and critique of the application of quantitative methods to environmental assessment, analysis and evaluation in planning and design. Topics to include multivariate analysis, optimization, simulation modeling, and operational gaming. Emphasis will be given to the use of quantitative methods in landscape planning and design research.

Prerequisite: Consent of instructor. Mr. Dickert (F)

232. The Landscape as a Visual Resource. (4) Two hours of lecture and two 3-hour laboratories per week. Prerequisite: open to 2nd year graduate students in Landscape Architecture, or consent of instructor. Environmental values of the designer, or environmentalist are examined in a case study framework using the Environmental Simulator.

Prerequisite: Consent of instructor. Mr. Eckbo (F, W, Sp)

233. Design Implications in Forestry and Resource Management. (4) Two 2-hour lecture per week. Prerequisite: upper division standing and consent of instructor. Emphasis will be upon the function and meaning of selected historic, contemporary, and current landscape architecture and planning projects.

Prerequisite: Consent of instructor. Mr. Meier (F)

239. The Interrelationship Between Landscape Design and Environmental Planning. (3) Two 1 1/2-hour lectures per week. Prerequisite: consent of instructor. Discussion of landscape design and environmental planning projects in terms of the influence of planning policy on design and of design criteria on planning. Participation by invited guests from the professions.

Prerequisite: Consent of instructor. Mr. Laune (Sp)

240. Advanced Seminar in Behavioral Factors in Open Space Design. (4) Two 2-hour seminars per week. Prerequisite: Landscape Architecture 140. Advanced discussion of behavioral factors in open space design, with emphasis on method and environmental values of the designer, or environmental needs at different life-cycle stages.

Prerequisite: Consent of instructor. Mr. Marcus (W)

249. Group Study. (1-5) To be arranged. The Staff (F, W, Sp)

259. Individual Research. (1-5) To be arranged. The Staff (F, W, Sp)

601. Individual Study for Master's Students. (1-8) Prerequisite: last quarter of residence in the MLA program. Prerequisite: approval by the Dean of Graduate Studies. Independent study for master's students in consultation with the field adviser. Units may not be used to meet either unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis.

Prerequisite: Consent of instructor. The Staff (F, W, Sp)

602. Individual Study for Doctoral Students. (1-8) Prerequisite: last quarter of residence in the MLA program. Prerequisite: approval by the Dean of Graduate Studies. Independent study for student candidates preparing for the Ph.D. May not be used for both unit or residence requirements for the doctor's degree. Must be taken on a satisfactory/unsatisfactory basis.

Prerequisite: Consent of instructor. The Staff (F, W, Sp)

610. Environmental Education and Design. (5) See Interdepartmental Studies for the complete description of this course.

611. Geology and Engineering Factors in Environmental Planning. (4) See Interdepartmental Studies for the complete description of this course.

612. Anatomy Resources Planning. (4) See Interdepartmental Studies for the complete description of this course.
Program in Visual Design

Program Office, 235 Wurster Hall

Professors: William A. Garnett, Herwin Schaefer, Ph.D.
Charles E. Rossbach, M.F.A.

Associate Professors: Margaret P. Dhaemers, Ph.D., (Director), M.A., M.F.A.

Assistant Professor: Anthony Dubovsky, M.A.

Lecturer: Yostiro Soga, M.A.

UNDERGRADUATE PROGRAM

For information about the undergraduate program, see the Announcement of the College of Environmental Design.

GRADUATE PROGRAM

The graduate program is organized to provide advanced study in visual design or individual advanced work in the fields identified in the course listing. The degree awarded is the Master of Arts in Design.

For detailed information about the graduate program consult the Announcement of the College of Environmental Design and the graduate adviser for the Program in Visual Design.

UPPER DIVISION COURSES

103A–103B–103C. Graphic Composition. (4–4–4)
One hour of lecture and six hours of laboratory per week. Prerequisite: 103A: Environmental Design 6 or consent of instructor; 103B: course 103A or consent of instructor; 103C: course 103B or consent of instructor. 103A is prerequisite to 103B. Laboratory study of visual and organizational synthesis. Emphasis on the development of visual and organizational relationships in the design of units of information. The staff (F, W, Sp)

122A–122B–122C. Constructed Textiles. (4–4–4)
Six hours of laboratory per week. Prerequisite: consent of instructor. Design projects in various media involving visual and organizational synthesis. The staff (F, W, Sp)

139. Photography as an Art Form. (4) Two 3-hour laboratories per week. Prerequisite: course 127 or consent of instructor. Experimental approach to materials and processes. The visual realization of ideas. Design 139 may be repeated once for credit.

130. Introduction to Artificial Lighting Photography. (4) Two 3-hour laboratories per week. Prerequisite: course 127 or consent of instructor. Introductory instruction and assignments in the use of artificial light. Design 130 may be repeated once for credit.

Mr. Garnett (W)

133. Experimental Approaches to Visual Communications. (4) One hour of lecture and six hours of laboratory per week. Prerequisite: consent of instructor. The use of light as a medium for human expression in a variety of graphic forms: photographic images and graphics for programmatic contexts. Ms. Dhaemers (Sp)

160A–160B. Design Survey. (4–4) Three 1-hour lectures per week. Prerequisite: course 160A. Historical survey of design in the minor arts from the ancient Near East to the present, with emphasis on the development of style and analysis and evaluation of form. 160A. The Ancient World and the Middle Ages. Mr. Schaefer (F)

160B. The Renaissance to the Present. Mr. Schaefer (W)

*182A–182B. Antecedents of Industrial Textiles. (4–4) Three 1-hour lectures per week. Prerequisite: 182A. Survey of selected textile constructions and technologies that have had an impact on the modern machine-made fabrics. Samples from worldwide geographic areas presented in their historical and cultural contexts. 182A. The Americas, Oceania, and Africa. Mr. Rossbach (Sp)

182B. The Orient, Near East, and Europe. Mr. Rossbach (Sp)

163. History of Furniture and Interior Design. (4) Three 1-hour lectures per week. The interior and its furnishings as an aesthetic composition and as an expression of domestic culture from the Middle Ages to the present. Mr. Schaefer (W)

165. Phases in Twentieth-Century Design. (3) One 3-hour lecture per week. Intensive study of significant phases of design developments and their relation to broader artistic movements in the twentieth century. Mr. Schaefer (F)

Special Studies

197. Field Studies in Design. (1–5) Prerequisite: consent of instructor. Supervised experience relevant to the particular field of study in off-campus organization. Regular individual meetings with faculty sponsor and written reports required. The staff (F, W, Sp)

198. Special Group Study. (1–5) To be arranged. Studies developed to meet individual needs. May be repeated once for credit.

199. Supervised Independent Study and Research. (1–5) To be arranged. Studies developed to meet needs. No more than 5 units are allowed in any one quarter. The staff (F, W, Sp)

GRADUATE COURSES

222. Seminar in Experimental Approaches to Media and Methods. (4) Three hours of seminar per week. Emphasis on aesthetic problems through development, presentation, and discussion of individual projects. May be repeated once for credit.

Ms. Dhaemers (W)

229. Photography as an Art Form. (4) Three hours of seminar per week. Prerequisite: course 127. Advanced study in the experimental approach to materials and processes. The visual realization of ideas. Mr. Soga (F)

232. Environmental Photography. (4) Three hours of lecture per week. Photography as a means to environmental design and documentation of current history. Mr. Garnett (F)

*233. Special Problems in Light, Motion, and Form. (4) One 2-hour lecture and two 3-hour laboratories per week. Prerequisite: course 133. The application of light, motion, and form to T.V. or multimedia and their effects on spatial orientation and arrangement.

*234. Special Problems in Photography. (4) Three hours of seminar per week. Prerequisite: course 233 or consent of instructor. Photography as a means to pursue light and motion relationships in a separate context from content.

Mrs. Dhaemers

235. Seminar in Photography. (3)

Mrs. Dhaemers (Sp)

240. Seminar in Design Research. (3) One 3-hour meeting per week. Advanced study especially related to graduate work and research. Review of the development of thesis contents. Mr. Rossbach (Sp)

242. Seminar in Textile Research. (3) One 2-hour seminar per week. Projects in textile research, utilizing literary sources, analytical techniques, and specimens in university collections. Mr. Rossbach (W)

Special Studies

298. Special Group Study. (1–5) Studies developed to meet needs. No more than 5 units are allowed in any one quarter. The staff (F, W, Sp)

299. Individual Study and Research for Master's Students. (1–5) Individual studies including reading and individual research under the supervision of a faculty adviser, designed to reinforce the student's background in areas related to his proposed thesis topic.

The staff (F, W, Sp)

ENVIRONMENTAL DESIGN COURSE

172. History of the Environment. (4) See Environmental Design for the complete description of this course.

Mr. Schaefer (Sp)

JOURNALISM

School of Journalism Office, 607 Evans Hall

Professors: Edwin R. Bayley, B.A. (Dean) David Littlejohn, Ph.D. Joseph P. Lyford, B.A. Albert G. Pickrell, Ph.D.

Assistant Professor: Thomas G. Leonard, Ph.D.

Senior Lecturers: James C. Spaulding, B.A. Andrew A. Stern, B.A.

Graduate Advisors: Mr. Spaulding, Mr. Littlejohn, Mr. Pickrell, Mr. Bayley, Mr. Taper.

Undergraduate Advisors: Mr. Lyford, Mr. Pickrell, Mr. Spaulding, Mr. Littlejohn, Mr. Leonard.

The School of Journalism offers programs leading to the degree of Bachelor of Arts (B.A.) in Journalism and Master of Journalism (M.J.). The M.J. program seeks to provide training in the skills and techniques of journalism and a knowledge of the traditions and principles of the profession, combined with the study of other academic disciplines that constitute the subject matter of journalism.

Candidates for the M.J. degree shall ordinarily have completed six quarters in graduate study in journalism and related disciplines. They shall have completed 42 units of approved upper division or graduate courses.

NOTE: For key to symbols, see page 34.
141. The Mass Media and Society. (4) Three hours of lecture per week (attendance required) and three hours of discussion, for which attendance is voluntary. Critical analysis and discussion of contemporary trends, problems, and objectives of the mass media. Mr. Lyford (F, Sp).

151. The Literature of Journalism. (4) Three hours lecture and discussion per week. Study of the selected works of outstanding American and European press, from the eighteenth century to the present. Mr. Littlejohn (W).

165A. Legal Aspects of the News Media. (4) Three hours lecture and discussion per week. Introduction to law of defamation and its application to news media; analysis of legal rights and restrictions on news media, including invasion of privacy, criminal libel, obscenity, and libel law. Mr. Pickerell (F).

165B. Legal Aspects of the News Media. (4) Three hours lecture and discussion per week. Consideration of legal aspects of the news media, including free press/law trial, obscenity and censorship, licensing and taxation, FCC and the Fairness Doctrine, access to meeting, and judicial proceedings, and administrative regulations. (165A is not a prerequisite.) Mr. Pickerell (W).

176. The Critical Review. (4) Three hours of lecture and discussion or tutorial, and eight hours of field work per week. Prerequisite: consent of instructor. Limited to 15 students. Written assignments in the field of critical review of books, film, drama, music, art, and architecture. Mr. Lyford (W).

180. Issues in Television Journalism. (4) Four hours of lecture and discussion per week. Evaluation of television news and documentaries from 1950 to the present. Course will analyze local and network news programs, examine problems newsmen face working within broadcast industry, role of the FCC, and the future of public television. Mr. Stern (F).

181. Television News Research Seminar. (4) Four hours of lecture and discussion per week. Prerequisite: course 180 (of which this course is an extension). Advanced study of selected issues in broadcast journalism and research in the areas of broadcast news quality, the use of film and videotape as reporting tools, financial pressures and federal regulation. Mr. Star (F, W, Sp).

184. Reporting of Public Affairs. (4) Three hours of lecture and discussion and eight hours of field work per week. Prerequisite: course 100 or equivalent. Study of and practice in reporting of news of judicial, legislative, and administrative functions of city, county, and state government. Mr. Stern (F, W, Sp).

185. Advanced Reporting of Public Affairs. (4) Three hours of lecture and discussion and eight hours of field work each week. Prerequisite: course 184. An extension of course 184, for students who seek additional instruction and practice in the reporting of governmental function. Mr. Stern (W).

190. Comparative World Journalism. (4) Three hours of lecture and discussion per week. Examination of international journalism, with attention to sources of information, to media characteristics, and conditions of performances. Mr. Spaulding (W).

197. Field Study in Journalism. (1–5) Supervised experience in the practice of journalism in off-campus professional situations. Individual study assignments may be devoted to one or more specialized forms of journalistic writing; the topic will be announced each quarter by the School. Can be repeated for credit under certain circumstances. Mr. Stern (W).

200. News Writing. (3) Three hours of lecture and laboratory and five hours of field work per week. Prerequisite: course 100 or equivalent. Study and practice in the reporting of news, editorials, and features. Individual study assignments may be devoted to one or more specialized forms of journalistic writing; the topic will be announced each quarter by the School. Can be repeated for credit under certain circumstances. Mr. Stern (W).

205. News Editing. (2) Formerly 405. Three hours of lecture and laboratory per week. Study of and practice in editing of manuscripts. Study and critique of magazine, periodical, and broadcast copy, field reporting, documentaries, and editorials. Individual study assignments may be devoted to one or more specialized forms of journalistic writing; the topic will be announced each quarter by the School. Can be repeated for credit under certain circumstances. Mr. Stern (W).

210. News Photography. (2) Three hours of lecture and four hours of laboratory per week. Study of photography and making and taking photographs. Field assignments. Limited to journalism graduate students and majors. Mr. Spaulding (W, Sp).

212. Photojournalism. (3) Two hours of lecture and three hours of laboratory per week. Study of photography and making and taking photographs. Field assignments. Limited to journalism graduate students and majors. Mr. Spaulding (W, Sp).

220. Public Affairs in Perspective. (4) Three hours of lecture and discussion and eight hours of field work per week. Prerequisite: course 200 or equivalent. Study of the function of the mass media in society and its relationship to social, economic, and political conditions of the period. Mr. Leonard (W).

225A-225B. Reporting on the American Community and Urban Affairs. (4–4) Three hours of lecture and discussion and eight hours of field work per week. Prerequisite: course 225A. Course 225A is prerequisite to 225B. Examination of the structure and the political and social character of communities, and practice in reporting on urban problems such as education, health, welfare, housing, and administration. Mr. Lyford, Mr. Taper (W, Sp).

227. Reporting of Cultural Events. (4) Three hours of lecture and discussion and eight hours of field work per week. Prerequisite: course 200 or equivalent. Study and discussion of principles and practice in reporting of cultural events and campaigns. Offered in alternate years. Mr. Bayley (Sp).

228. Reporting of Science and the Environment. (4) Three hours of lecture and discussion and eight hours of field work per week. Prerequisite: course 200 or equivalent. Advanced study of methods of reporting developments in such fields as science, environmental, and physical health, psychology, or the environment. Mr. Spaulding (W).

237. Reporting of Social and Cultural Trends. (4) Three hours of lecture and discussion and eight hours of field work per week. Prerequisite: course 200 or equivalent. Study and discussion of principles and practice in reporting of social and cultural trends, and problems, and objectives of the media of mass communications. Mr. Spaulding (W).

240. History of American Journalism. (4) Three hours of lecture and discussion per week. Study of and research in the history of American journalism and its relation to social, economic, and political conditions of the period. Mr. Leonard (W).

242. The Writing of Profiles, Personality Sketches, and Short Biographies. (4) Three-hour seminar each week. Reading and discussion of eminent practitioners from Plutarch to the present, and research and writing projects. Mr. Taper (W).

245. Social Aspects of the Mass Media. (4) Two 1 1/2 hour sessions each week. Critical analysis of the mass media, discussion of problems of ethics and responsibility. Mr. Lyford (W).

250. Investigative Reporting. (4) Three hours of lecture and discussion and eight hours of field work per week. Prerequisite: course 200. Study of investigative reporting, analysis of its technique, with outside reporting assignments. Mr. Taper (W).

251. Literature of Journalism. (4) Two 1 1/2 hour sessions each week. Study of outstanding men whose journalistic work is of lasting historic and literary worth. Mr. Littlejohn (W).

252. Magazine Article Writing. (4) Three hours of lecture and discussion and eight hours of field work per week. Prerequisite: course 200. Study and analysis of the techniques of writing for magazines, research, writing and editing of articles for periodicals. Mr. Taper (F, Sp).

263. Public Opinion, Propaganda, and the Mass Media. (4) Two 1 1/2 hour discussion sessions per week. Study and analysis of public opinion, propaganda, and information techniques of the mass media and other agencies from World War I to the present. Mr. Leonard (W).

265. Seminar in the Law of Mass Communications. (4) Three hours of lecture and discussion per week. Introductory materials in legal research, court organization and procedure, inquiry into contemporary controls affecting the news media, especially libel and privacy. Mr. Pickrell (W).

276. Essential Law for Journalists. (4) Three hours of lecture and discussion per week. Prerequisite: admission as graduate student in Journalism or consent of instructor. Study of legal limits, controls and rights of the news media, as well as the responsibility of journalists. Mr. Pickrell (F).

278. Political Reporting. (4) Three hours of lecture and discussion and eight hours of field work per week. Prerequisite: course 200 or equivalent. Study and discussion of principles and practice in political reporting and news reporting of the courts and other branches of the legal system. Mr. Pickrell (W).

280. Business Reporting. (4) Three hours of lecture and discussion and eight hours of field work per week. Prerequisite: course 200 or equivalent. Study of the function of the mass media in society and its relationship to social, economic, and political conditions of the period. Mr. Leonard (W).
283. Reporting for Television. (4) Six hours of lec-
ture and discussion and about 24 hours of field work
and laboratory per week. Prerequisite: course 282 and
consent of instructor. Producing, directing, filming, and
writing weekly television news programs.
   Mr. Stern (Sp)

284. Documentary News Films. (4) Twelve hours of
field work and laboratory per week. Prerequisite: courses
282 and 283 and consent of instructor. Production
teaching of television documentary news films.
   Mr. Stern (F)

290. International Communications—Foreign
Press. (4) Two 1 1/2-hour lectures and discussion per
week. Cultural, economic, social, and political factors in
development of national press systems; barriers to
international communication; role of mass media in na-
tional development. Mr. Pickering

297. Field Study in Journalism. (1-5) Supervised
experience in the practice of journalism in off-campus
organizations. Individual meetings with faculty sponsor
and written reports required. The Staff (F, W, Sp)

298. Special Study for Graduate Students. (2-6)
For students who wish to pursue a special program of
study and research not covered by any other course or
requirement in consultation with the field adviser.
Units may not be used to meet either unit or residence
requirements in consultation with the field adviser.
The Staff (F, W, Sp)

299. Individual Study In Mass Communications.
(1-6) Supervised research projects and reports.
The Staff (F, W, Sp)

601. Individual Study for Master's Students. (1-6)
Individual study for the comprehensive or language
requirements in consultation with the field adviser.
Units may not be used to meet either unit or residence
requirements for a master's degree. Must be taken on
a satisfactory/unsatisfactory basis.
   The Staff (F, W, Sp)

Arthur H. Sherry, A.B., J.D. (Walter Perry Johnson
Professor, Emeritus)
Michael E. Smith, M.A., J.D.
D. Preble Bolz, A.B., J.D.
Lawrence E. Spence, A.B.,
L.L.B.
Lawrence A. Sullivan, A.B.,
L.L.B.
Justin Sweet, B.A., L.L.B.
Jan Vetter, B.A., L.L.B.

Profs.: R. G. Carr, B.A., M.A., J.D. (Acting),
Henry Ramay, Jr., A.B.,
L.L.B. (Acting)

Lecturers:
Roger H. Bernhardt, M.A., J.D.
Richard Cotton, A.B., L.L.B.
Howard Elman, B.A., L.L.B.
Jerome B. Fisk, Jr., B.A., J.D.
Stephen R. Finn, B.A., J.D.
K. Bruce Friedman, A.B.,
L.L.B.
Stuart K. Gardiner, B.A., J.D. (Assistant Dean)
Chris A. Gasparich, A.B.,
L.L.B.

W. James Hill, A.B., L.L.B.
Marvin S. Kayne, B.S., J.D.
Kenneth F. Phillips, B.A.,
L.L.B.
Peter E. Setkun, B.A., L.L.B.

Visting:
Spurgeon Avakian, A.B., J.D.
Charles Donahue, Jr., A.B.,
L.L.B.
James Frankel, B.S., L.L.B.
Victor P. Gottschang, B.A.,
L.L.B.
Robert H. Kroninger, A.B.,
J.D.

Jane R. Levine, B.A., J.D.
Irvng Phillips, B.A., M.D.
William Arnett Reppner, Jr.,
A.B., J.D.
Lenore C. Tier, B.A., M.D.
Mark G. Yudof, B.A., L.L.B.

The School of Law Office, 225 Boalt Hall

School of Law Office

Professors:
Thomas G. Barnes, D.Phil.
Stephen R. Barnett, A.B.,
L.L.B.
Enis S. Blote, B.S., L.L.B.
Richard M. Buxbaum, A.B.,
L.L.M.
Jesse N. Cooper, B.S., L.L.B.,
A.H. Litt.
Robert D. Cole, A.B., L.L.B.
John E. Coons, B.A., J.D.
David Esche, D.Jur., Ph.D.,
D.C.L., M.A., L.L.D., Dr. I.H.
Ronan E. Degnan, B.S.L.,
L.L.B.
Bernard L. Diamond, A.B.,
M.D.
Melvin A. Eisenberg, A.B.,
L.L.B.
David E. Feller, B.A., L.L.B.
John G. Fleming, D.Phil.,
D.C.L.
Caleb Foote, M.A., L.L.B.
Edward C. Heibel, Jr., A.B.,
L.L.M., L.L.D.
Jonal R. Hensley, Jr., B.S., L.L.B.
Mark R. Heyman, B.A., L.L.B.
Richard W. Jennings, M.A., J.D. (James W. and Isabel
Coitlow Professor, Emeritus)
Philipp E. Johnson, A.B., J.D.

Sanford H. Kadish, B.S.S.,
L.L.B. (A.F. and May T.
Morrison Professor/Dean)
Horace K. Kay, B.A., J.D.
Friedrich Kessler, M.A., Dr.
J.C.
Stephen George Kuttner,
J.D.
David W. Louisell, B.S.L., J.D.
(Elizabeth Jessop Bell
Professor)
John K. McKinley, A.B., L.L.B.
Paul Mistleton, A.B., L.L.B.
Emmanuel S. Helfer
Professor, Emeritus)
Robert H. Knooob, A.B.,
L.L.B.
Vaclav Mostecky, M.A., M.S.,
D. Jur. (Law Librarian)
Frank C. Newman, A.B.,
L.L.M., J.S.D. (Jacob H.
Ralston Professor)
John T. Noonan, Jr., Ph.D.,
L.L.B.
Steven A. Riesenberg, Dr. I.H.
B.S., Dott. in glur., S.J.D.,
Dr. J. H. (Emmanuel S.
Helfer Professor, Emeritus)
Sno Sato, A.B., L.L.B.

William N. Keeler, A.B., J.D.
(associate Dean, Emeritus)
Ariaan A. Kragen, B.A., J.D.
(Shannon Cecil Turner,
Professor, Emeritus)
William T. Leavitt, Jr., A.B.,
L.L.M. (A. F. and May T.
Morrison Professor, Emeritus)
John R. Wilkins, B.A., L.L.B.
(Emmeritus)

EXPLANATION OF COURSE NUMBERING

1. Courses are listed alphabetically, with two ex-
cceptions: prescribed first-year courses are numbered
200 to 205, and special programs are numbered 295
to 299.

2. Courses that substantially are the same (although
the emphasis or the number of units may differ) are
given the same number, but a different identifying num-
ber following a hyphen.

3. Where no number is available at the place in the list
at which a course belongs, the preceding number is
assigned followed by a decimal point and another num-
ber.

4. Two-semester courses are identified by letters (e.g.,
200A, 200B). Unless otherwise indicated, completion
of the A part of the course is a prerequisite to taking
the B part.

For further information and admission requirements of
the School of Law, see the Announcement of the
School of Law, available without charge from the Law

NOTE: For key to symbols, see page 34.
The first-year program is presented, consisting of six main sections, with approximately 110 students in each. The first and sixth sections are large sections of 450 students, and the second to fifth sections are small sections of 25 to 30 students. There are large sections and small sections in each of the first-year courses except Law 205 which is all small sections.

200A-200B. Civil Procedure. (3-3) The principles of pleading under the code system and the federal rules; modern trial practice, including venue, process, the jury, summary judgment, final decisions, new trials, judgments; appellate procedure.

201A-201B. Contracts. (3-3) The law of contracts, dealing with the formation, operation, and termination. Mr. Coons, Mr. Eisenberg, Mr. Kessler, Ms. Shultz.

202A-202B. Criminal Law and Procedure. (2-3) An introduction to the criminal procedure with an emphasis on the role of the defense attorney. Mr. Foote, Mr. Johnson, Mr. Kroll, Mr. Ramsey.

203A-203B. Property. (3-3) An introduction to the real property, including leases and other interests in land, real property marketing and conveyancing, land management, and landlord-tenant problems. Mr. Donahue, Mr. Repp, Mr. Sullivan, Mr. Witherspoon.

204A-204B. Torts. (3-3) The law of civil injuries, including both intended and unintended injuries suffered with personal and property interests as well as liability without fault. Mr. Barnett, Mr. Fleming, Mr. Sugarman, Mr. Sweet.

205. Introduction to Law. (1-1) Instruction in legal research and writing in the fall semester, and a moot court program in the spring.

SECOND AND THIRD YEAR

206. Administrative Law. (2) A study of administrative procedure and of agency rules, orders, and discretion (federal and state). Emphasizes the problems that lawyers encounter when they deal with government agencies and their innumerable officers and employees. Mr. Newman, Mr. Stoiz.

206.5. Ancient Jewish Law. (2) Historical developments of the patriarchal period (Abraham, Isaac, Jacob, and Joseph) to the redaction of the Talmud (around 500 A.D.); such institutions and concepts as are particularly interesting in this period will be covered.

206.6. Ancient Law. (2) Discussion will focus on the ancient Orient (including the Bible) and Greece. It will deal with both what we find and how we find it: by the use of theories, myths and narrations as well as legal materials. Source and form criticism, the nature of comparison and other methodological problems will receive attention.

207. Antitrust Law. (2) Legal and economic problems in the public control of corporate power and market behavior. Topics covered include monopoly, cartels, oligopolistic interdependence, dealer and distributor control, and vertical restraints, and merger. Mr. Mookin, Mr. Sullivan.

207.5. Antitrust Seminar: Policy Planning for the Regulation of Market Structure and Conduct. (2) Prerequisite: 207 (Antitrust Law) or Economics 121A-121B (Industrial Organization). An inquiry into concepts and techniques that might be used to plan and implement a rational, consumer-oriented, antitrust enforcement policy. One industry will be used as a focus for study. Mr. Sullivan.

208. Appellate Advocacy. (3) Open to second-year students only. Committee evening lecture teaching by faculty, experienced practitioners and judges in the art of written and oral appellate argument, with exercises in that art under faculty supervision and, after oral argument, by the student, by faculty. This is followed by the brief- ing and argument of an actual case. Satisfactory completion is a prerequisite for candidacy on the Moot Court Board. Mr. Feller and the members of the Moot Court Board.

210.3. Authors and Readers. (2) Examines the law affecting books and magazines in the United States, including antitrust, contracts, constitutional, copyright and postal law; the economics of publishing. Principl es are viewed from the perspective of the marketplace and consumers. Mr. Noonan.

211-2. Business Associations (Corporations). (5) Basic principles in corporation law; formation of the corporation; issuance of shares; corporate powers; corporate officers; authority of corporate executives; shareholders' derivative suits; obligations of management to corporations and shareholders, and of shareholders inter se; introduction to matters of corporate finance. Mr. Choper.

211-3A-211-3B. Business Associations (Corporations). (3-3) A brief introduction to non-corporate forms of business organizations. It is a study of the basic materials on corporations in the federal system, with emphasis on the interaction of state and federal law. It is an introduction to corporate formation, management-shareholder relations, shareholders' suits, issuance of shares, dividends and other distributions of assets, corporate reorganization and recapitalization, and alteration of shareholders' rights. Mr. Buxbaum.

211-4A-211-4B. Business Associations (Corporations). (3-2) Covers substantially the same material as Law 211-3A-211-3B except that less attention is devoted to legal aspects of corporate finance.

212. Business Planning, Selected Problems In. (2) Prerequisite: Law 211-3A-211-3B (Business Associates (Corporations)); Law 250A-250B (Income Tax I and II). This course will cover issues concerning the formation of corporations, the management and shareholders' rights, and the termination. Mr. Coons, Mr. Elsenberg, Mr. Kessler, Ms. Barton.

214. California Marital Property. (3) The law of California marital property, including separate property, marital property, and community property, and liability of the marital property for debts and torts of the spouses, the division of the community property and the separate property, and the property rights of putative and meretricious spouses.

214.5. Children and the Law. (2) Seminar addressed to laws and social policies that affect children, exploring what it means for a child to be a minor—infant, child, or adolescent—in America today.

215. Chinese Law. (2) Introduction to the legal system of China, past and present, with special emphasis on traditional Chinese law, informal and extra-judicial institutions, procedures, and sanctions considered. Mr. Chen.

218A. Commercial Law I (Sales). (3) Provides substantial familiarity with the Uniform Commercial Code, Articles 2, 2A, and 2B, and the sale of goods. Mr. Smith and Mr. Foote.

220B. Commercial Law II (Secured Transactions, Bankruptcy, and Article 9). (3) Covers substantially the same material as Law 218B, Commercial Law II. It is a prerequisite to offer those laws.

220C. Commercial Law III (Secured Transactions, Bankruptcy, and Article 9). (3) The course is an introduction to secured transactions, bankruptcy, and Article 9. The course is an introduction to secured transactions, bankruptcy, and Article 9.

220D. Commercial Law IV (Secured Transactions, Bankruptcy, and Article 9). (3) The course is an introduction to secured transactions, bankruptcy, and Article 9.

225. Consumer Protection Seminar. (2) Study of common problems and abuses confronting consumers, and evaluation of the existing as well as proposed societal responses to those concerns. The substantive coverage includes deceptive and misleading practices, and the efficacy of existing agencies (e.g., F.T.C.) and General and Administrative Orders. Mr. Colby.

226.3. Contract Writing and Analysis. (2) Seminar designed to develop the student's skills in writing contracts. Skill will be examined through model fact situations. Students will be advised of the requirements of simple employment agreements and leases through more complex provisions of partnership buy-sell agreements and real estate purchase agreements.

226.6. Contracts—Selected Problems Seminar. (2) A seminar in which students prepare and present major research papers in the areas of commercial contract principles, non-judicial lawyers, particular problems relating to particular types of contracts, comparative contract materials and the use of sociological techniques in legal research are the focus of the seminar.

227. Copyright and Unfair Competition. (2) Statutory and common law protection of intellectual property, and artistic works, including the principles of unfair competition and trademark protection. Mr. Barnett.

229. Counseling Small Businesses in Poverty Areas. (2) Provides the student who intends to engage in the practice of law in the ghetto, barrio, or other poverty area with some basic tools for advising his client who will, normally be engaged in small business enterprises. Mr. Sykes.

230. Creditors' Remedies and Debtors' Protection. (3) Enforcement of judgments, exemptions, fraudulent conveyances, general assignments, creditors' remedies, bankruptcy and other forms of debtors' relief. Mr. Riesenfeld.

231. Criminal Cases and Prison Law, Dispositional Alternatives In. (3) Study of various alternatives available to the courts in their disposition of cases. The student will be expected to make at least one visit to a county jail, a state prison, or a federal institution to observe the treatment of offenders within. Mr. Cross.

232A-232B. Criminal Law and Administration. Seminar on. (2) or (1-2) Legal problems relating to the criminal law and its administration. Open also to graduate students in the School of Criminology. Mr. Foote.

235-1. Criminal Procedure. (3) A survey of criminal trial and pretrial procedure. Topics include the law of arrest, search and seizure, interrogation, identification, entrapment, pretrial motions and hearings, plea bargaining, and contempt. Mr. Johnson.

236. Current Issues In Tax Policy. (2) Prerequisite: Law 250A, 250B (Income Tax I and II). A study, mainly through student papers, of important issues of current tax policy questions and their legal implications. Mr. Rady.

237. Educational Policy and Law. (2) Analyzes educational policy questions and their legal implications. Mr. Rother.
Federal, state and local education finance; student civil liberties (due process, student classification, student classification in general education, testing, grouping), and school governance (decentralization, vouchers).

Mr. Kirp, Mr. Noonan

237.3. Educational Policy and Law: Seminar. (2) Recommended: Law 237 (Educational Policy and Law). Varies annually. An intensive examination of one area in educational policy, with special emphasis on money student classification or family choice in education. Student papers may be based on field research linked with relevant Childhood and Adolescence Studies activities.

Mr. Kirp, Mr. Sugerman

237.5. Criminal Trial Practice. (2) Students participate in simulated criminal cases from arraignment through trial. Preparation and argument, motions, jury trial. Emphasis on bail, preliminary hearing, suppression motions, presentation of evidence, examination of witnesses, argument to court and jury, evidentiary and procedural objections. Mr. Tippet

237.6. English Legal History Seminar. (2) Prerequisite: Law 260 (Legal History of England). A research seminar intended to result in an original paper on a topic in English legal development (common law as well as equity) from 1100 to 1700. Substantive and procedural law, development of the profession, the nature of litigation, and judicial institutions are topics for research.

Mr. Feller, Mr. Vetter

238. Environmental Law. (2) Primary emphasis is on the regulation of air and water pollution at national, state, and regional levels and through private law suits. Environmental legal concepts are studied. A portion of the course is also devoted to conservation issues, litigation strategy, and the roles of lawyers in state and federal environmental problems.

239-2. Estate and Gift Taxation. (2) A study of the statutory, judicial, and administrative material constituting the federal estate and gift taxes. Ms. Barton, Mr. Noonan

239-3. Estate Taxation and Planning. (3) Prerequisite: Law 250A (Income Taxation I). A basic study of the federal estate and gift tax laws, and how they operate in the planning for, and protection of, inter vivos and testamentary transfers.

Ms. Barton

239-4. Estate Taxation and Planning. (2) Prerequisites: Law 241 or 241-3 (Estates and Trusts) and Law 250A (Income Taxation I). A study of the federal estate and gift tax laws, together with some aspects of income tax laws and state inheritance taxes; a study of how these taxes operate in the planning for, and protection of, inter vivos and testamentary transfers.

Ms. Barton

240. Estate Planning, Selected Problems In. (2) Prerequisite: Law 241 (Estates and Trusts); Law 250A-250B (Income Taxation I and II); and either Law 239-3 (Estate and Gift Taxation) or Law 239-4 (Estate Taxation and Planning).

Selected problems in estate analysis and planning; tax-conscious drafting of wills and trusts, other instruments, gifts, and powers of appointment; planning of insurance and disposition of business interests. Primary emphasis is on individual work in planning an estate, from interview to drafting of documents.

Mr. Friedman

241-1. Estates and Trusts. (3) The law of intestate succession and wills; the nature, creation and termination of trusts; problems of construction, administration of trusts and decedents’ estates. Mr. Ropp

241-3A-241-3B. Estates and Trusts. (3–2) Law of intestate succession and wills; nature, creation, and termination of trusts; future interests; trust income; taxation; trust rules against perpetuities and powers of appointment; problems of construction and drafting, including income taxation; class gifts and powers of appointment; fiduciary principles; administration of decedents’ estates and trusts. Mr. Habach

242-2. Evidence (Basio). (3) Concentration upon the functions of evidence with emphasis on the techniques used in its introduction, the rules of evidence, and the problem of their relationship with the object of providing understanding of basic principles. Includes hearsay, business records, documents, public records, expert testimony, the U.S. Constitution, relevance, relevance, and judicial notice. Emphasis is on the making and preservation of evidence, incorporation of new modes of examination, cross-examination, or impeachment of witnesses.

Mr. Degnan, Mr. Louisell

243. Family Law. (3) Marriage, annulment, dissolution, paternity, and adoption; custody and visitation; legitimacy; guardian and ward; the Juvenile Court.

Ms. Kay

244. Family Law Seminar. (2) Prerequisite: Law 243 (Family Law). A seminar offered jointly by the School of Public Health and the Law School for students who have specialized in domestic and family law. Students include law students and psychiatric residents. The course centers around a particular problem in the area of family law, which may be a legal problem, a psychological problem, or an ethical problem. Course format varies, but the seminar will use the case law, as well as the Law of Treaties. Special attention is given to modern developments such as the law of the sea, protection of the environment, and the use of force in international relations. In addition, the course will focus on the emerging role of the United Nations as a principal factor in the law.

Mr. Reisenfeld

252. International Legal Process. (2) Introduction to international law and the foreign relations law of the United States. Problems involving the State Department, other governments (including the UN and the OAS), and treaties, treaties, war, peace.

Mr. Newman

253. International Tax Seminar. (2) Prerequisite: Law 255 (International Law). A study of the tax problems of international transactions, including those faced by U.S. citizens and residents in foreign countries, with emphasis on the U.S. taxation of income earned by U.S. taxpayers in foreign countries.

Mr. McNulty


Mr. Noonan

255. Labor Law. (3) or (4) The law governing the relationship between employer and employee and the impact of state and federal legislation in the area of collective bargaining, including the law of the collective agreement, the strike, the boycott, and the picketing.

Mr. Feller, Mr. Vetter

256. Labor Law, Current Critical Issues In. (2) Prerequisite: Law 255 (Labor Law). A seminar examining current critical issues in the field of labor law and the interest in the developing law of labor-management relations.

Mr. Feller, Vetter

257. Land Use and Development. (2–3) Land use planning and development control by local, state, and federal government. Students also study land development finance, including problems of real estate syndication and finance bearing upon the practical aspects of urban and suburban planning, development, finance, and preservation of open space. Problems include public and private land, problems of low-cost housing, use of joint venture and lease devices, and other subjects affecting land development and urban growth with an emphasis on practical considerations.

Mr. Ellman

256. Legal Accounting. (2) Study of mechanics of bookkeeping including balance sheets, income statements, and the principal types of accruals and deferrals. Discussion of major substantive accounting issues, such as inventory pricing, depreciation, retained earnings, and the nature and meaning of profit.

Mr. Stone

260. Legal History of England. (2) A topical introduction to English legal development, both common and civil law traditions. Focus on late fourteenth centuries to eighteenth. Major emphasis on the growth of legal institutions, the profession, and substantive and adjective law concerning litigation patterns, particularly in real property law.

Mr. Barnes

263. Legal Process, The. (2) Designed to illuminate the major institutions and processes of the American legal system. Problems covered include the relative advantages and disadvantages of regulation, arbitration, adjudication, legislation and administrative action as methods of problem solving, the relationship between officially promulgated law and private activity, custom and morality; the extent to which courts do and should decide issues, in what sort of cases a court should draw in making law; the reasons for, and the consequences of, the decision of stare decisis; the appropriate scope of retroactive and prospective law making; and the interpretation of statutes.

Mr. Eisenberg

264. Legislative Process, The Lawyer In. (2) The course provides experience in the various roles of the lawyer in the modern legislative process, including participation in development of legislation and legislative drafting. Student legislative projects, presented under faculty supervision, are submitted to the class in simulation hearings. Mr. Stone

265. Native Americans and the Law. (2) Introductory survey of laws, legal institutions, and practices affecting Native Americans. Topics include historical and present eras, sovereignty, jurisdiction, land and water rights, self-government, civil rights, government benefits, urban issues, international, and comparative aspects.

Mr. Duke

NOTE: For key to symbols, see page 34.
273.5. Slavery as an American Legal Institution. (2) Constitutional provisions, federal and state legis- lation, and common law; the creation and main- tenance of slavery as a legal institution from colonial times to the Civil War. Mr. Noonan

273.6. Social Welfare Legislation. (3) Income main- tenance and related programs: "poverty" aid—AFDC ("Welfare"); the adult programs (blind, aged, and dis- abled) and general assistance; "work" based—OASDI ("Social Security"); manpower and un- employment compensation; and reform proposals — "negative income tax" and national health insurance. Mr. Sugarman

273.7. Social Welfare Legislation. (2) An exam- ination of welfare law: food stamps, aid to families with dependent children, and income maintenance reform. Mr. Sugarman

275. State and Local Government. (3) Power allocation among governmental units: between state and local units, and among local units. Objectives and methods of governmental restructuring in metropolitan areas. Legal and ethical problems in the development of effective governmental agencies, judicial bodies, legal staffs of various pro- fessional organizations, and other governmental agencies. Mr. Jennings


285.7. Torts II. (2) An advanced course in Torts. Topics will include defamation and invasion of privacy. Mr. Healey, Mr. Gasparich

286. Trial Practice, Elements of, (1) A one-semester series of lectures and demonstrations providing a general introduction to trial practice, procedures, and strategies. Mr. Healey, Mr. Gasparich

288. Water Resources Law. (2) Water taken as the rango of potential remedies including those drawn from state and federal constitutional law, statutory en- ablement, and common law. Subject matter areas include sex-based discrimination in family law, employment law (including Title VII, the Equal Pay Act, and Civil Service orders), educational Opportunity, and criminal law. Ms. Kay

THE LAW AND SOCIETY PROGRAM

The program is designed to provide intensive cross- disciplinary training and research experience in the field of law and society. It is open to selected law students who are interested in the M.A. in Law and Society, in addition to the J.D. degree; and to selected social science doctoral candidates, for whom it forms a substantive field of specialization within their Ph.D. program. The program emphasizes individual research and writing under the supervision of an attorney. It is implemented by a variety of courses currently offered in the Law School and the social science departments so as to provide a wide range of coursework, including interdisciplinary training in social science research, and social science students in legal research, and the students may have an opportunity to do intensive work in particular fields of specialization in law and social science.

THE GRADUATE MAJOR

The requirements for the M.A. degree in Law and Soci-
The College of Letters and Science offers the undergraduate student a variety of programs leading to the Bachelor of Arts degree in four academic years of full-time study. The basic concern of the College is with the whole range of human knowledge, with knowledge which will facilitate and enrich further studies. The student must complete a minimum of 180 units, including 120 units of upper-division course work distributed according to regulations which appear in the Announcement of the College of Letters and Science. There are also scholarship, residence, breadth, and major requirements; these are described in the Announcement as well. Brief descriptions of the breadth and major requirements appear below, and major programs appear in this publication under the department or group heading. In addition, the student must satisfy the University requirements in Subject A, the humanities, the natural sciences, and the social sciences. Moreover, a student in good academic standing may, with permission of the Dean and support and supervision of a College faculty member, pursue an individual major designed to satisfy special academic goals.

RELATED COURSES IN OTHER DEPARTMENTS.

Law and Anthropology (Anthropology 157)
Law and Anthropology (Anthropology 25 IO-25 IP)
Legal Environment of Business (Business Administration 110)
Legal Process (Law 283)
Legal History of England (Law 260)
Psychiatry and the Criminal Law (Law 268)
Family Law (Law 243)
Jurisprudence (Law 254)
Legal Theory (Political Science 151)
Legal Institutions (Political Science 152)
Comparative Law (Political Science 250)
Law and Society (Sociology 119)
Deviance and Social Control (Sociology 212)
Sociology of Law (Sociology 219)

The student, the first two years are a time of exploration, experimentation, and decision. The last two years are a period of confirmation and of the acquisition and refinement of special knowledge, usually in connection with a department. The College's departments are devoted to instruction and research in the several academic subjects. Each department represents a style of study and communication and a refined development of a set of structured ideas. The subjects of the departments overlap and complement each other.

REQUIREMENTS FOR ADMISSION IN ADVANCED STANDING

Students applying for admission in the fall quarter 1975 or later are not considered if they have completed more than 120 quarter units. Only in unusual circumstances are exceptions to this policy made by the Dean of the College. In computing the number of units which they have completed, students should be aware that the College of Letters and Science does not grant unit credit for courses completed in a two-year college after a total of 105 quarter units has been completed in all institutions attended. Subject credit toward completion of College requirements is granted for these courses, however.

Students who have completed 84 or more units are required to have satisfied the reading and composition requirement as well as the foreign language requirement of the College. If they plan to declare a major in a biological science, they must in addition have completed the minimum subject preparation in the major indicated below with a grade-point average of C or higher:

Students who have completed 84 to 105 quarter units:

1. General chemistry with laboratory (8 quarter or 5 semester units)
2. General biology with laboratory or a course in botany plus a course in zoology (12 quarter or 8 semester units)
3. Students who have completed 106 to 120 quarter units:
   1. and 2. above plus
   3. Introductory organic chemistry with laboratory (9 quarter or 6 semester units)

REQUIREMENTS FOR THE BACHELOR OF ARTS DEGREE

The student must complete a minimum of 180 units, distributed according to regulations which appear in the Announcement of the College of Letters and Science. There are also scholarship, residence, breadth, and major requirements; these are described in the Announcement as well. Brief descriptions of the breadth and major requirements appear below, and major programs appear in this publication under the department or group heading. In addition, the student must satisfy the University requirements in Subject A, in American History, and in American Institutions.

Breadth Requirements. Each student in the College is required to enroll in his or her program a study of the use and appreciation of the English language. This requirement is to be completed in the freshman or sophomore year in order that the student may develop skill in the appreciation of ideas and a sensitivity for language which will facilitate and enrich further studies. There is also a minimal foreign language requirement, which almost all of the students admitted to the College will have satisfied in high school. If not satisfied at the time of admission, the requirement must be completed without delay. The third breadth requirement involves exploration in several broad areas of knowledge, the humanities, the natural sciences, and the social sciences. This exploration by the student is intended to deepen appreciation for language, literature, and the arts, to develop comprehension of the structure of living organisms and the environment of man, and to facilitate understanding of the individual and social behavior of human beings. Completion of this requirement may be spread over the four years of college attendance.

Major Programs. Each student must pursue and complete a major program, the object of which is to provide him or her with a limited experience in specialization. There are fifty-one departmental major programs, ranging from art to zoology. In addition, there are group majors in Asian studies, biophysics, Dutch studies, environmental studies, genetics, neurobiology, religious studies, and social welfare. There are also field majors in humanities, biological sciences, physical sciences, and social sciences. Moreover, a student in good academic standing may, with permission of the Dean and support and supervision of a College faculty member, pursue an individual major designed to satisfy special academic goals.

INTERDISCIPLINARY AND GENERAL STUDIES

The Division of Interdisciplinary and General Studies (DIGS) is included in the College. It was established in 1969 as a place where experimental courses that could not find a home in any one department could be offered, where the field majors in humanities and in social sciences could be administered, and where courses that might be described as pertaining to general education could be provided for the College at large.

At the present time, no new students are being accepted in the humanities field major: the program is being revised and a new program is being formulated. Interested students should inquire at the DIGS Office, 301 Campbell Hall, at the end of the fall quarter 1976.

LETTERS AND SCIENCE LIST OF COURSES

The regulations governing the List are to be found in the Announcement of the College of Letters and Science.

Afro-American Studies

Department Office, 3335 Dwinelle Hall

Professor: Reginald Jones, Ph.D. (Chairman)

Associate Professor: William M. Banks, III, Ph.D.

Assistant Professors: Barbara Christian, Ph.D. Albert Raboteau, Ph.D.
Henry Jackson, Ph.D. Agboyi Yansane, Ph.D.

Professor: Henry Ramsey, Jr., LL.B. (Acting)

Assistant Professor: Earnie Peters (Acting)

Lecturer: Gregory Thomson, M.A.

THE MAJOR

Students majoring in Afro-American studies must declare an area of concentration in either the social sciences or the humanities. Within each area they are required to complete a sequence which provides academic depth as well as breadth, and they are expected to enroll in related offerings scheduled by other campus units. Students concentrating in the social sciences are strongly encouraged to take additional upper division courses in appropriate research methodologies.

Lower Division. All major students are required to take Afro-American Studies 5, one section of which focuses on the humanities and the other on the social sciences. Students emphasizing the humanities will elect at least one of the following courses: Art 60 or 61, Dramatic Art 40A or 40B, English 27, 28, or 30, Music 27. Students emphasizing the social sciences will take an introductory lower division course specific to a so-
**Financial Aid**

In the 10 units of financial aid.

**Scholarship**

In the 10 units of scholarship.

**Grant**

In the 10 units of grant.

**Loans**

In the 10 units of loans.

**Total Financial Aid**

In the 10 units of total financial aid.

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**AFRO-AMERICAN STUDIES**

**AFRO-AMERICAN STUDIES DEPARTMENT**

The program offers a three-year curriculum designed to provide a comprehensive understanding of African-American history, culture, and society. The program is open to students with a strong interest in African-American studies.

**AFRO-AMERICAN STUDIES MAJOR**

The major requires a minimum of 40 units, including 12 units of core courses and 18 units of elective courses. The core courses include:

- **History of African-American Studies**
- **Sociology of African-American Studies**
- **Psychology of African-American Studies**
- **Economics of African-American Studies**

**AFRO-AMERICAN STUDIES MINOR**

The minor requires a minimum of 15 units, including 6 units of core courses and 9 units of elective courses. The core courses include:

- **History of African-American Studies**
- **Sociology of African-American Studies**
- **Psychology of African-American Studies**

**AFRO-AMERICAN STUDIES PROGRAM**

The program is open to both undergraduate and graduate students. The undergraduate program offers a baccalaureate degree in African-American studies, while the graduate program offers a master's degree in African-American studies.

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**AFRO-AMERICAN STUDIES COURSES**

**History of African-American Studies**

This course provides an overview of the history of African-American studies, focusing on the development of the field and its contribution to the understanding of African-American history.

**Sociology of African-American Studies**

This course explores the impact of sociological theories on the study of African-American communities, focusing on the role of race and ethnicity in shaping social policies and practices.

**Psychology of African-American Studies**

This course examines the psychological aspects of African-American communities, focusing on issues such as identity, representation, and power.

**Economics of African-American Studies**

This course addresses the economic challenges facing African-American communities, focusing on issues such as poverty, inequality, and social justice.

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**AFRO-AMERICAN STUDIES FACULTY**

**Professor John Smith**

Faculty member in African-American studies, focusing on the role of race and ethnicity in shaping social policies and practices.

**Professor Jane Doe**

Faculty member in African-American studies, focusing on the psychological aspects of African-American communities, focusing on issues such as identity, representation, and power.

**Professor Bob Johnson**

Faculty member in African-American studies, focusing on the economic challenges facing African-American communities, focusing on issues such as poverty, inequality, and social justice.

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**AFRO-AMERICAN STUDIES DEPARTMENTAL ACTIVITIES**

- **Lecture Series**
- **Student Internships**
- **Research Opportunities**
- **Community Service Projects**
- **Graduate Assistantship Program**

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**AFRO-AMERICAN STUDIES DEPARTMENTAL RESOURCES**

- **Library Resources**
- **Computer Lab**
- **Study Rooms**
- **Tutoring Services**
- **Student Support Services**

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**AFRO-AMERICAN STUDIES DEPARTMENTAL ALUMNI**

- **Alumni Network**
- **Career Services**
- **Mentorship Program**
- **Alumni Events**
- **Alumni Scholarship Program**

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**AFRO-AMERICAN STUDIES DEPARTMENTAL CONTACTS**

**Department Chair**

**Graduate Program Coordinator**

**Undergraduate Program Coordinator**

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**AFRO-AMERICAN STUDIES DEPARTMENTAL PUBLICATIONS**

- **Journal of African-American Studies**
- **Annual Review of African-American Studies**
- **African-American Studies Newsletter**
- **African-American Studies Yearbook**
- **African-American Studies Conference Proceedings**

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**AFRO-AMERICAN STUDIES DEPARTMENTAL AWARDS**

- **Outstanding Student Award**
- **Excellence in Research Award**
- **Community Service Award**
- **Graduate Teaching Award**
- **Undergraduate Service Award**

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**AFRO-AMERICAN STUDIES DEPARTMENTAL SUPPORT**

- **Funding Opportunities**
- **Scholarships and Grants**
- **Research Assistance**
- **Graduate Assistantships**
- **Undergraduate Work-Study**

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**AFRO-AMERICAN STUDIES DEPARTMENTAL COLLABORATIONS**

- **Interdisciplinary Programs**
- **Community Partnerships**
- **International collaborations**
- **Online Learning Opportunities**
- **Distance Learning Programs**

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**AFRO-AMERICAN STUDIES DEPARTMENTAL INITIATIVES**

- **Diversity and Inclusion Initiatives**
- **Equity and Access Programs**
- **Social Justice Campaigns**
- **Community Engagement Projects**
- **Student Leadership Development**

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**AFRO-AMERICAN STUDIES DEPARTMENTAL HISTORY**

The department has a rich history of engaging with African-American communities and promoting understanding and appreciation of African-American culture and history. The department has been a leader in the field of African-American studies, providing a platform for research, education, and community engagement.
**166. Slavery: A Comparative Analysis.** (4) Four hours of lecture and one hour of discussion per week. Prerequisite: lower division courses in one of the social sciences or consent of instructor. The history of slavery, its comparative features, and its influence on American society. Emphasis on the social, economic, and political factors that relate to the institution of slavery. Mr. Thomson (Sp)

**167A. Third World Cinema.** (5) Four hours of lecture and one hour of discussion per week. Prerequisite: lower division courses in one of the social sciences or consent of instructor. An examination of the institution of slavery as it existed in many parts of the world during different periods; examination of the philosophical, economic, and social factors that relate to the institution.

Mr. Johnson (W)

**167B. Afro-Americans in the World of Cinema.** (5) Four hours of lecture and one hour of discussion per week. Prerequisite: completion of the reading and composition requirement. A course designed to explore the use and misuse of black people in the film industry. Through articles, lectures, and selective films, all aspects of this subject will be analyzed and discussed. Mr. Johnson (W)

**170. Student Activism in the University and Society.** (5) Four hours of lecture and one hour of discussion per week. Prerequisite: lower division courses in one of the social sciences or consent of instructor. The political, social, and psychological dynamics involved in student activism and the social and political implications of the constitutional involved. An investigation of the plays that incorporate the Pan-African theoretic intellectual development. Contemporary movements that incorporate the Pan-African theoretic.

Mr. Yansane (Sp)

**H195A–H195B. Honors Thesis.** (4–4) Four hours of lecture per week. Open only to students admitted to the Honors Program in Afro-American Studies. Students must enroll for both quarters of the sequence. Credit and grade will be assigned upon completion of the full sequence. Mr. Jones (in charge) The Staff (W, Sp)

**197A. Field Study in Afro-American Life.** (1–5) Twelve weeks in one of the field work organizations. Regular individual meetings with faculty sponsor and written reports required. Mr. Banks (W, Sp)

**198. Directed Group Studies for Undergraduates.** (1–6) Mr. Jones (in charge) (W, Sp)

**199. Supervised Field Work in Student Research.** (1–5) Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis. Mr. Jones (W, Sp)

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### Ancient History and Mediterranean Archaeology

**Program Office, 5303 Dwinelle Hall**

**Professors:**

- Paul J. Alexander, Ph.D. (History)
- Darrel A. Amyx, Ph.D. (History of Art)
- J. Anderson, M.A. (Classical Archaeology)
- George F. Dales, Jr., Ph.D. (Near Eastern Archaeology)
- David Dauter, M.D., Ph.D. (D.C.L., L.L.D. (Law))
- Miguel Garcia, Ph.D. (History)
- Ad. G. Duddell, Ph.D. (Asiatic Studies)

**Associate Professors:**

- Guzyt Azarpay, Ph.D. (Near Eastern Art History)
- Crawford H. Greenewalt, Jr., Ph.D. (Classical Archaeology)
- Wolfgang J. Heimert, Ph.D. (Latin Literature)
- Leonhard H. Lesko, Ph.D. (Epidology)
- William J. Proctor, Ph.D. (Islamic Studies)

**Assistant Professors:**

- Louis J. Bax, Ph.D. (Islamic Studies)
- Martin Schwartz, Ph.D. (Iranian Studies)

**Assistant Professor:**

- Stephen G. Miller, Ph.D. (Classical Archaeology)
- Robert J. Rodden, Ph.D. (Anthropology)
- Robert R. Rodgers, Ph.D. (Iranian Studies)
- Leonhard H. Lesko, Ph.D. (Epidology)

**Senior Staff:**

- Martin Schwartz, Ph.D. (Iranian Studies)

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**Ancient History and Mediterranean Archaeology**

The concept of Pan-Africanism and its historical and intellectual development. Contemporary movements that incorporate the Pan-African theoretic.

- Mr. Yansane (Sp)

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**The Major**

There is no undergraduate major.

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**The Graduate Program**

The program is interdisciplinary in nature, administered by a faculty group drawn from several departments. Both M.A. and Ph.D. degrees are offered. Fields of emphasis include Near Eastern History, Greek History, Roman History, Classical Art, Archaeology, Near Eastern Art and Archaeology, Ancient Law, Epigraphy, and Papyrology. Candidates for degrees will offer a combination of three of these fields or similar fields, taken as a major subject, two as a minor subject.

The program is open to students with the B.A. in a relevant area who have completed at least one year of undergraduate study in Ancient History or Archaeology. Ap
Anthropology
Department Office, 232 Kroeber Hall

Professors:
- William R. Bascom, Ph.D.
- Burton Benedict, Ph.D.
- Bernd Berlin, Ph.D.
- Gerold D. Bierens de Haan, Ph.D.
- J. Desmond Clark, Ph.D., F.A.A.A.S.
- Elisabeth Collier, Ph.D.
- George A. DelVico, Ph.D.
- Phyllis Dohling, Ph.D.
- Alain Dundes, Ph.D.
- George M. Foster, Ph.D.
- John A. Graham, Ph.D.
- Robert F. Heizer, Ph.D., Sc.D.
- Sherwood L. Washburn, Ph.D.
- Laura Nader, Ph.D.
- Herbert P. Phillips, Ph.D.
- Margaret MacNeish, Ph.D.

Associate Professors:
- James N. Anderson, Ph.D.
- Robert J. Rodden, Ph.D.
- John H. Graham, Ph.D.
- Eugene A. Hames, Ph.D.
- Robert F. Heizer, Ph.D., Sc.D.

Assistant Professors:
- Stanley Brandes, Ph.D.
- J. Michael Hoffman, M.D., Ph.D.

F. Clark Howell, Ph.D.
Glynn L. Isaacs, Ph.D.
Paul Kay, Ph.D.
David G. Mandelbaum, Ph.D.
Laura Neder, Ph.D.
Harley L. Phillips, Ph.D.
Jack M. Porter, Ph.D.
John R. Rade, Ph.D.
William A. Shackle, Ph.D.
Sherwood L. Washburn, Ph.D.
Robert F. Heizer, Ph.D.
L. (Emeritus)

The Department of Anthropology offers students the opportunity to study from the broadest historical and geographical perspective. Courses in the Department offer knowledge of the physical nature of man as well as the social and cultural aspects of behavior. Lower division courses are intended to give a general understanding of the physical, prehistoric, and the nature of human cultures, while upper division courses elaborate particular themes.

The anthropology major is designed to serve two purposes: to provide a general education in anthropology for students who are pursuing a liberal education; and to provide preparation for graduate work for students who wish to become professional anthropologists. Students who do not intend to do graduate work in anthropology may plan their program with considerable freedom, taking care only to fulfill the requirements listed below. Students who plan to go on to graduate study, either at Berkeley or at another institution, should plan their undergraduate course work to meet the admissions requirements. Students should select a combination of courses to form a unified plan of study that meets special intellectual interests.

Undergraduate students, both majors and nonmajors, seeking information or advice about their programs about courses should inquire in Room 213 Kroeber Hall.

The collections and research facilities of the Robert H. Lowie Museum of Anthropology are available for study in anthropology, ethnography, physical anthropology, and related subjects by graduate and undergraduate students and by visiting scholars; the museum's exhibit hall is used for instructional and educational purposes, particularly in connection with class work. Those interested may address the Director, 103 Kroeber Hall.

The Department maintains a laboratory for quantitative analysis in all branches of the discipline. The laboratory is centered on a sophisticated minicomputer system used in teaching as well as in undergraduate and graduate research. It consists of both independent and linked on-line terminals and is one of the few such facilities extensively. Packages for statistical analysis, mapping, and computer graphics are available for use by students and faculty of the Department.

THE MAJOR
Anthropology 1, 2, 3, 4, and one course from three of the following five groups: Group I—all courses in Physical Anthropology; Group II—all courses in Archaeology; Group III—all courses in Social and Cultural Anthropology; Group IV—all courses in Language, Culture, and Society; Group V—all Area Courses. Also required is an additional course to total 40 units of upper division courses in anthropology. These elective units may be taken from any of the groups I-V; however not more than 12 units of courses 191, 196, 197, and 199 combination will be accepted toward fulfilling major requirements.

Substitutions may be permitted among these additional elective courses of not more than 10 units in allied subjects approved by the department.

Students applying for admission to the major are required to have completed three of the four lower division course requirements (Anthropology 1, 2, 3, 4). In planning their workload students should be aware that the Department adheres to Academic Senate regulation 760: "The value of a course in units shall be reckoned at the rate of one unit for three hours' work per week per term on the part of a student, or the equivalent."

Honor Program. The Department of Anthropology provides several specialized programs leading to the A.B. degree with honors. Students with an overall grade-point average of 3.0 or higher and a grade-point average of 3.3 or higher in courses in the major may, upon approval of the major advisor, enroll in one of these honors programs. The program will include the writing of a thesis supervised under the H198A-C series of courses.

PREPARATION FOR GRADUATE STUDY
Admission to graduate studies at Berkeley does not presuppose an A.B. in Anthropology. The graduate program is oriented toward the doctorate, and only candidates for the Ph.D. will be accepted. The M.A. degree is awarded in the course of study leading to the doctorate.

Because of the number of students who wish advanced training, only a small percentage of applicants can be accepted. Applications are considered only once a year for the following fall quarter. The deadline for application is December 1.

THE GRADUATE MAJOR
The program for the Ph.D. degree normally takes five years and is divided into three steps, as follows:

Step I. This segment normally takes one year, during which students begin to narrow down their interests to particular topical and geographical fields of specialization.

Step II. During this period, which normally lasts from one to two years, the student attends seminars, carries out individual research projects related to his field of specialization, and, if eligible, takes the oral qualifying examination. With the successful passing of this examination, the student is advanced to candidacy for the Ph.D. degree.

Step III. Students undertake research for the Ph.D. dissertation under supervision of a three-person committee in charge of research and dissertation. With some exceptions, the dissertation is based on the results of original field research, which normally requires a minimum of one year. The writing of the dissertation normally requires an additional year. On completion of the research and approval of the dissertation by the committee, the student is awarded the Ph.D. degree.

For further information, please address correspondence to the Graduate Adviser, Department of Anthropology, University of California, Berkeley, California 94720.

COURSES AND SEMINARS
Courses and seminars are listed below. Instructor listings, quarter offerings, and schedule changes are available in 213 Kroeber Hall.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSES
1. Introduction to Physical Anthropology. (5) Three 1-hour lectures and one 1-hour section meeting per week. Facts and problems of human evolution, man, race and race differences. Mr. Sarich (F), Mr. McKenna (Sp).

2. Introduction to Archaeology. (5) Three 1-hour lectures and one 1-hour section meeting per week. Origins and development of prehistoric and cultural growth. Mr. Isaac (W).

3. Introduction to Social and Cultural Anthropology. (5) Three 1-hour lectures and one 1-hour section meeting per week. Structure and dynamics of culture. Ms. Nauer (F); Mr. Benedict (Sp).

4. Introduction to Linguistic Anthropology. (5) Two and a half hours of lecture and two hours of sections per week. Language in its interrelationships with man's culture and with his society. Mr. Gumperz (W).

5. *115. Human Evolution. (5) Three hours of lecture and one hour of discussion per week. Limited to freshmen. Reading and papers on the problems and meaning of human evolution. Undergraduate seminar which provides a part of every person's education.

45. Freshman Seminars. (2) One 2-hour meeting per week. Prerequisite: appropriate lower division lecture course (Anthropology 1, 2, or 3 or 4) completed or being taken concurrently. Limited to 12 freshman students per section. Discussion, substantial reading and papers developing the salient topics which guide anthropological work. Mr. Howell (Sp).

UPPER DIVISION COURSES
General prerequisite: junior standing or courses 1, 2, 3, 4.

Undergraduate seminars: Certain upper division lecture courses are followed in the next quarter by an undergraduate seminar which provides further and more advanced work in the subject matter of the lecture course. Enrollment in these seminars is restricted to students who have received a grade of B or better in the antecedent lecture course and/or who have the instructor's permission. The undergraduate seminars are given as sections of Anthropology 195.

Class meetings: Unless otherwise noted, lecture courses meet for three lecture hours and one consultation hour per week. Enrollment may be limited.

GROUP I. PHYSICAL ANTHROPOLOGY AND PRIMATEOLOGY
100. Fossil Man. (5) Prerequisite: course 1 or equivalent. Origin and relationships of the distinct forms of mankind.

Mr. Howell (Sp).

102. Human Variation In an Evolutionary Perspective. (5) Three hours of lecture and one hour of laboratory per week. Prerequisite: course 1 or equivalent. Human variation in both a racial and nonracial context; basic genetics (both molecular and population); theories of racial origins, selective bases of human variations.

Mr. Sarich (W).

104L. Physical Anthropology Laboratory. (2) Two 2-hour meetings per week. Prerequisite: course 100, or 102, or 108 may be taken concurrently. Enrollment limited to twelve students: primarily for majors in anthropology and the life sciences. Descriptive and ana-
lytical techniques and methods applicable to the study of intra- and inter-group resemblances and differences.

Mr. Sarich (W)

105. Introduction to Human Osteology, (8) Three hours of lecture and two hours of laboratory per week. Prerequisite: course 108 or consent of instructor. An intensive study of the human skeleton. Reconstruction of individual and group morphology and the analysis of human populations from archaeological and historical contexts. Prerequisite: one course in geological anthropology.

Mr. Sarich (W)

106. Advanced Human Osteology, (4) Two hours of lecture and three hours of laboratory plus one hour of consultation per week. Prerequisite: consent of instructor. Theories and methods in advanced human osteology. Special topics include paleoanthropology, paleodemography, forensic anthropology, metric and nonmetric analysis, dental anthropology, computer use and statistical applications. May be repeated for credit with consent of instructor. Enrollment limited to 15 students. Mr. Hoffman (W)

108. Primate Evolution. (5) Prerequisite: course 106 or equivalent. A consideration of the major groups of primates with emphasis on the evolution of behavior.

Mr. Howell (W)

*108L. Primate Evolution Laboratory, (2) Four hours of lecture and laboratory sessions per week. Prerequisite: course 108 (preferably taken concurrently with course 106). Enrollment limited to 12 students. Mr. Howell (W)

109. Experimental Anthropology, (5) Prerequisite: two lower division courses in the biological sciences. A laboratory course that illustrates and emphasizes the use of the combination of experimental and evolutionary approaches in understanding problems such as adaptation, learning, and social life. Emphasis will change from year to year.

Mr. McKenna (W)

110. Primate Social Behavior, (5) Three hours of lecture per week. Prerequisite: course 109 or equivalent. Survey of the social behavior and organization of monkeys and apes; their relevance to the evolution of human behavior and social groups. Ms. Dolhinow (W)

111. Problems in Primate Social Behavior, (4) Three hours of lecture and one hour of consultation per week. Prerequisite: course 110. Special topics of social behavior such as socialization, aggression, communication, and reproductive behavior.

Ms. Dolhinow (Sp)

*117L. Theory and Method in Physical Anthropology, (2) Four hours of lecture and two hours of laboratory per week. Enrollment limited to twelve students; primarily for majors in anthropology and the life sciences.

Ms. Dolhinow (Sp)

GROUP II. ARCHAEOLOGY, PREHISTORY, AND CULTURE HISTORY

120. Culture Growth. (6) Three hours of lecture per week. Prerequisite: course 2 or consent of instructor. Archaeological theory and cultural process, illustrated by archaeological developments of civilizations in the Old World and the New.

Mr. Rowe (Sp)

*122. Archaeology of North America. (5) Three hours of lecture per week. Prerequisite: course 2 or consent of instructor. Prehistoric peoples of North America; prehistoric culture areas; relations with historic Indians.

Mr. Doumani (W)

*124. Ancient Civilization of Mexico and Central America. (4) Three hours of lecture per week. A study of the development, form, and history of pre-Columbian Indian civilization, surveying the achievements of the Maya, the Aztec, and the Inca civilizations.

Mr. Graham (Sp)

125. The World of the Ancient Maya. (4) Three hours of lecture per week. A study of the development and culture history of the longest sustained tradition of aboriginal New World civilizations.

Mr. Graham (Sp)

126. Peoples of the Andes. (5) Three hours of lecture per week. Prerequisite: course 2 or consent of instructor. Intensive study of the cultural development and the archaeology of the Andes, from the earliest times to the present.

Mr. Rowe (W)

*127. The Olmec World. (5) Prerequisite: course 2 or consent of the instructor. Intensive study of the cultural history, sites, and chronology of the Preclassic Olmec civilization.

128A-128B. Old World Prehistory, (5-5-5) Prerequisite: upper division standing or consent of instructor. Survey of the prehistoric cultures of Europe and Asia.

128C. Post-Paleolithic cultural phenomena of Europe and Asia.

Mr. Clark (F)

*128D. Special Topics in Old World Prehistory, (3) Three hours of lecture or demonstration per week. Prerequisite: upper division standing or consent of instructor. Prehistory of Australia, from the discovery of sites in the Hunter and Warburton environmental change in Old World Prehistory. May be repeated for credit with consent of instructor.

128L. Old World Prehistory Laboratory, (5) Five hours of class meetings and directed study per week. Prerequisite: upper division standing or consent of instructor. May be repeated without duplication of credit with consent of instructor. Descriptive and analytical methods used in classification and discussion of prehistoric cultures of the Old World.

Mr. Lasch (F)

130. Invention and Technology, (5) Three hours of lecture per week. Prerequisite: upper division standing or consent of instructor. Origin, history, and spread of fundamental inventions; illustrative material from the Lowland (Sp)

*131. Science and Archaeology. (5) Prerequisite: course 2. A survey of the application of techniques deriving from the physical and life sciences to the interpretation of archaeological data.

Mr. Belford (Sp)

132. Archaeology and Society, (5) Three hours of lecture per week. Prerequisite: course 2 or consent of instructor. Archaeological research methods and their uses in the analysis of the relationship between man and his environment.

Mr. Lasch (W)

133. Field Course in Archaeological Method, (5) One hour of lecture and one 8-hour (Saturday) field course meeting per week. Prerequisite: course 2 or consent of instructor. Enrollment limited to twelve students; primarily for majors in anthropology and the life sciences.

Mr. Lasch (W)

*134. Archaeological Method, (5) One 3-hour laboratory meeting with three hours of independent laboratory work required per week. Prerequisite: course 135 or consent of the instructor. With consent of the instructor, may be repeated without duplication of credit. Advanced field investigation and guidance in preparation of materials for publication.

Mr. Lasch (Sp)

135. Field Practice in Archaeology, (15) Forty hours of lab per week. Prerequisite: consent of instructor. Practical experience in the field study of excavation, curation, and conservation. Depending upon study area selected, coverage may include reclamation, mapping, recording, and excavation. May be repeated for credit.

Mr. Lasch (Sp)

136. History and Theory of Archaeology. (5) Three hours of seminar and one hour of tutorial per week. Prerequisite: senior standing or consent of the instructor. A critical review of the historical background and philosophical premises of past and current anthropological theory with respect to the concepts of time and change. Mr. Rodden (F)

GROUP III. SOCIAL AND CULTURAL ANTHROPOLOGY: THEORY AND METHOD

140. The Nature of Culture: An Introduction to Cultural Anthropology. (5) Prerequisite: course 3 or the consent of the instructor. An introduction to the study of culture for credit to students who have taken course 3. Advanced level introduction to cultural anthropology for nonmajors.

Mr. Brandes (W)

141. Comparative Sociology, (5) Prerequisite: course 3 or 140 or consent of the instructor. Theories of social structure, functional interrelationships of social institutions. Primary emphasis on non-Western societies.

Mr. Simmons (Sp)

142. Kinship and Social Structure, (5) Prerequisite: course 141. Comparison of kinship and family types throughout the world, techniques of kinship and structural analysis.

Mr. Graburn (W)

*143. Plural Societies, (5) Three hours of lecture per week. Prerequisite: course 3 or consent of instructor. A consideration of the major social and cultural features of societies with ethnographic examples from various parts of the world.

144. Social and Cultural Change, (5) Three hours of lecture per week. Prerequisite: course 3 or consent of instructor. Theories of social and cultural change: social evolution, diffusion, acculturation, pattern dynamics, structural-functional approach to change. Illustrative materials from anthropological sources.

Mr. Donmani (W)

145. Urban Anthropology, (5) Three hours of lecture per week. Prerequisite: course 3 or consent of instructor. Comparative and conceptual analysis of the impact of urbanization on society. Mr. Schwartz (Sp)

146. Comparative Peasant Society, (5) Three hours of lecture per week. Prerequisite: course 3 or consent of instructor. A comparative study of peasant society as a social type contrasted with primitive and industrial society. Mr. Doumani (W)

*147. Anthropology and Development, (5) Three hours of lecture per week. Prerequisite: course 3. Critical examination of the relationships of applied to the theoretical development of the field.

148. Men's Ecological Relationships, (5) Three hours of lecture per week. Prerequisite: course 3 or the consent of the instructor. Survey of theories, methods, and applications of the ecological perspective to cultural and physical attributes of human populations.

Mr. Anderson (F)

149. Culture and Personality, (5) Three hours of lecture per week. Prerequisite: course 3 or the consent of the instructor. Personality factors in human behavior; personality in representative societies; techniques for studying culture personality relations.

Mr. Davos (F)

150. Social Problems in Changing Cultures, (5) Three hours of lecture and two hours of tutorial and special seminars per week. Prerequisite: course 3 or the consent of instructor. Social problems in the social sciences; courses in the social sciences; consent of instructor. Cross-cultural approach to conflict in society, culture, and personality. Topics covered: basic socialization, social learning, deviant behavior, status and role, religious revivalism, alienation, culture patterns in suicide, ethnic conflict, migration, and cultural influences on personal and social behavior. These topics will be illustrated as they apply to research in these areas.

Mr. DeVos (W)

152. Anthropology in Modern Life, (5) Three hours of lecture per week. Prerequisite: course 3 or the consent of instructor. Anthropological theory and data applied to problems in such fields as medicine, agriculture, education, and international technical aid programs.

Mr. Foster (Sp)

153. Introduction to Medical Anthropology, (5) Three hours of lecture per week. Prerequisite: no medicaid for this. A consideration of the natural history and pathogenesis of human diseases; presentation of new diseases; attitudes of patients and their families; their treatment. Mr. Mackenzie (W)

*155. Economic Anthropology, (5) Three hours of lecture per week. Prerequisite: course 3 or the consent of instructor. Economic behavior in industrial societies; its social and cultural setting, and its modern changes.

156. Politics and Anthropology, (5) Three hours of lecture per week. Prerequisite: course 3 or the consent of instructor. Anthropological concepts relevant to the comparative analysis of political ethnography.

Mr. Colson (W)

157. Law and Anthropology, (5) Three hours of lecture per week. Prerequisite: course 3 or the consent of instructor. Comparative survey of the ethnography and rules and concepts relevant to the comparative analysis of the forms and functions of law.

Mr. Nader (Sp)

158. Religion and Anthropology, (5) Three hours of lecture per week. Prerequisite: course 3 or the consent of instructor. A consideration of the interplay between religious beliefs and institutions and other aspects of society. Mr. Mendelbaum (W)

159. The Forms of Folklore, (5) Three hours of lecture per week. Prerequisite: upper division standing. A worldwide survey of the major and minor forms of folklore with special emphasis upon proverbs, riddles, superstitions, games, songs, and narratives.

Mr. Dunford (F)

160. Narrative Folklore, (5) Three hours of lecture per week. Prerequisite: course 3 or the consent of instructor. A consideration of the interplay between religious beliefs and institutions and other aspects of society.
162. Art and Culture. (5) Three hours of lecture per week. Prerequisite: course 3 or consent of instructor. Comparative study of art and culture in non-literate societies; illustrative material from the Louvre Museum of Anthropology. Mr. Graburn (Sp)

163. Education and Culture. (5) Prerequisite: course 3 or consent of instructor. Comparative study of educational theory and method applied to the problems of education in traditional and modern cultures. Mr. Ogbu (W)

164. Man's View of Nature. (4) Three hours of lecture per week. Prerequisite: course 3 or consent of instructor. Comparative study of man's conceptual organization of his natural universe, especially his views of the environmental impact of human societies. Mr. Berlin (Sp)

166. Advanced Survey of Social and Cultural Anthropology. (5) Three hours of lecture per week. Prerequisite: course 3 or consent of instructor. Historical survey of anthropological theories, methods, and findings. Mr. Phillips (W)

167A–167B. Research Theory and Methods in Ethnology. (5–5) Three hours of lecture per week. Prerequisite: course 3 or consent of instructor. Introduction to theoretical and methodological problems and techniques for collection, analysis, and presentation of data. Mr. Cunneen (Sp)

186. Variation in Language. (4) Three hours of lecture per week. Prerequisite: one course in anthropology or linguistics. Synchronic variation in phonology, syntax, and semantics and its implications for language change. Ms. Asian (Sp)

188A–188B. South Asia. (5–5) 188A: Development of cultural traditions. Mr. Mendelbaum (Sp) 188B: Social organization and social trends. Mr. Hoffmann (W)

189A–189B. Southeast Asia. (5–5) Three hours of lecture per week. Prerequisite: 189A. Peoples and cultures of Southeast Asia. Mr. Hoffman (W)

190A–190B. Analytical Methods in Anthropology. (5–5) Four hours of lecture per week. Prerequisite: course 167A or 167B or consent of instructor. Techniques of analysis appropriate to anthropological data, including the use of computerized anthropological data and computer usage. P/NP. Entire sequence must be completed to receive credit. Mr. Geoghegan, Mr. Hammel (W)

190L–190M. Laboratory in Analytical Methods. (1–1) Three hours of laboratory per week. Prerequisite: 190A–190B. Peoples and cultures of South Asia. Mr. Geoghegan, Mr. Hammel (W)

GROUP VI. GENERAL COURSES

191. Experimental Courses. Mr. Washburn (F, Sp); Ms. Dolhinow (F)

192. Archaeology Seminars. (4) Two hours of lecture per week. Prerequisite: consent of instructor. Seminar in current research. Mr. Brock (F, Sp); Ms. Dolhinow (F)

200. Physical Anthropology Seminars. (4) Two hours of lecture per week. Prerequisite: consent of instructor. Mr. Howell (F, Sp); Ms. Dolhinow (F)


Graduate Seminars

Seminars normally entail at least 8–10 hours per week of library, museum, or laboratory work.

200. Physical Anthropology Seminars. (4) Two hours of lecture per week. Prerequisite: consent of instructor. Mr. Washburn (F, Sp); Ms. Dolhinow (F)

220. Archaeology Seminars. (4) Two hours of lecture per week. Prerequisite: consent of instructor. Mr. Brock (F, Sp); Ms. Dolhinow (F)

220A. Western North America. Mr. Washburn (F, Sp) 220B. Mesoamerica. Mr. Washburn (F, Sp) 220C. Archaeology and Ethnology of South America. Mr. Washburn (F, Sp) 220D. African Prehistory. Mr. Washburn (F, Sp) 220E. African Prehistoric Archaeology. Mr. Washburn (F, Sp) 220F. European and Near Eastern Prehistory. Mr. Washburn (F, Sp) 220G. Method. Mr. Clark, Mr. Rodden, Mr. Isaac, Mr. Rowe (F), Mr. Graham (W) 220H. Physical Anthropology Seminars. (4) Two hours of lecture per week. Prerequisite: consent of instructor. Mr. Washburn (F, Sp); Ms. Dolhinow (F) 220I. Human Evolution. Mr. Washburn (F, Sp) 220J. Conservation. Mr. Washburn (F, Sp) 220K. Conservation. Mr. Washburn (F, Sp) 220L. Conservation. Mr. Washburn (F, Sp) 220M. Conservation. Mr. Washburn (F, Sp) 220N. Conservation. Mr. Washburn (F, Sp) 220O. Conservation. Mr. Washburn (F, Sp) 220P. Conservation. Mr. Washburn (F, Sp) 220Q. Conservation. Mr. Washburn (F, Sp) 220R. Conservation. Mr. Washburn (F, Sp) 220S. Conservation. Mr. Washburn (F, Sp) 220T. Conservation. Mr. Washburn (F, Sp) 220U. Conservation. Mr. Washburn (F, Sp) 220V. Conservation. Mr. Washburn (F, Sp) 220W. Conservation. Mr. Washburn (F, Sp) 220X. Conservation. Mr. Washburn (F, Sp) 220Y. Conservation. Mr. Washburn (F, Sp) 220Z. Conservation. Mr. Washburn (F, Sp)

240A–240B. Fundamentals of Anthropological Theory. (5–5) One or two lecture meetings and one or two 2-hour meetings each week. Required of all graduate students doing their principal work in social/cultural anthropology. Advanced survey of the major theoretical and empirical areas of social/cultural anthropology. Sequence beginning (F) Mr. Brandes/Mr. Foster; Ms. Collins/Mr. Shack, Mr. Anderson/Mr. Graburn

250. Seminars in Social and Cultural Anthropology. (5) Two hours of lecture per week. Prerequisite: consent of the instructor. Several one-quarter
270Q. Decision Making.
270S. Recent Developments. (4) Two hours of lecture per week. Prerequisite: consent of instructor. The following seminars extend over two consecutive quarters. Credit and grade will be assigned upon completion of the full sequence. Consult departmental listings for accurate course information:
271A--271B. Semantics.
271C--271D. Interactional Sociolinguistics.
271E--271F. Language Variation.
271G--271H. Information Processing.
271I--271J. Formal Ethnography.
271K--271L. Ethnobiology.
271M--271N. Color Categorization.
271O--271P. Ethnolinguistics.
271S--271T. Recent Developments.
271U--271V. Research Design.
271W--271X. Culture and Personality.
271Y--271Z. Special Topics to be announced. May be repeated for credit with consent of instructor.
273A--273B. Professional Training: Teaching (6) The Staff
273C. Research Training. (6) The Staff
273D. History and Theory of Anthropology. (4) Two hours of lecture per week. Prerequisite: consent of instructor.
273E. Practice in Original Field Research Under Staff Supervision.
273F. Analysis and Write-up of Field Materials. The Staff
275. Directed Reading. (2--6) Prerequisite: consent of instructor. Individual conferences to be arranged. Intended to provide directed reading in subject matter not covered in available seminar offerings. The Staff
290. Research Training. (6) The Staff
291A--291B. Urban Anthropology. (4--4--4) Three hours of seminar per week. Prerequisite: graduate standing or consent of instructor. Required of all first-year graduate students concentrating in linguistic anthropology. Advanced survey of current theory and research in linguistic anthropology. Topics in ethnographic semantics, language and social structure, folk biological nomenclature, formal rule systems. Linguistic Anthropology Staff
293. Seminar in Linguistic Anthropology. (4--4--4) Three hours of seminar per week. Prerequisite: consent of instructor. Required of all first-year graduate students concentrating in linguistic anthropology. Advanced survey of current theory and research in linguistic anthropology. Topics in ethnographic semantics, language and social structure, folk biological nomenclature, formal rule systems. Linguistic Anthropology Staff
295. History and Theory of Anthropology. (4) Two hours of lecture per week. Prerequisite: consent of instructor.
296A--296B. Supervised Research. (4--9; 4--9) Two hours of lecture per week. Prerequisite: consent of instructor.
296C. Practice in Original Field Research Under Staff Supervision.
296D. Analysis and Write-up of Field Materials. The Staff
299B. History and Theory of Anthropology. (4) Two hours of lecture per week. Prerequisite: consent of instructor. (Mr. Rowe (W))
301. Professional Training: Teaching (6) The Staff (F, W, Sp)
602. Individual Study for Doctoral Students. (1--6) Individual study in consultation with Adviser. Intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)
603. Conference in Anthropology. (1--6) Individual conference in consultation with Adviser. Intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)
604. Conference in Linguistics. (1--6) Individual conference in consultation with Adviser. Intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)
610. Advanced Field Training. (4-9) Two units of field training. Field work may be conducted at any level. Courses under three instructors of the regular staff. The Staff
616. Study Abroad. (1--6) Two units of study abroad. The Staff
619. Independent Study. (1--6) Independent study. The Staff
621. Independent Study for Doctoral Students. (1--6) Individual study in consultation with Adviser. Intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)
LOWER DIVISION COURSES

2A. Form in Drawing. (4) Three 3-hour studio classes per week. Introduction to the basic elements of form and their relationship to the human figure. The Staff (F, W, Sp)

2B. Form in Color. (4) Three 3-hour studio classes per week. Prerequisite: course 2A. Introduction to color and its relationship to the other elements of form. The Staff (F, W, Sp)

3. Composition in Life Drawing. (4) Three 3-hour studio classes per week. Prerequisite: course 2A-B. An exploration of the techniques and methods of painting. Mr. Allen, Mr. Ballinas, Mr. Kasten (F, W, Sp)

4. Materials of Painting. (4) Three 3-hour studio classes per week. Prerequisite: course 2A-B. An introduction to the elements of form and their relationship to the human figure. The Staff (F, W, Sp)

UPPER DIVISION COURSES

The various courses in Art differ in content, use of materials, and type of subject matter, depending upon the individual aims of the artist in charge. All but Art 120 and Art 121 may be repeated for credit.

It is a requirement for the major in Art that the student complete at least 12 units of upper division courses under three instructors of the regular staff.

Students must have completed 20 units of lower division courses to enter upper division courses.

102. Advanced Drawing And Painting. (4) Three 3-hour studio classes per week. Prerequisites: group prerequisites. The Staff (F, W, Sp)

102A. Ms. Brown
102B. Mr. McCray
102D. Mr. Rovolo
102E. Mr. Kasten
102F. Mr. Hartman
102G. Mr. Blachoff
102H. Mr. Allen
102J. Mr. Miyasaki
102K. Mr. Simpson
102M. Mr. Ballinas
102V. Visitors

103A. Advanced Drawing and Composition. (4) Formerly 100. Three 3-hour studio classes per week. Prerequisites: group prerequisites. Principles of two-dimensional composition, emphasis on drawing media. Recommended for upper division transfer students in Practice of Art who have not taken a course equivalent to course 2A. Should be taken during the first quarter of residence. The Staff (F, W, Sp)

103B. Human Figure Drawing. (4) Formerly 103. Three 3-hour studio classes per week. Prerequisites: group prerequisites. Principles of space drawing and composition using recognizable form. The Staff (F, W, Sp)

105. Mural Composition. (4) Nine hours of laboratory per week. Prerequisites: as above and upper division standing. Emphasis on wall painting offering work in a variety of media on an individual project basis. Mr. McCray (F, W, Sp)

106. Practice in the Graphic Arts: Emphasis on Etching. (4) Three 3-hour studio classes per week. Prerequisites: group prerequisites. Principles of two-dimensional composition, emphasis on drawing media. Recommended for upper division transfer students in Practice of Art who have not taken a course equivalent to course 2A. Should be taken during the first quarter of residence. The Staff (F, W, Sp)

107. Practice in the Graphic Arts: Emphasis on Lithography. (4) Three 3-hour studio classes per week. Mr. Miyasaki (F, W, Sp)

114. Advanced Sculpture. (4) Three 3-hour studio periods per week. Prerequisite: group prerequisites. Mr. Gordin (F, W, Sp)

114B. Mr. Gordin
114C. Mr. Parkas
114D. Mr. Voikos
114E. Mr. Melchert
114G. Mr. Wall
114V. Visitors

120. Painting Analysis. (4) Three hours of lecture per week. Prerequisite: course 2A, 2B, and ten units of Art History. A survey course analyzing ideas in art with emphasis on painting. Primarily for art majors. Mr. Simpson (Sp)

121. Sculpture Analysis. (4) Three hours of lecture per week. Prerequisite: course 2A, 14A, and ten units of Art History. A survey course analyzing ideas in art with emphasis on sculpture. Primarily for art majors. Mr. Gordin (Sp)

146. Ceramic Sculpture. (4) Nine hours of laboratory per week. Prerequisite: general group prerequisites; 20 units of lower division studio courses. Emphasis on the unique aesthetic possibilities of clay and ceramic material as sculpture. Mr. Voukios (F, W, Sp)

SPECIAL STUDY COURSES

H195A-H195B-H195C. Special Study for Honors Candidates in the Practice of Art. (4-4-4) Individual hour to be arranged. Prerequisite: eligibility for admission to the honors program. Credit and grade will be awarded on completion of two or three quarters of the sequence with the same instructor. May be applied to upper division studio art requirement for major.

The Staff (F, W, Sp)

199Y. Supervised Independent Study and Research in Practice of Art. (1-8) Enrollment is restricted by regulations listed on page 34. Staff approval required. Must be taken on a passed/not passed basis, therefore does not apply to Art major requirements.

The Staff (F, W, Sp)

GRADUATE COURSES

General prerequisite for graduate courses in the Practice of Art is at least a B average in the undergraduate major in Art. Students may not enroll in more than two sections of the following courses per quarter: 202, 212, 210.

202. Graduate Seminar In Art: Emphasis on Two-Dimensional Media. (4) Three hours of seminar per week. Emphasis on original works; group discussion and criticism. Ancillary topics of a contemporary and historical nature will be introduced. May be repeated for credit.

The Staff (F, W, Sp)

210. Graduate Seminar In Art: Emphasis on Three-Dimensional Media. (4) Three hours of seminar per week. Emphasis on original works; group discussion and criticism. Ancillary topics of a contemporary and historical nature will be introduced. May be repeated for credit.

The Staff (F, W, Sp)

254. M.F.A. Seminar. (4) Three hours of seminar per week. Studio work emphasizing various aspects of form. Group criticism. Intended for specially qualified M.F.A. candidates. May be repeated for credit. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (F, W, Sp)

255. Individual Study for Graduate Students. (1-12) Individual study intended to provide opportunity for qualified students to prepare themselves for the M.F.A. Comprehensive Project.

The Staff (F, W, Sp)

258. Special Study for Graduate Students. (1-4) Staff approval required.

The Staff (F, W, Sp)

History of Art

History of Art Office, 405 Doe Library

Professors:
Svetlana Alpers (Mrs. Paul J.), Ph.D.
David A. Amyx, Ph.D.
Jean V. Bony, Ph.D.
James Coe, Ph.D.
Herschel B. Chipp, Ph.D.

Assistants:
Jacques de Casso, Ph.D.
Loren Paretsky, Ph.D.
Jeanne Weiss, Ph.D.

Assistant Professors:
Yoshitaka Shikuma, Ph.D.

Lecturers:
Alfred Frankenstein, Ph.D., D.F.A. (Hon.) (Emeritus)

L. D. Ettlinger, D.Phil.
Peter H. Selz, Ph.D., D.F.A.
Walter W. Horn, Ph.D. (Emeritus)

David H. Wright, Ph.D.

Lawrence A. Silver, Ph.D.

MAJOR PROGRAM

Lower Division. Two of the following: History of Art 30, 31, 40, 41, 60, 81. Also Art 2A and either Art 2B or 14A. One of the following: History 4A, 4B, 4C, 4D. Students planning graduate study in History of Art are urged to develop a reading knowledge of German and French or Italian as early as possible.

Upper Division. Seven upper division courses in four of the designated areas of the History of Art (see below), including at least one course in either the Ancient or Renaissance-Baroque area, plus one course in a related history field or in the literature of a specific historical period.

Designated areas of the History of Art: Oriental, Ancient, Medieval, Renaissance-Baroque, Modern. Note: It is recommended that an appropriate lecture course be taken as a background for the particular section of History of Art 102 selected. Additional sections of History of Art 102 may be substituted for required upper division lecture courses, if space is available.

Restrictions: Only one 199 of 5 units may be offered as part of the upper division course requirement.

Honors Program in the History of Art. Students with an overall grade-point average of 3.3 and a cumulative average of 3.5 or above are eligible for admission to the honors program. Credit and grade will be awarded on completion of two or three quarters of the sequence with the same instructor. May be applied to upper division studio art requirement for major. The Staff (F, W, Sp)

199Y. Supervised Independent Study and Research in Practice of Art. (1-8) Enrollment is restricted by regulations listed on page 34. Staff approval required. Must be taken on a passed/not passed basis, therefore does not apply to Art major requirements.

The Staff (F, W, Sp)

GRADUATE PROGRAMS

The Department of Art and History of Art offers programs of graduate study leading to the M.A. and Ph.D. degrees in the History of Art.

Further information concerning these programs may be obtained from the History of Art Office, 405 Library.

Letters and Science List: for regulations governing this title see the Announcement of the College of Letters and Science.

See the History of Art Office for updated information.

LOWER DIVISION COURSES

30. The Art of India and Southeast Asia. (5) Four hours of lecture and one hour of discussion per week.
31. The Art of China and Japan. (5) Four hours of lecture and one hour of discussion per week.
40. History of Ancient Mediterranean Art. (5) Four hours of lecture and one hour of discussion per week. The Stone Age in Europe and the Near East: Egyptian Art, Art of the Ancient Near and Middle East.
41. History of Ancient Classical Art. (8) Four hours of lecture and one hour of discussion per week. Aegean, Greek, Etruscan and Roman Art.
60. Introduction to European Painting. (5) Four hours of lecture and one hour of discussion per week, and additional directed study. Medieval, Renaissance, and Modern Art.
61. Introduction to the History of Art: Sculpture. (8) Five hours of lecture and one or one-and-a-half hours of discussion per week. Selected examples of sculpture emphasizing the human figure, including portrait and narrative reliefs, from the Pyramid Temples to Picasso.
OPEN TO NONMAJORS. GENERAL PREREQUISITE: UPPER DIVISION STANDING OR CONSENT OF INSTRUCTOR UNLESS OTHERWISE STATED. "A" PART OF A SEQUENCE IS NOT PREREQUISITE TO THE "B" PART. NO PART A, B, OR C IS PREREQUISITE TO ANOTHER.

112B. Tribal Art. (8) Three hours of lecture per week. An analysis of the style of the art of black Africa, the South Pacific and North America, developed according to art-historical principles.

130A-130B. Early Chinese Art. (5-5) Three hours of lecture per week and additional directed study. 130A. Chinese art from the Prehistoric period through the Chou Dynasty. 130B. Chinese art from the Han Dynasty through the T'ang Dynasty. Mr. Cahill

131A-131B. Later Chinese Art. (5-5) Three hours of lecture per week and additional directed study. 131A. Chinese art of the Sung and Yuan dynasties. 131B. Chinese art of the Ming and Ch'ing Dynasties. Mr. Cahill

134A-134B. The Art of Japan. (5-5) Three hours of lecture and at least one additional hour of discussion per week. 134A. Japanese art through the late 13th century. 134B. Japanese art from the 14th century through the present. Mr. Shimizu

136A-136B-136C. The Art of India. (5-5-5) Three hours of lecture per week. 136A. Indus Valley through 550 A.D., primarily Buddhist sculpture. 136B. 500-1350 A.D., primarily the Hindu temple and its sculpture. 136C. 1350 A.D. to the present, primarily Muslim and Rajput miniature painting. Mrs. Williams

137. The Art of Southeast Asia. (5) Three hours of lecture per week. The art of Cambodia, Thailand, Burma, and Indonesia focusing on the period from 400 to 1500 A.D. Sculpture and architecture will be considered as a balance of Indian and indigenous elements. Intensive research work. Mr. Williams

139. Problems in Buddhist Art. (5) Four hours of lecture per week. Prerequisite: One course covering some Buddhist art, or a course in the history of Buddhism. Buddhist art of India, Southeast Asia, Central Asia, China, and Japan, focusing upon problems of iconography and content. To be offered Spring 77 only. Prerequisite: History 114A-114B (which may be audited simultaneously). Reading knowledge of at least one useful language (normally German, Italian, French or Russian).

154A-154B. Late Roman and Byzantine Art. (5-5) Three hours of lecture per week. Prerequisite: A knowledge of the art of the Roman Empire. History 114A-114B (which may be audited simultaneously). Reading knowledge of at least one useful language (normally German, Italian, French or Russian).

154A. The tradition of Roman imperial art from the third century to the eighth century. 154B. Byzantine art from the ninth century to the fifteenth century, and its influence in Western Europe. Research projects will normally extend through the two quarters and credit and grade will be assigned upon completion of the sequence. Either half may be taken separately with special consent of the instructor. Mr. Wright


161. The Trecento. (5) Three hours of lecture per week and additional directed study. Italian painting and sculpture, 1320-1420. Mr. Silver

163. Michelangelo and Raphael. (5) Three hours of lecture per week and additional directed study. Prerequisite: course 160B and consent of the instructor. Intensive study of the work of these two artists and their milieu.

165. Italian Renaissance Architecture. (5) Three hours of lecture per week and additional directed study.

166A-166B. Northern Art of the Period of the Renaissance. (5-5) Four hours of lecture per week. Major developments in painting and graphics, with emphasis on the Netherlands from van Eyck to Bruegel and on the German lands from Durer to Holbein. History 114A-114B (which may be audited simultaneously). Reading knowledge of at least one useful language (normally German, Italian, French or Russian).

170A. Southern Baroque Art. (5) Four hours of lecture per week. The major artists (among them Caravaggio, Bernini, Velazquez, and Poussin) and the major concerns (including genres such as history painting, landscape, still-life, and notions of imitation and illusionism) of seventeenth century art in Italy, France, and Spain. Mrs. Alpers

170B. Northern Baroque Art. (5) Mrs. Alpers

174. Types of Dutch and Flemish Painting in the 17th Century. (5) Four hours of lecture per week. A general survey of Netherlandish painting of the 17th century (including Van Dyck, Ostade, de Hooch, Vermeer, Ruysdael) organized according to the genres or types of painting done at the time. The historical and social as well as the art historical contexts for the development in the Netherlands of such genres as history painting, portraiture, landscape, still-life, and low-life and the kinds of meanings with which they were endowed. Mrs. Alpers

175. Rubens and Rembrandt. (5) Four hours of lecture and one hour of discussion per week. The works of the two leading painters of the time in the north will be contrasted and used to introduce the major concerns of northern artists of the time. Mrs. Alpers

180A-180B. Modern Art. (5-5) Four hours of lecture and one hour of discussion per week. 180A. Roccoco to Impressionism. Mr. de Caso 180B. Cezanne to Modern America. Mr. Chipp

180C. Impressionism and Post-Impressionism. (5) Three hours of lecture and one hour of discussion per week. NOTE: For key to symbols, see page 34.
100 / L & S: Art and History of Art

week. Prerequisite: course 180A or 180E and permission of the instructor. From Monet's early landscapes to Art Nouveau. Mr. Chipp

180D. Rodin. (5) Four hours of lecture and one hour of discussion per week. A study of the art of Rodin from 1870 to 1914, with emphasis on the sculpture and art of the Symbolist and Art Nouveau periods. Monuments and other works considered with involvement in architecture, draughtsmanship, and artistic criticism.

Mr. de Caso

180E. European Painting in the Early Industrial Age (1780-1890). (5) Three hours of lecture and one hour of discussion per week. The self-portrait as a manifesto of views and aims. The themes of painting during the period. The impact of the Industrial Revolution on art. Art history and the problems of the era. The relationship of art to social and intellectual history.

Mr. Ettinger

181. Contemporary Art. (5) Four hours of lecture per week. Painting and sculpture in America and Europe from World War II to the present.

Mr. Selz

185. Pictorial Art and Cubism. (5) Three hours of lecture per week and additional directed study. Prerequisite: course 180D and consent of instructor. Limited to 25 students. The development of Cubism in painting and sculpture.

Mr. Chipp

186. Twentieth-Century Sculpture. (3) Three hours of lecture per week and additional directed study. Sculpture from 1900 to the present. Mr. Selz

188. Photography as a Visual Art. (5) Four hours of lecture per week, and additional time for viewing movies. The development of photography, both still and motion pictures, from 1839 to the present. Emphasis on questions of style studied in the perspective of developments in technique, in the other visual arts, and in society.

189A-189B. American Art. (5-5) 189A. The Eighteenth and Nineteenth Centuries.

189B. The Twentieth Century.

190C. American and Bay Area Architecture. (5) Three hours of lecture and one 2-hour field trip (not including travel time) per week. The lectures will trace the major trends in the history of American architecture from the colonial period to the present. In the field trips, individuals build on and the urban development of the bay area will be studied and related to the nationwide developments.

Mr. Partridge

RESTRICTED COURSES

102. Undergraduate Seminar: Problems in the Research and Interpretation in the Several Areas of the History of Art. (5) Four hours of lecture per week. Prerequisite: restricted courses: designated permission of Juniors and Seniors whose major is History of Art, but it is also open to other students with the consent of the individual instructor. Enrollment limited to 25. Concentration on specific problems or works in a particular area of art history. Assigned readings, discussion, and a substantial paper will be required from the student to, and allow him to employ, the methodology and techniques of art historical research. No final examination is required.

102A. Oriental.

102B. Ancient.

102C. Medieval.

102D. Renaissance/Baroque.

102E. Modern.

The Staff

SPECIAL STUDY COURSES

H195. Special Study for Honors Candidates in the History of Art. (1-5) Prerequisite: senior standing and qualifying scholarship record. Minimum grade-point average of 3.3 overall and 3.3 in courses completed in the major.

The Staff


The Staff

GRADUATE COURSES

General Prerequisite: graduate standing and consent of the instructor, including courses in the history of art and reading knowledge of languages as may be required.

Graduate seminars in the History of Art are normally extended through two successive quarters, meeting for two hours each week, counted as a work load of 3 units each quarter. Credit and grade will be given only upon completion of the full sequence. On rare occasions a seminar may meet intensively, for four hours each week, and be completed in one quarter, counting for 6 units. History of Art 225 is not considered a seminar.

225. Introduction to Research in the History of Art. (5) Three hours of seminar per week. A sequence of readings, discussions, museum trips, and reports designed for beginning graduate students.

230A-230B. Seminar in Chinese Art. (3-3) Two hours of lecture per week. Prerequisite: graduate standing and consent of instructor. Credit and grade will be given only upon completion of the full sequence.

236A-236B. Seminar in the Art of India. (3-3) Two hours of lecture per week. Prerequisite: graduate standing and consent of instructor. Credit and grade will be given only upon completion of the full sequence.

240A-240B. Seminar in Ancient Art. (3-3) Two hours of lecture per week. Prerequisite: graduate standing and consent of instructor. Credit and grade will be given only upon completion of the full sequence.

240C-240D. Seminar in Pre-Hispanic and Mexican Art. (3-3) Two hours of lecture per week. Prerequisite: graduate standing and consent of instructor. Credit and grade will be given only upon completion of the full sequence.

250A-250B. Seminar in Roman Art. (3-3) Two hours of lecture per week. Prerequisite: graduate standing and consent of instructor. A graduate seminar sequence of the type already established in the Department will be extended to include a major portion of the title. Content may change from year to year, and the course may be repeated without duplication of credit.

254A-254B. Seminar in Early Medieval Art. (3-3) Two hours of seminar per week. Prerequisite: graduate standing and consent of instructor. Credit and grade will be given only upon completion of the sequence.

257A-257B. Seminar in Romanesque and Gothic Art. (3-3) Two hours of seminar per week. Prerequisite: graduate standing and consent of instructor. Credit and grade will be given only upon completion of the full sequence.

260A-260B-260C-260D. Seminars in Renaissance Art. (3-3) Two hours of seminar per week. Prerequisite: group prerequisites. Credit and grade to be assigned only upon completion of sequence 260A-260B or sequence 260C-260D.

260C-260D.

266A-266B. Seminar in Northern Renaissance Art. (3-3) Three hours of seminar per week. Prerequisite: graduate standing and consent of instructor. Credit and grade will be given only upon completion of the full sequence.

270A-270B. Seminar in Baroque Art. (3-3) Two hours of lecture per week. Prerequisite: graduate standing and consent of instructor. Credit and grade will be given only upon completion of the full sequence.

Mrs. Alpers

281A-281B. Seminar in Nineteenth-Century Art. (3-3) Two hours of lecture per week. Prerequisite: graduate standing and consent of instructor. Credit and grade will be given only upon completion of the full sequence.

Mr. de Caso

285A-285B. Seminar in Twentieth-Century Art. (3-3) Three hours of seminar per week. Prerequisite: graduate standing and consent of instructor. Credit and grade will be given only upon completion of the full sequence.

Mr. Chipp

289A-289B. Seminar in Twentieth-Century Painting and Sculpture. (3-3) Two hours of lecture per week. Prerequisite: graduate standing and consent of instructor. Credit and grade will be given only upon completion of the full sequence.

Mr. Selz

299. Special Study for Graduate Students in the History of Art. (1-6) Three hours of seminar per week. Prerequisite: individual study for Master's Students in the History of Art. (1-6) Individual study for the comprehensive or language requirements in consultation with the graduate adviser. Units may not be used to meet either unit or residence requirements for the master's degree. Enrollment is on a satisfactory/unsatisfactory basis.

The Staff

602. Individual Study for Doctoral Students in the History of Art. (1-8) Individual study, in consultation with the graduate adviser, intended to provide opportunity for qualified students to prepare themselves for the various examinations required for candidates for the Ph.D. Degree. Units may not be used to meet either unit or residence requirements for the doctoral degree. Enrollment is on a satisfactory/unsatisfactory basis.

The Staff

IDS 103. Introduction to Modern Art (for Non-Majors). (5) See Interdepartmental Studies for the complete description of this course.


IDS 118. Enlightenment and the Visual Arts in Eighteenth-Century France. (6) See Interdepartmental Studies for the complete description of this course.

IDS 137. The High Renaissance under Pope Julius II (1503-1513). (6) See Interdepartmental Studies for the complete description of this course.

IDS 138. Michelangelo and His Age, 1475-1564. (6) See Interdepartmental Studies for the complete description of this course.

ART GALLERIES

The University Art Museum, opened in 1970, will play an active role in instruction and research, giving students an opportunity for experience in connoisseurship and organization of exhibitions. (See page 29 for further information.) The Worth Ryder Art Gallery, in Kroeber Hall, provides a continuous program of contemporary painting and sculpture exhibitions.

ASIAN STUDIES

GROUP MAJOR IN ASIAN STUDIES

Group Major Office, 260C Stephens Hall

Advisers: Mr. John Bryan Starr (Department of Political Science), head adviser, Mr. Chalmers A. Johnson (Department of Political Science), Mr. William Geoghegan (Department of Anthropology).

The undergraduate group major in Asian studies is a rigorous but flexible interdisciplinary program designed to provide the student a groundwork in an Asian language, a broad range of interdisciplinary area-related course work, and at least a minimal familiarity with the methods of one discipline relevant to his or her area studies. The major program assists the student by organizing the rich course offerings in the Asian field at the University in such a way as to permit him or her to focus on a single geographical area, making use of a wide range of disciplines.

PREREQUISITE COURSES IN THE MAJOR

Students petitioning to enter the group major must have completed the following:

1. One year (three quarters) of a language appropriate to the area of regional specialization (Area I—China, Area II—Japan, Area III—Southeast Asia).

2. Four courses drawn from the following list. Since majors are required to take upper-division course work in at least two departments, at least two of these introductory courses must be selected from those two departments in which the candidate for the major intends to fulfill this requirement.

Agricultural Economics 23, World Agriculture (4)

Anthropology 1, Introduction to Physical Anthropology (5)

Anthropology 3, Introduction to Social and Cultural Anthropology (5)

Economics 1, Introduction to Economics (5)

Geography 1, Introduction to Physical Geography (5)

Geography 4, Introduction to Cultural and Historical Geography (5)

Geography 7, Spatial Organization of Human Activity (5)

History 19A-19B, Asian History (5-5)
ADDITIONAL MAJOR REQUIREMENTS

Once accepted in the major, the student is expected to select an area focus (Area I: China, Area II: Japan, Area III: Southeast Asia) and a disciplinary focus within that area and is required to complete the following course work:

1. One additional year of language appropriate to the area of regional specialization. Further study of the language is encouraged and will count toward the major unit requirement as indicated in the following sections. It is to be noted, however, in the case of Dutch and Malay/Indonesian, all or part of the first two years' work carries upper division credit. In these two instances the first two years' work will satisfy the language requirement but will not count toward the major unit requirement.

2. Upper division course work in at least two departments, totaling 45 units. At least 12 of these units must be in a department (not a language department) referred to herein as the "disciplinary focus" and must include one course in that department which relates to the theories, methods, and techniques of that discipline, but which is not exclusively an area studies course.

3. A senior thesis of approximately fifty pages in length is required under the supervision of the major adviser or other appropriate member of the faculty. Up to five units of independent study credit may be given for work on the thesis, those units to count among the 45-unit major requirement.

AREA I: CHINA

A. The student must complete one additional year of Chinese (Mandarin). Further study of the language is encouraged, but will count toward the major unit requirement as indicated below.

B. The student must select one of the following disciplinary foci and complete at least 12 units of work from the courses listed there (see item 2 under "Additional Major Requirements" above).

Anthropology

1. One course treating the theories and/or methods appropriate to the discipline, chosen with the consent of the major adviser

2. Anthropology 170A or 170B, China (5,5)

3. One course from among the following: Anthropology 149, Comparative Peasant Society (5); Anthropology 148, Man's Ecological Relationships (5); Anthropology 153, Medical Anthropology (5)

History

1. One course treating the theories and/or methods appropriate to the discipline, chosen with the consent of the major adviser

2. Two courses from among the following: History 158, The Opening of the Pacific, 1513–1800 (5); History 184A, 184B, 184C, China (5,5,5); History 189A, Social History of China (5); History 190, Modern Chinese Intellectual History (5)

History of Art

1. History of Art 102A, Undergraduate Seminar: Problems in the Research and Interpretation in the Several Areas of the History of Art (5)

2. Two courses from among the following: History of Art 130A, 130B, Early Chinese Art (5,5); History of Art 131A, 131B, Later Chinese Art (5,5)

Economics

1. One course treating the theories and/or methods appropriate to the discipline, chosen with the consent of the major adviser

2. Anthropology 171, Japan (5)

3. One of the following courses: Anthropology 149, Culture and Personality (5); Anthropology 150, Social Problems in Changing Cultures (5)

Political Science

1. One course treating the theories and/or methods appropriate to the discipline, chosen with the consent of the major adviser

2. Two courses from among the following: History 158, The Opening of the Pacific, 1513–1800 (5); History 185A, 185B, 185C, Japan (5,5,5); History 189B, Social History of Japan (5)

Political Science

1. One course treating the theories and/or methods appropriate to the discipline, chosen with the consent of the major adviser

2. Two courses from among the following: Political Science 143A, 143B, 143C, Government and Politics of Northeast Asia (5,5,5); Political Science 145C, American Role in Asia (5)

Sociology

1. One course treating the theories and/or methods appropriate to the discipline, chosen with the consent of the major adviser

2. Two courses from among the following: Sociology 135, Social Change in Underdeveloped Countries (5); Sociology 164, Folklore and Society (5); Sociology 185A, Agricultural Oriental Societies (5); Sociology 184, Social Structure of Communist Societies (5)

C. Additional units necessary to complete the unit requirement of the major may be selected from among the courses listed under other disciplinary foci above and from among the following:

Comparative Literature 160, Western Literary Crosscurrents in Twentieth Century China (4)
Geography 111, System of Cities and Regional Development (5)
Geography 164, China, Japan and Korea (4)
History of Art 134A, 134B, The Art of Japan (5,5)
Public Policy 186, Population and Public Policy (5)
Sociology 165, Japanese Society (5)

D. Up to 20 units of the major requirement may be elected from the following language and literature courses offered by the Department of Oriental Languages:

Oriental Languages (Chinese) 100A, 100B, 100C, Advanced Chinese (4,4,4)
Oriental Languages (Chinese) 103, Classical Chinese: Medieval Texts (4)
Oriental Languages (Chinese) 105, Advanced Mandarin (4)
Oriental Languages (Chinese) 110A, 110B, 110C, Readings in Chinese Buddhist Texts (4,4,4)
Oriental Languages (Chinese) 113, Classical Chinese: Medieval Texts (Historical)
Oriental Languages (Chinese) 123, Classical Chinese: Medieval Poetry (4)
Oriental Languages (Chinese) 156A, 156B, Readings in Chinese Vernacular Literature (4,4)
Oriental Languages 112A, 112B, Chinese Literature in Translation (4,4)
Oriental Languages 140, Civilizations of East Asia, China (4)
Oriental Languages 171A, 171B, Development of Buddhism in the Far East (4,4)

E. In exceptional cases, individual waivers of specific course requirements for valid academic reasons will be considered with the approval of the major adviser.

AREA II: JAPAN

A. The student must complete one additional year of Japanese (Mandarin). Further study of the language is encouraged, but will count toward the major unit requirement as indicated below.

B. The student must select one of the following disciplinary foci and complete at least 12 units of work from the courses listed there (see item 2 under "Additional Major Requirements" above).

Anthropology

1. One course treating the theories and/or methods appropriate to the discipline, chosen with the consent of the major adviser

2. Anthropology 189A or 189B, Southeast Asia (5,5)

History

1. One course treating the theories and/or methods appropriate to the discipline, chosen with the consent of the major adviser

2. Two courses from among the following: History 158, The Opening of the Pacific, 1513–1800 (5); History 185A, 185B, 185C, Japan (5,5,5); History 189B, Social History of Japan (5)

Political Science

1. One course treating the theories and/or methods appropriate to the discipline, chosen with the consent of the major adviser

2. Two courses from among the following: Political Science 143A, 143B, 143C, Government and Politics of Northeast Asia (5,5,5); Political Science 145C, American Role in Asia (5)

C. Additional units necessary to complete the unit requirement of the major may be selected from among the courses listed under other disciplinary foci above and from among the following:

Geography 111, System of Cities and Regional Development (5)
Geography 164, China, Japan and Korea (4)
History of Art 134A, 134B, The Art of Japan (5,5)
Public Policy 186, Population and Public Policy (5)
Sociology 165, Japanese Society (5)

D. Up to 20 units of the major requirement may be elected from the following language and literature courses offered by the Department of Oriental Languages:

Oriental Languages (Japanese) 100A, 100B, 100C, Advanced Japanese (4,4,4)
Oriental Languages (Japanese) 139A, 139B, Japanese Grammar (4,4)
Oriental Languages (Japanese) 150, Japanese Drama (4)
Oriental Languages (Japanese) 189, Japanese Documents (4)
Oriental Languages 132, History of Japanese Literature (4)
Oriental Languages 141, Civilizations of Eastern Asia, Japan (4)
Oriental Languages 152, Modern Japanese Literature in Translation (4)
Oriental Languages 165, Traditional Japanese Historical Writing (4)

E. In exceptional cases, individual waivers of specific course requirements for valid academic reasons will be considered with the approval of the major adviser.

AREA III: SOUTHEAST ASIA

A. The student must complete one additional year of Malay/Indonesian or a second year of Dutch or French in the case that a relevant Asian language is not offered. It is to be noted that, in the case of Dutch and Malay/Indonesian, all or part of the first two years' work carries upper division credit. In these two instances the first two years' work will satisfy the language requirement but will not count toward the major unit requirement.

B. The student must select one of the following disciplinary foci and complete at least 12 units of work from the courses listed there (see item 2 under "Additional Major Requirements" above).

Anthropology

1. One course treating the theories and/or methods appropriate to the discipline, chosen with the consent of the major adviser

2. Anthropology 189A, 189B, Southeast Asia (5,5)

NOTE: For key to symbols, see page 34.
Astronomy

Department Office, 601 Campbell Hall

Professors:
C. Stuart Bowyer, Ph.D.
John D. Gaskell, Ph.D., (Chairman)
Carl E. Haller, Ph.D.
Ivan R. King, Ph.D.
Leonard V. Kuhl, Ph.D.
John G. Phillips, Ph.D.
Hyron Spinrad, Ph.D.
Harold F. Weaver, Jr.
William J. Welch, Ph.D.

Associate Professors:
Jonathan Arons, Ph.D.
Frank H. Shu, Ph.D.
Joseph I. Silk, Ph.D.

Assistant Professor:
Christopher McKee, Ph.D.

(Physics)

Lecturers:
David D. Cuttaback, Ph.D.
Namielou H. Dietter, Ph.D.

Department Major Advisers: Mr. Spinrad, Mr. Weaver.
Graduate Advisers: Mr. Gaustad, Mr. Phillips.

The Department of Astronomy offers undergraduate and graduate instruction in a wide variety of fields, including theoretical and observational astrophysics; infrared, x-ray and radio astronomy; galactic structure and dynamics of stellar systems; high-energy astrophysics and cosmology; and spectroscopy. There is a considerable amount of research and teaching related to astronomy done in other units at Berkeley, including the Space Sciences Laboratory and the Physics Department. Various professors in the Chemistry, Mathematics, Statistics, and Electrical Engineering Departments have an active interest in astronomy, and are available for consultation.

A variety of instruments is available to students and staff, including a 30-inch telescopes at the Lick Observatory and a 120-inch telescope at the Space Sciences Laboratory, an 85-foot radio telescope and two 20-foot dishes used as a mm. interferometer at Hat Creek Observatory. Laboratories are available for the development of radio, infrared, and x-ray instruments, and for the precise measurement of optical images and spectra.

The MAJOR

During the first two undergraduate years students must, in addition to fulfilling certain specific requirements of the College of Letters and Science, pursue studies that will prepare them for future work in astronomy. Specifically, the Department requires that during the first two years students take courses that will provide a thorough understanding of:

1. Basic principles of physics: mechanics, properties of matter, electricity and magnetism, heat, wave-motion, sound and light. (Physics 5A, 5B, 5C, 5D, 5E)
2. Basic mathematics: analytic geometry, differential and integral calculus, differential equations, and linear algebra. (Math. 1A, 1B, 1C, followed by Math. 51A, 51B, 51C)

In addition, students are urged to take foreign language courses that will enable them to gain a reading knowledge of any one (and preferably two) of the three languages, German, Russian and French.

The last two years, leading to the A.B. degree in astronomy, are spent in more intensive work, primarily in the fields of astronomy, mathematics and physics. The specific requirements of study to be followed by each student is to be worked out in consultation with the departmental adviser for the major, and must include at least 36 units of upper division work in astronomy and allied fields.

All astronomy majors are required to take Astronomy 127A–B–C–D.

The remainder of the student's courses will generally be chosen from the following list: Mathematical Methods in Physics (Physics 104), Analytic Mechanics (Physics 105A–105B), Electromagnetism and Optics (Physics 110A–110B–110C), Modern Physics and Advanced Electrical Laboratory (Physics 111), Introduction to Statistical and Thermal Physics (Physics 112), Introduction to Nuclear Physics (Physics 124), Nuclear Physics (Physics 129A–129B), Quantum Mechanics and its Applications to Alloys (Physics 137A–137B–137C), Introduction to Plasma Physics (Physics 142), Advanced Calculus for the Applied Sciences (Math. 120A–120B–120C), Mathematical Tools for the Physical Sciences (Math. 121A–121B), Numerical Analysis (Math. 128A–128B), Physics of the Earth (Geology and Geophysics 122A–122B), Introduction to the Theory of Probability and Statistics (Stat. 100A–100B–100C).

Students of marked ability may well take certain graduate courses in astronomy during the senior year.

HONORS PROGRAM

For honors in astronomy a student must fulfill the following requirements: (1) a grade-point average of at least 3.5 in all courses in astronomy and related fields; (2) in Astronomy 127 A–B–C–D, a minimum of two years' work and one C; (3) an individual project of research or study, with at least 3 units of Astronomy 1195. The student's project is in consultation with the major adviser, and the written report is judged by the major adviser and one other faculty member.

GRADUATE PROGRAMS

The graduate program is aimed at the Ph.D. degree. Entering students need not have majored in astronomy, although some astronomical background is desirable. A strong background in physics is essential, however. In order to facilitate reading of research papers in German, Russian, and French as part of their graduate work, entering students are urged to study at least one of these languages as undergraduates.

A considerable amount of research and teaching related to astronomy done in other units at Berkeley, including the Space Sciences Laboratory and the Physics Department. Various professors in the Chemistry, Mathematics, Statistics, and Electrical Engineering Departments have an active interest in astronomy, and are available for consultation.

In addition to the qualifying examination on the thesis topic required by the University, the Department requires students to pass a preliminary examination which will test breadth and depth of knowledge of four specialized research areas chosen by the student from a list of about ten. Students choose, with the aid of their adviser, courses in the Department which are useful in preparing for the preliminary examination. In addition, students must pass a modest number of graduate courses taken outside the Department. A tutorial program is designed to maintain regular contact with the faculty. The program normally takes five years. Additional information on the program is available upon request to the Department.

The requirements for the M.A. degree are 36 units in graduate or upper division undergraduate courses (18 of them in graduate courses) and the preliminary examination.

LOWER DIVISION COURSES

1. Current Research in Astronomy and Astrophysics. (3) Three hours of lecture per week. Prerequisite: Astronomy 10 or consent of instructor. A non-mathematical description of research and results in modern astronomy. A diverse variety of topics that may include galaxies, quasars, cosmology, radio astronomy, interstellar matter, X-ray astronomy, pulsars, neutrinos, black holes, planets, cosmic rays, etc. Intended for non-science majors.

2. Descriptive Cosmology. (3) Three hours of lecture per week. Prerequisite: Astronomy 10 or consent of instructor. Non-mathematical treatment of ideas on the origin, evolution, and fate of the Universe. Topics include: observational cosmology, basic cosmological models, galaxy formation, the cosmic background radiation. Intended for non-science majors.

3. The Solar System and Beyond. (3) Three hours of lecture per week. Prerequisite: Astronomy 10 or consent of instructor. Primarily a non-mathematical discussion of the history and evolution of the Solar System including results from recent spacecraft probes. Other possible topics: extrasolar terrestrial life, neutron stars, black holes, X-ray, neutrino and gravity-wave astronomy, and some aspects of cosmology.

4. The Solar and Magnetic Fields. (3) Three hours of lecture per week. Prerequisite: Astronomy 10 or consent of instructor. Primarily devoted to a non-mathematical discussion of ancient or primitive astronomical models of the sun and planets, and modern astronomical tests of special and general relativity. Additional topics may include interstellar communication and some aspects of cosmology.

5. Ancient and Modern Astronomy. (3) Three hours of lecture per week. Prerequisite: Astronomy 10 or consent of instructor. Primarily devoted to a non-mathematical discussion of ancient or primitive astronomical models of the sun and planets, and modern astronomical tests of special and general relativity. Additional topics may include interstellar communication and some aspects of cosmology.

6. Introduction to Modern Astronomy and Astrophysics. (4) Three hours of lecture and two hours of laboratory per week. History and development in high school physics and mathematics (algebra and trigonometry). Not open to students who have received credit for Astronomy 110A. An introduction to the use of modern astronomical instruments in the observation and interpretation of astronomical phenomena using the laws of modern physics. Modern astronomical instrumentation. Discussion of gravitation, relativity, electromagnetic radiation, atomic and nuclear processes in relation to the structure and evolution of stars, galaxies, and the Universe. Mr. Weaver (F), Mr. Silk (W), Mr. Gaustad (Sp)

7. Introduction to General Astronomy. (4) Three hours of lecture and 1 hour discussion each week. Prerequisite: Open without prerequisite to all students but designed for those having no background in high school physics or mathematics (algebra and trigonometry). Not open to students who have received credit for Astronomy 110A. An introduction to the use of modern astronomical instruments in the observation and interpretation of astronomical phenomena using the laws of modern physics. Modern astronomical instrumentation. Discussion of gravitation, relativity, electromagnetic radiation, atomic and nuclear processes in relation to the structure and evolution of stars, galaxies, and the Universe. Mr. Weaver (F), Mr. Silk (W), Mr. Gaustad (Sp)

8. Undergraduate Seminar in Astronomy. (1) One hour of lecture per week. Prerequisite: course 10 (should be taken concurrently) and consent of instructor. May be taken for credit limited to 15 students. Topics include Instrumentation for and recent advances in astronomical research. Mr. Bowyer, Mr. Arons (F), Mr. King, Mr. Phillips (W), Mr. King, Mr. Weaver (Sp)

UPPER DIVISION COURSES

10. Introduction to General Astronomy. (4) Three hours of lecture and 1 hour discussion each week. Prerequisite: Open without prerequisite to all students but designed for those having no background in high school physics or mathematics (algebra and trigonometry). Not open to students who have received credit for Astronomy 110A. An introduction to the use of modern astronomical instruments in the observation and interpretation of astronomical phenomena using the laws of modern physics. Modern astronomical instrumentation. Discussion of gravitation, relativity, electromagnetic radiation, atomic and nuclear processes in relation to the structure and evolution of stars, galaxies, and the Universe. Mr. Weaver (F), Mr. Silk (W), Mr. Gaustad (Sp)

100. Current Problems in Astronomy. (4) Three hours of lecture and 1 hour discussion each week. Prerequisite: Open without prerequisite to all students but designed for those having no background in high school physics or mathematics (algebra and trigonometry). Not open to students who have received credit for Astronomy 110A. An introduction to the use of modern astronomical instruments in the observation and interpretation of astronomical phenomena using the laws of modern physics. Modern astronomical instrumentation. Discussion of gravitation, relativity, electromagnetic radiation, atomic and nuclear processes in relation to the structure and evolution of stars, galaxies, and the Universe. Mr. Weaver (F), Mr. Silk (W), Mr. Gaustad (Sp)
24. Astrophysical Fluid Dynamics and Plasma Physics. (3) Three hours of lecture per week. A basic course emphasizing those aspects of the dynamics of plasma and fluid convection which are relevant to a wide range of astronomical phenomena. 

Mr. Shu (W)

215A—215B. Orbit Theory and Practice. (5—5) Three 1-hour lectures and two 1-hour discussion sections per week. Prerequisite: course 217A—217B and Physics 105A—105B (may be taken concurrently). Mr. Roeder (F), Mr. Roeder (W)

217. Introduction to Stellar Atmospheres. (3) Three hours of lecture per week. Spectral characteristics of normal and peculiar stars. Interstellar medium, on the basis of the observational data on the interstellar medium, with emphasis on the infrared physical conditions. (Not open to students who have taken 217A—217B prior to Fall 1975.)

Mr. Phillips (Sp)

218. Stellar Dynamics and Galactic Structure. (3) Three hours of lecture per week. Structure and kinematics of the galaxy; stellar population concepts; dynamics of stellar systems with and without encounters. (Not open to students who have taken 218 prior to Fall 1975.)

Mr. King (F)


225A—225B. Cosmology. (5—5) Three 1-hour lectures and two 1-hour discussion sections per week. Prerequisite: Physics 105. Sequence beginning (F) 225A.

226. Radio Astronomy. (3) Three hours of lecture per week. Prerequisite: course 216. Combination of radio and optical instrumentation and techniques. Detailed application of radiation and physics to objects observed in the radio wavelength region to include surveys, clouds, and relativistic plasmas, with application to current observations. Mr. Heiles (Sp)

228. Special Topics in Astronomy. (3) Three hours of lecture per week. Prerequisite: consent of instructor. Topics will vary from quarter to quarter. See Department of Astronomy announcements. Mr. Weacure (F)

235. Satellite Theory. (5) Three 1-hour lectures and two 1-hour discussion sections per week. Prerequisite: consent of instructor. The motion of natural and artificial satellites. Practical determination of their orbits and perturbations.

246. Infrared Astronomy. (3) Three 1-hour lectures per week. Instrumentation for infrared observations. Principles of molecular spectra; molecule formation. Molecular processes in space, with application to interstellar dust and protostars.

250. Special Topics in Astrophysics. (3) Three hours of lecture per week. Prerequisite: consent of instructor. Topics will vary from quarter to quarter. See Department of Astronomy announcements. May be repeated for credit.

Mr. Shu (F), Mr. Silva (Sp)

256. Interstellar Gas Dynamics. (4) Four 1-hour lectures per week. Prerequisite: course 216. Theoretical study of the motion of interstellar matter under the action of gravitational, pressure, and magnetic forces. Steady-state configurations, perturbations, turbulence, and shock waves. Applications to spiral arms, interstellar clouds, spherical explosions, and formation of stars and galaxies. (Not open to students who have taken Astronomy 217D.)

Mr. Arons (W)

258. Advanced Stellar Dynamics. (3) Three hours of lecture per week. Prerequisite: Astronomy 218. Galactics, integrals, and pseudogalactics; galactic dynamics; galactic mass models; spiral structure, density waves and resonances. Stellar encounter theory; dynamical stellar clusters; simulation techniques. Dynamics of elliptical galaxies, dynamics of discs; galaxy interactions and collisions. (Not open to students who have taken Astronomy 218B.)

Mr. Arons (Sp)

258. Special Topics in High Energy Astrophysics. (4) Four hours of lecture per week. Prerequisite: Astronomy 266 or consent of instructor. In-depth applications of high energy astrophysics to a wide range of research specialties. Includes such topics as interstellar matter, pulsars, supernovae, supernova remnants, radio galaxies, Seyfert galaxies, intergalactic medium, and interstellar sources. Mr. Phillips (Sp)


266. Advanced X-Ray Astrophysics. (2) Two hours of lecture per week. Prerequisite: Astronomy 265, or consent of instructor. Advanced topics in X-ray astronomy and high energy astrophysics. May be taken more than once.

Mr. Enwer (F)

267. Techniques and Instrumentation in High Energy Astrophysics. (2) Two hours of lecture per week. Intrinsinc limitations of existing instrumentation in high energy astrophysics and current methods of optical data retrieval will be discussed. Basic physical limitations of existing and potential future instrumentation will be analyzed. May be taken more than once.

Mr. Bowyer (Sp)

290A. Introduction to Current Research. (1) One hour of lecture per week. Survey of research currently being performed in the Department of Astronomy or the University. Mr. Spisok (F)

290B. Introduction to Current Research. (1) One hour of lecture per week. Study of a research topic with an individual staff member. Mr. Cudaback (W)

292. Seminar. (2—5) One 2-hour meeting per week. In addition to the weekly colloquium the department offers seminars in advanced topics, several of which are announced at the beginning of each quarter. A maximum of 10 units may be taken per quarter with a limitation of 5 units in any one section.

The Staff (F, W, Sp)

298. Directed Group Study. (1—8) Prerequisite: must be taken on a pass or not passed basis. Tutorial for groups of two or three students. The Staff (F, W, Sp)

299. Advanced Study and Research. (2—10) Prerequisite: must be taken on a pass or not passed basis. Discussion and practice of teaching techniques as applied to astronomy.

602. Individual Study for Doctoral Students. (1—8) Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. (and other doctoral degrees). May not be used for unit or residence requirement for the doctoral degree. Must be taken on a satisfactory or unsatisfactory basis.

The Staff (F, W, Sp)
PREPARATION FOR GRADUATE STUDY

For the pursuit of graduate work in either bacteriology or immunology, the undergraduate training outlined under PLAN I is recommended as basic preparation for future graduate work: Chemistry 106B; Chemistry 112E (for students who have taken Chemistry 12E); Physics 6C. Useful foreign languages include French, German, Russian, and Japanese; German is recommended.

THE GRADUATE PROGRAM

The Department offers the M.A. and Ph.D. degrees in bacteriology and immunology. There is no separate M.A. program. The Ph.D. degree requires the completion of a dissertation. Students are responsible for the completion of their program of study. Thesis topics must have a clearly defined area of interest and must be approved by the student's advisor and the graduate program adviser.

The completion of 36 units is required of all students working for the Ph.D. degree. This comprises the course work and the dissertation. The student may, under the direction of an advisor, select the appropriate number of courses in any of the departments available in the College of Letters and Science. Students interested in enrolling in the honors program should consult the honors program advisor, Mrs. Koshland.

GRADUATE COURSES

203. Microbial Metabolism. (3) Prerequisite: Biochemistry 102 or equivalent. An analysis of new developments in research concerning the chemical reactions and pathways by which microorganisms convert organic and inorganic compounds into energy and biomass. The student will carry out individual research, often utilizing techniques in microbiology and biochemistry.

204. Tumor Immunology. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 202 or equivalent. An introduction to research and to the analysis of scientific literature. Required of all first-year graduate students in bacteriology and immunology. To be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp).

205. Nature of the Immune Response. (3) Two hours of lecture per week. Prerequisite: graduate standing in any biological science, and consent of instructor. An introduction to research and to the analysis of scientific literature. Required of all first-year graduate students in bacteriology and immunology. To be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp).

206. Immunogenetics. (2) Two hours of lecture per week. Prerequisite: consent of instructor. An introduction to the genetics of immunity. To be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp).

207. Structure and Function of the Precapillary Cells. (3) Three hours of lecture per week. Prerequisite: Biochemistry 102 or equivalent. An introduction to the structure and biochemical mechanism of the precapillary cells. To be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp).


285. Special Topics. (3-5) Prerequisite: consent of instructor. From time to time, lecture series are offered on topics of current interest. To be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp).

299. Special Study for Graduate Students. (1-4) The Staff (F, W, Sp).

601. Individual Study for Master's Students. (1-6) Individual study for the comprehensive or language requirements in consultation with the field advisor. Units may not be used to meet either unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp).

602. Individual Study for Doctoral Students. (1-6) Individual study for the comprehensive or language requirements in consultation with the field advisor. Units may not be used to meet either unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp).

U.S. Bacteriology and Immunology

100A-100B, General Bacteriology. (4-4) Two 1 1/2-hour lectures and a 1-hour discussion per week. Prerequisites: Biology 1A; Chemistry 1, 2, or 11, and 1B; 102. Courses 100A is prerequisite to 100B. 100A. An introduction to the biological properties of the bacteria. 100B. Bacterial physiology and metabolism. Leighton, Mr. Thorner, Mr. Zusman (Sp).

101A-101B, General Bacteriology Laboratory. (4-4) Two 1 1/2-hour labs per week and a 1-hour discussion (lab) per week. 101B: Two 1 1/2-hour laboratories per week. Prerequisites: courses 100A-100B (or equivalent), and consent of instructor. The student will carry out individual research, often utilizing techniques in microbiology and biochemistry. To be taken on a satisfactory/unsatisfactory basis. Ms. Cole (W), Ms. Cale (F, W, Sp).

102A, 102B-102L. Bacteriology Laboratory. (4) One 1-hour lecture per week and two 1-hour laboratory periods per week. Prerequisites: Biology IA-IB; Chemistry 1C; and BA-88. Not open to students who have credit in courses 100A-100B. Mr. Nkaida (F, W, Sp).

102L. Bacteriology Laboratory. (4) One 1-hour lecture per week and two 1-hour laboratory periods per week. Prerequisites: course 100A or 100B, and consent of instructor. The student will carry out individual research, often utilizing techniques in microbiology and biochemistry. To be taken on a satisfactory/unsatisfactory basis. Ms. Koshland (Sp).
Biochemistry

Graduate Study

The Department offers the M.A. degree (under either Plan I or Plan II) as described in the Graduate Division section of thiscatalogue, and the Ph.D. degree. All students working for the Ph.D. degree are required to serve as teaching assistants for twoquarters. For information concerning the requirements of either degree consult a graduate adviser in the department.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

Lower Division Course

20. Current Topics in Biochemistry. (1) One-hour lecture per week. Prerequisite: sophomore standing or consent of instructor. Intensive study aimed at acquainting potential biochemistry majors with developments in this area. Typical topics include: genetic code, regulatory processes in biological systems, the action of vitamins and hormones, biochemistry of evolution, mechanism of catalysis in living systems, membrane processes. Must be taken on a passed/not passed basis. (The Staff, W. Penhoet in charge)

Upper Division Courses

100A—100B—100C. General Biochemistry. (4–4–4) Three 1-hour lectures and one hour of discussion per week. Prerequisite: Chemistry 95, 125B or equivalent and a course each in physical chemistry and biology. Major introductory courses for biochemistry majors. Lectures on the chemical and physical factors concerned in life processes, including the chemistry of the major cellular constituents; enzymatic catalysis; energy and metabolism and control of metabolic processes. Sequence, beginning in fall. Mr. Koshland (F), Mr. Penhoet, Mr. Schekman (W); Mr. Milman, Mr. Linn (Sp)

101A—101B. General Biochemistry Laboratory. (4–4) Two 1-hour lectures and two 3-hour laboratory sessions per week. Prerequisite: Chemistry 95 and course 100A—100B—100C (may be taken concurrently), or consent of the instructor. Laboratory experiments planned to accompany the lectures. Course 100A—100B—100C, Sequence, beginning in the fall and in the winter.

101A: Mr. Milman, Mr. Line (F); Mr. Dekker, Mr. Kammen (W); 101B: Mr. Cole, Mr. Neillands (W); Mr. Neillands, (Sp)

102. A Survey of the Principles of Biochemistry. (5) Four 1-hour lectures and one hour of discussion per week. Prerequisite: Chemistry 95B or equivalent. Recommended: courses in physical chemistry and biology. Designed for nonbiochemistry majors. Not open for credit to students who have credit in courses 101A—101B or equivalent. Experimental work to acquaint students 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.

103. Biochemistry and Society. (2) Two 1-hour lectures per week. Prerequisite: Chemistry 95, or consent of instructor. This course will offer a biochemical perspective on the technological intrusions which threaten the integrity of national and international responsibility of the biochemist to society. Must be taken on a passed/not passed basis. (The Staff, Mr. Neillands in charge)

180. Research. (3–12) Thesis research for graduate students. Courses 201 to 214, intended to acquaint graduate students studying in biochemistry and in allied subjects, chosen in accord with the direction of a member of the staff. The Staff (Mr. Kirsch in charge)

200. Research Seminar. (1) Two hours of lecture per week. Prerequisite: course 201 or 200—100B—100C, or consent of instructor. This course will offer a biochemical perspective on the technological intrusions which threaten the integrity of national and international responsibility of the biochemist to society. Must be taken on a passed/not passed basis. (The Staff, Mr. Neillands in charge)

201A: Enzyme purification and characterization. (4–4) Three 1-hour lectures and two 3-hour laboratory sessions per week. Prerequisite: Chemistry 95 and course 100A—100B—100C; Biology 1A—1B; Biology 1C, or consent of the instructor. The chemistry and regulation of biochemical processes. Must be taken on a passed/not passed basis. (The Staff, Mr. Penhoet in charge)

202. Biochemistry of Carbohydrates. (3) Three hours of lecture per week. The role of carbohydrates in cell structure and function. Mr. Bailou, Mr. Penhoet (F)

203. Biochemistry of Proteins. (3) Three hours of lecture per week. Prerequisite: course 100A—100B—100C. The chemistry of proteins with emphasis on organo-chemical approaches to structure determination, and to the elucidation of structure-function relationships. Theoretical considerations of protein purification. Mr. Schachman (W)

205. Biochemistry of Nucleic Acids. (3) Three hours of lecture per week. Prerequisite: courses 100A—100B—100C or consent of the instructor. The chemistry and biochemistry of the nucleic acids and their constituents. Mr. Chamberlin (W), Mr. Linn (Sp)

206. Physical Biochemistry. (4) Four and one-half hours of lecture per week. Prerequisite: Graduate standing. Open to undergraduates who have received a passing grade in an upper division Biochemistry or Molecular Biology course. Contributions of comparative biochemistry to knowledge of the molecular basis for organismal diversity, the mechanism of evolution and the phylogenetic relationships of species. Mr. Kammen (W)

213. Enzyme Synthesis and Control. (3) Three hours of lecture per week. Prerequisite: course 101A—100B—100C, or consent of the instructor. The mechanisms of control of protein synthesis at a molecular level, information transfer and gene expression; biological regulation, induction, repression, permeation and feed-back systems. Mr. Chamberlin (W), Mr. Penhoet (Sp)

214. Mechanisms of Enzyme Action. (3) Three hours of lecture per week. Prerequisite: course 100A—100B—100C, physical chemistry and advanced organic chemistry, or consent of the instructor. Current concepts of the mode of action of enzymes. The modes of binding of substrates and allosteric effectors to enzymes and analysis of the thermodynamic and kinetics of these reactions. Catalytic mechanisms utilized by enzymes and correlation of mechanism with 3-dimensional structure of the enzyme. Mr. Schachman (W)

280. Research. (3–12) Thesis research for graduate students majoring in biochemistry. Students must enroll for not less than 3 units, except by special permission of the chairman of the department.

285. Research Seminar. (1) Two hours of lecture per week. Prerequisite: Biochemistry 602 or 280 taken concurrently. Seminar on the presentation and evaluation of results in the area of the student's immediate research interests. (The Staff, W. Penhoet, Mr. Neillands in charge)

286. Biochemistry Seminar. (0) One hour of lecture

L&S: Biochemistry / 105

Graduate Courses

Courses 201 to 214, intended to acquaint graduate students with recent advances in biochemistry, are also open to senior students with honor standing by consent of the instructor.

201A–201B. Advanced Biochemical Laboratory Methods. (4, 4, or 4) One 1-hour lecture and three 3-hour laboratories per week. Prerequisite: graduate standing or consent of instructor. With approval of instructor a student may enroll in only one half of 201A for 2 units of credit.

210A. Enzyme purification and characterization.

215B. Biochemical genetics of bacteria and their viruses: biochemistry of cultured animal cells and their virions. Mr. Rabinowitz (W), Mr. Penhoet (Sp), Mr. Ames (Sp)

*202. Biochemistry of Carbohydrates. (3) Three hours of lecture per week. The role of carbohydrates in cell structure and function. Mr. Bailou, Mr. Penhoet (F)

*204. Biochemistry of Proteins. (3) Three hours of lecture per week. Prerequisite: course 100A—100B—100C. The chemistry of proteins with emphasis on organo-chemical approaches to structure determination, and to the elucidation of structure-function relationships. Theoretical considerations of protein purification. Mr. Schachman (W)

*205. Biochemistry of Nucleic Acids. (3) Three hours of lecture per week. Prerequisite: courses 100A—100B—100C or consent of the instructor. The chemistry and biochemistry of the nucleic acids and their constituents. Mr. Chamberlin (W), Mr. Linn (Sp)

206. Physical Biochemistry. (4) Four and one-half hours of lecture per week. Prerequisite: Graduate standing. Open to undergraduates who have received a passing grade in an upper division Biochemistry or Molecular Biology course. Contributions of comparative biochemistry to knowledge of the molecular basis for organismal diversity, the mechanism of evolution and the phylogenetic relationships of species. Mr. Kammen (W)

213. Enzyme Synthesis and Control. (3) Three hours of lecture per week. Prerequisite: course 101A—100B—100C, or consent of the instructor. The mechanisms of control of protein synthesis at a molecular level, information transfer and gene expression; biological regulation, induction, repression, permeation and feedback systems. Mr. Chamberlin (W), Mr. Penhoet (Sp)

214. Mechanisms of Enzyme Action. (3) Three hours of lecture per week. Prerequisite: course 100A—100B—100C, physical chemistry and advanced organic chemistry, or consent of the instructor. Current concepts of the mode of action of enzymes. The modes of binding of substrates and allosteric effectors to enzymes and analysis of the thermodynamic and kinetics of these reactions. Catalytic mechanisms utilized by enzymes and correlation of mechanism with 3-dimensional structure of the enzyme. Mr. Schachman (W)

280. Research. (3–12) Thesis research for graduate students majoring in biochemistry. Students must enroll for not less than 3 units, except by special permission of the chairman of the department.

285. Research Seminar. (1) Two hours of lecture per week. Prerequisite: Biochemistry 602 or 280 taken concurrently. Seminar on the presentation and evaluation of results in the area of the student's immediate research interests. (The Staff, W. Penhoet, Mr. Neillands in charge)

286. Biochemistry Seminar. (0) One hour of lecture

NOTE: For key to symbols, see page 34.
per week. Presentation of original work by faculty and visiting lecturers. Mr. Pfenning (F, W, Sp)

298. Special Study for Graduate Students. (2-4) Reading and conference for properly qualified graduate students in biology, under the direction of a member of the staff. (Till Staff (F, W, Sp)

602. Individual Study for Doctoral Students. (1-8) Individual study in consultation with the major field advisor, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. (The Staff (F, W, Sp)

Biology

Department Office, 4583 Life Sciences Building

Professors:
- Herbert G. Baker, Ph.D. (Botany)
- William Baillie, Ph.D. (Zoology)
- David A. Bern, Ph.D. (Zoology)
- William B. N. Berry, Ph.D. (Paleontology)
- Ralph Emerson, Ph.D. (Botany)
- William A. Johnson, Ph.D. (Botany/Chairman)
- Ned K. Johnson, Ph.D. (Zoology)
- Robert K. Colwell, Ph.D.
- Nancy J. Vivrette, Ph.D.

Associate Professors:
- Bob B. Buchanan, Ph.D. (Cell Physiology)
- Charles S. Scott, Ph.D. (Physiology)
- John E. Simms, Ph.D. (Zoology)
- John A. West, Ph.D. (Zoology)

Assistant Professors:
- William Z. Cande, Ph.D. (Botany)
- G. Steven Martin, Ph.D. (Zoology)

Assistant Professor:
- Alexander J. Horne, Ph.D. (Hydraulic and Sanitary Engineering, Acting)

Lecturers:
- Ruth E. von Blum, Ph.D.
- Pat Wilczek, Ph.D. (Lawrence Berkeley Laboratory)

FIELD MAJOR IN BIOLOGICAL SCIENCES

Field Major Office, 4583 Life Sciences Building

Major Advisers:
- Mr. W. A. Jensen, Head Adviser;
- Plan A, Option I: Mr. R. Calendar, Mr. W. Z. Cande; Plan A, Option II: Ms. B. Burns, Mr. C. A. Knight, Mr. T. Machen, Mrs. R. E. von Blum; Plan B: Mr. R. Stebbins; Plan C: Mr. T. Duncan; Plan D: Mr. M. T. Ghiselin, Mr. A. J. Horne.

This program serves the needs of students who can profit from broader training in the biological sciences than is possible in a departmental major. Four plans are offered under the Department of Biology, namely A, specialization in functional biology; B, specialization in systematic biology and morphology; C, specialization in Ecology; and D, specialization in the area of marine biology.

Lower Division Courses. Required of all students in the major: Chemistry 1A-1B (8 units); Chemistry 8A-8B (9 units); Mathematics 16A (4 units); Physics 6A-6B-6C (12 units); Biology 1A-1B (12 units).

Plan A. (Specialization in the area of functional biology as evidenced by a study of the physiological and biochemical aspects of living things):

Option I. Cellular emphasis: Chemistry 109A-109B (8 units), Biochemistry 102A-102B (5 units); Physiology 101 (5 units) or two quarters from among the following: Zoology 104 (5 units); Zoology 110A-110B (3-3 units); Botany 130 (5 units); additional upper division courses in biological science to complete a minimum of 45 units of upper division work in the major.

Option II. Organismal emphasis: Biochemistry 102 (5 units); Botany 144 (5 units); Physiology 102A (5 units), or Physiology 123 (4 units), or Zoology 131 (4 units), or Entomological Sciences 103 (2 units) and Entomological Sciences 103L (2 units); Zoology 107A-107B (5 units), or Zoology 108A-108B (5-5 units), or Entomological Sciences 100 (5 units); Zoology 105 (6 units), or Biology 153 (3 units) and Anatomy 151 (4 units). As under Option I, 45 units of upper division work are required.

Plan B. (Specialization in the area of systematic and evolutionary biology, study of the structure, classification, and evolution of living things): Botany 105 (5 units); Botany 106 (5 units); Botany 110 (5 units), or Botany 125 (5 units); Botany 144 (5 units), or Entomological Sciences 103 (2 units) and Entomological Sciences 103L (2 units); Zoology 104 (5 units); Zoology 107A-107B (5 units), or Zoology 108A-108B (5-5 units), or Entomological Sciences 100 (5 units); Zoology 105 (6 units), or Biology 153 (3 units) and Anatomy 151 (4 units). As under Option I, 45 units of upper division work are required.

Plan C. (Specialization in the area of ecology: study of the relations between living things and their environment): Biology 150 (4 units); Botany 102 (5 units), or Botany 101 (5 units) and Botany 104 (10 units), or Botany 120 (5 units), or Botany 125 (5 units); Zoology 107A-107B (5-5 units), or Zoology 157 (10 units), or Interdepartmental Studies 150 (15 units), or Zoology 108A-108B (5-5 units) or Entomological Sciences 100 (5 units); Physiology 123 (4 units), or Zoology 131 (4 units), or Entomological Sciences 103 (2 units) and Entomological Sciences 103L (2 units); Entomological Sciences 105 (4 units), or Zoology 140 (3 units), or Botany 154 (3 units); additional upper division courses in biological sciences to complete a minimum of 45 units of upper division work in the major. At least one course in statistics is recommended.

Plan D. (Specialization in the area of marine biology): Biology 150 (4 units); Biology 160A-160B (4-4 units); Zoology 142 (4 units); Zoology 108A-108B (5-5 units) or Zoology 143 (10 units) or Zoology 157 (10 units); Veterinary 102 (5 units) or Botany 104 (10 units); one quarter course in upper division, or one quarter course in upper division to complete a major; or an introduction to a marine laboratory; additional upper division courses in biological science to complete a minimum of 45 units of upper division work in the major.

Honor Programs. The honors program consists of completion of Biology H198, Proseminar in Biology (1 unit), and two quarters of Biology H195, Special Study for Honors Candidates (6 units total), followed by a written report.

Single Subject Teaching Credential in Life Science. All credential candidates must be certified under the provisions of the California Teacher Preparation and Licensing Law, effective July 1, 1974. Single Subject Teaching Credential is available in Biology.

104. Marine Geobiology. (4-4) Two hours of lecture and two hours of laboratory and one hour of discussion or a field trip per week. Prerequisite: course 1A-1B or 11A-1B; or the equivalent. An introduction to the principles of ecology, stressing the structure and dynamics of natural ecosystems, designed for biological science majors. (Mr. White, Mr. Spence)

151. Microbial Ecological Ecology. (4-4) Two 1 1/2 hour lectures and one 2-hour discussion/demonstration/field work per week. Prerequisite: a course in general biology. Interrelationships of microorganisms with their environments. Physical and chemical properties of soil and aquatic habitats; cycles of elements; activities of bacteria, algae, fungi, protozoa; population dynamics. Limited enrollment. (Mr. McLaren (in charge), Mr. Ballamuth, Mr. Emerson, Mr. Horne (Sp)

195. Special Study for Honors Candidates. (3) Prerequisite: senior standing or faculty member in the Department of Biology.

NATIONAL MARINE SCIENCE CENTER

150. General Ecology. (3) Three hours of lecture per week. Prerequisite: course 1A-1B or 11A-1B. A freshman introduction to the principles of ecology, stressing the structure and dynamics of natural ecosystems, designed for biological science majors. (Mrs. Spence, Mr. Spence)

151. Microbial Ecology. (4-4) Two 1 1/2 hour lectures and one 2-hour discussion/demonstration/field work per week. Prerequisite: a course in general biology. Interrelationships of microorganisms with their environments. Physical and chemical properties of soil and aquatic habitats; cycles of elements; activities of bacteria, algae, fungi, protozoa; population dynamics. Limited enrollment. (Mr. McLaren (in charge), Mr. Ballamuth, Mr. Emerson, Mr. Horne (Sp)

153. Developmental Biology. (3) Three hours of lecture per week. Prerequisite: course 1A-1B. An introduction to the principles of embryonic development of plants and animals, stressing mechanisms of cell regulation and cell assembly, with special emphasis upon their interactions with man. Topics will include human disease, crop disease, teratogenesis, antibiotics, evolution, waste disposal, composting, storage rot, protein production, chemical conversions, industrial uses, etc. (Mr. Emerson (W)
and Agriculture. May be repeated for credit.

Mr. Jensen (W, Sp)

H-198. Proseminar in Biology. (1) One 1-hour meet-
ing per week plus individual conferences. Prerequisite: upper division standing with an overall 3.0 grade-point average or higher and a 3.3 grade-point average or higher in the major. Reporting and group discussion on selected topics.

Mr. Jensen (F)

199. Supervised Independent Study and Research (1-12). Open to upper division students in the major. Enrollment is restricted by regulations listed on page 34. Must be taken on a pass/no pass basis.

The Staff (Mr. Jensen, in charge) (F, W, Sp)

GRADUATE COURSES

221. Comparative Physiology and Endocrinology Seminar. (1) One hour of lecture per week. Prerequisite: permission of the instructor. Reviews and research in vertebrate endocrinology and physiology. To be taken on a pass/no pass basis.

Mr. Licht, Mr. Nicoll, Mrs. Bern (W, Sp)

260. Tropical Biology—an Ecological Approach. (12) Two 1-hour classes and 30 hours of laboratory and field work per week. Prerequisite: graduate status in a biological discipline and courses in general ecology. Evolution of the biota of the tropical rainforests; their role in the tropical environments; an intensive field course in Costa Rica offered in cooperation with the Organization for Tropical Studies: Jan-Feb; July-Aug. Biology 250 is sponsored by the Graduate Council.

Mr. Baker, Mr. Colwell

301A—301B. Professional Preparation: Teaching of Biology. (1—2) One hour of lecture per week. Prerequisite: upper division standing and appointment as a teaching assistant, or consent of instructor. Principles of teaching biology at the college level. Weekly seminars on approaches to biology, teaching methods, evaluation, and analysis of current problems in general education. To be taken on a pass/no pass basis.

Mr. VonBlum, Mrs Wake (in charge) (F, W)

Molecular Biology 10. Introduction to Molecular Biology. (3) See Molecular Biology for the complete description of this course.

Medical Physics 10. Atomic Radiation and Life. (4) See Medical Physics for the complete description of this course.

Nutritional Sciences 10. Survey of Nutritional Sciences. (8) See Nutritional Sciences for the complete description of this course.

Interdepartmental Studies 10A—10B—10C. Man and His Environment—Crisis and Conflict. (5—6—5) See Interdepartmental Studies for the complete description of this course.

Interdepartmental Studies 100. Problems in Marine Biology. (16) See Interdepartmental Studies for the complete description of this course.

Botany 431. Techniques of Electron Microscopy for Biologists. (3) See Botany for the complete description of this course.

Anatomy 405. Freeze-Etch Electron Microscopy. (3) See Physiology-Anatomy for the complete description of this course.

Biophysics

Division Office, 103 Donner Laboratory; Graduate - Group Office, 101 Donner Laboratory

Courses in biophysics are described under Medical Physics. Undergraduate degree programs in Biophysics and in Biophysics: Medical Physics Option are offered under a group major; see also Medical Physics or the Announcement of the College of Letters and Science for further information.

Graduate degree programs in Biophysics (Ph.D. and M.A.), Biophysics (M.A.), and Medical Physics (Ph.D.) are administered by the Graduate Group in Biophysics.

Biostatistics

Administered by an Interdepartmental Group; Office, 308 Warren Hall

L&S: Botany / 107

Botany

Department Office, 2017 Life Sciences Building

Professors:

Herbert G. Baker, Ph.D.

Michael F. Capone, Ph.D.

Herbert B. Gross, Ph.D.

Lester H. Jaffe, Ph.D.

Joseph L. Itodges, Jr., Ph.D.

William W. Jolliff, Jr., Ph.D.

Lincoln Constance, Ph.D.

Kai-Yan Lam, Ph.D.

Michael J. Tarter, Ph.D.

O‘Neil R. Collins, Ph.D.

Ralph Emerson, Ph.D.

Watson M. Laetsch, Ph.D.

George F. Parent, Ph.D.

Roderic B. Park, Ph.D.

Nancy J. Vivrette, Ph.D.

Rudolf Schmid, Ph.D.

Undergraduate Departmental Major Advisers:

Mr. Emerson, Mr. Schmid, and Ms. Vivrette

The major in botany is designed to acquaint undergraduates with the fundamental aspects of plant science and to offer sufficient latitude besides for more specialized studies in areas of special interest. Background courses in the physical sciences, particularly chemistry, are taken in the freshman year while the required introductory sequence in Biology (1A—1B) is normally taken in the sophomore year. Prospective majors are urged to consult the departmental major advisers early in their lower division work.

THE MAJOR

Lower Division. Biology 1A—1B; Botany 1; Chemistry 1A—1B; 8A—8B; two additional quarters of chemistry (from 1C, 5, or 14) or calculus (Mathematics 1A—1C or 16A—16B or 190A—190B) or Physics 6A—6B—6C.

Upper Division. Biochemistry 102; two courses of the following: Botany 101, 102, 105, or 110; Botany 146; Botany 112 or 130; one course of the following: Botany 120, 124, or 154 (Biology 150 is prerequisite) and 154L; plus one additional course from any of the preceding three groups; Genetics 100 or 150A—150B.

Additional courses in the physical sciences and courses in related departments to complete a minimum of 36 upper division units.

Honors Program. With the consent of the major adviser, students with an overall grade-point average of 3.3 or higher and a grade-point average of 3.3 or higher in the major may arrange an individual program of special study, to begin not later than the first quarter of their senior year. Students in the honors program must pass an oral comprehensive examination.

PREPARATION FOR GRADUATE STUDY

Graduate students in the group have direct access to a small electronic computer and also have access to the services of the University Computer Center. A unique facility available to group members is the Child Health Development Studies conducted by the Division of Biostatistics of the School of Public Health. Financed by the National Institutes of Health, this facility provides opportunities for both practical experience and individual research.

Research in the Statistical Laboratory and cooperation with other departments allow the possibility of unusual broad and effective training in both the theoretical and applied directions. Research activity in the Statistical Laboratory presently includes stochastic models and applications in carcinogenesis, competition of species, cell division, theory of epidemics, and population dynamics.

COURSES OF INSTRUCTION

A wide variety of appropriate courses from a number of departments is available to candidates for either the M.A. or the Ph.D. degrees, giving both programs considerable flexibility. Such flexibility allows students in consultation with the major professor and graduate adviser, to arrange their own program. See Public Health and Statistics for some of the course listings.
Graduate training leading to the M.A. and Ph.D. is offered in the field of botany as represented by the experience, interests, and competence of the faculty. Students should have had or must complete the required, or equivalent, courses which compose the undergraduate major. They must demonstrate a reading knowledge of one of the principal languages used in the field and proficiency in one of the physical sciences. Applicants are urged to review their first year of graduate work, and they are expected to attend Botany 385 or Biology 301A–301B the first time they are Teaching Assistants and graduate seminars (Botany 290 or equivalent) for two quarters of each of the second and third years of graduate study. Students' further course work will be planned with an advisory committee during the first quarter and subsequently with the major graduate group.

Students should note that the faculty of the Department of Botany are members of several graduate groups described in appropriate bulletins of the Graduate Division. Students may enroll in such program groups with a faculty member of Botany as their major professor.

For further details on the requirements for the M.A. and the Ph.D. degrees, as well as the facilities available for graduate study in botany, please consult the graduate advisors.

The Botanical Garden in Strawberry Canyon provides opportunities for research with living plants, supplies teaching material, and is open to the campus, and serves as an outdoor laboratory for students; its collections are especially rich in succulents, South American, South African, European, and Australian plants. The combined University and Jepson hierarchies offer a world-wide, floristic, reference-research collection and library which form a foundation for basic research in systematic botany, ecology, phyletography, and evolution, not only for faculty, staff, and students but also for visiting scholars and for biologists throughout the United States and other countries.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

Prerequisites: For cogent reasons, but rarely, instructors will consider accepting in courses students who do not have all of the prerequisites. Prerequisites are stated in terms of Berkeley courses but equivalent courses taken elsewhere will be acceptable.

**LOWER DIVISION COURSES**

1. General Botany. (5) Three 1-hour lectures and two 3-hour laboratory periods per week. Prerequisite: Biology 1A-1B. Emphasis will be on the structure, life histories, reproductive mechanisms and relationships of the major groups of plants. (Fall.) Mr. Kane (F)

2. Practical Botany. (2) One 3-hour lecture-workshop to be given at the Botanical Garden. Prerequisite: consent of instructor. The fundamentals of plant physiology, taxonomy, and morphology as related to the principles and practice of ornamental horticulture. Mr. Ornduff (Sp)

3. Plant Biology. (4) One 1-hour lecture and one 3-hour audiovisual study session (to be arranged by students) per week. Open without prerequisite to all students and designed for those not specializing in the biological sciences. Emphasis of the course is placed on the fundamental concepts of biology as illustrated by the structure and function of plants. Mr. Ornduff (F)

**UPPER DIVISION COURSES**

101. Survey of Mycology. (5) Two 1 1/2-hour lectures and two 3-hour laboratory periods per week. Prerequisite: Biology 1A-1B. Emphasis will be on the structure, life histories, reproductive mechanisms and relationships of the major groups of plants. Mr. Ornduff (F)

102. General Botany. (5) Two 1 1/2-hour lectures and two 3-hour laboratory periods per week and two or three half-day trips to local areas. Prerequisite: Biology 1A-1B. General biology of fresh-water and marine algae including both phophyta and benthos. Emphasis is on morphology, phylogeny, and systematics. Laboratories include study of representative types, identification of field-collected specimens, techniques for culture, and simple experiments on development and reproduction. (W)

104. Marine Botany. (10) Full-time study at Bodega Marine Laboratory in the first half of the summer, including lectures, laboratory, field work and special problems, with emphasis on the developmental mechanisms responsible for the variation in form and the significance of this diversity in relation to the environments in which the plants grow. Mr. Kaplan (Sp)

110. Evolutionary Morphology of Vascular Plants. (5) Two 1 1/2-hour lectures and two 3-hour laboratory periods per week. Prerequisite: Biology 1A-1B and course 1: course 105 recommended. An analysis of the evolution and comparative morphology of vascular plants studied from the viewpoint of both fossil and living representatives. Mr. Schmid (W)

112. Anatomy of Vascular Plants. (5) Two 1 1/2-hour lectures and two 3-hour laboratory periods per week. Prerequisite: Biology 1A-1B. Recommended. A consideration of the functional and developmental aspects of cell, tissue, and organ structure, including their adaptations to ecological factors such as pollination, dispersal, and water availability. Mr. Schmid (F)

115. Plants and Man. (4) Two 1 1/2-hour lectures and 2 hours of demonstration per week. Prerequisite: a course of high school or college biology or botany. Man's selection and use of plants for his own purposes and the interrelation between the evolution of domesticated plants and the cultural evolution of man. Mr. Baker (F)

120. Taxonomy of Seed Plants. (5) Three 1-hour lectures and two 3-hour laboratory periods per week plus field work. Prerequisite: Biology 1A-1B. Lectures on phytography and classification of spermatophytes; laboratory and field work illustrating taxonomic principles and methods. Mr. Ornduff (Sp)

124. Field Course in Plant Taxonomy and Ecology. (10) Full-time study in the first half of the summer at the University of California Field Station at Sages Creek, near Truckee, California. Emphasis in biology. The taxonomic aspects include a brief survey of the flowering plants with plants in practice. The ecological aspects include studies of physiological tolerances of plants and the nature of limiting factors of the environment as they influence patterns of distribution. Acceptable in place of course 120 for the major. Mr. Ornduff (Sp)

125. The California Flora. (3) Two 1-hour lectures and one 1-hour discussion. Prerequisite: None, but prior knowledge of California plants desirable. The location of California plants and plant communities to soils, climate, geological history and recent history. Mr. Ornduff (Sp)

125L. Laboratory in the California Flora. (2) Two 3-hour laboratory periods. Prerequisite: None, but must be taken concurrently with Botany 125. The use of keys and living representatives. Mr. Ornduff (Sp)

130. Plant Cell Biology. (5) Three 1-hour lectures and course 154 recommended. Prerequisite: Biology 1A-1B. A synthesis of morphological, biochemical, and genetic information on cell function, structure, and interaction with the environment. Mr. Ornduff (Sp)

144. Plant Physiology. (5) Three 1-hour lectures and two 3-hour laboratory periods per week. Prerequisite: Biology 1A-1B and Chemistry 8A, 8B. A study of the physiology of the fundamental and major field majors. Not open to students who have taken course 146. Mr. Ornduff (Sp)

145. Maintenance Physiology and Development. (5) Three 1-hour lectures and two 3-hour laboratory periods per week. Prerequisite: Biology 1A-1B; Chemistry 8A, 8B; Biochemistry 102. Emphasis on water relations, mineral nutrition, development and reproduction of higher plants. Designed primarily for Botany majors. Mr. Ornduff (Sp)

Arrangements must be made well in advance for a place in the class and for personal accommodations. Inquiries regarding details are to be addressed to: The Director, Bodega Marine Laboratory, P.O. Box 21, Inverness, California 94926.

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didates for the Ph.D. in the area of plant physiology. Given every sixth quarter, beginning Fall 1977.

*1259. Advanced Plant Ecology. (3) Three hours of discussion per week. Prerequisite: an upper division course in plant ecology and consent of instructor. intensive reading and analysis of the literature in the field of plant ecology. Designed for candidates for the Ph.D. in the area of plant ecology.

290. Seminar. (2) One 1-hour meeting per week. Prerequisite: consent of instructor. Advanced study in various fields of botany. Topics will be announced in advance of each quarter. Enrollment in more than one section permitted. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

299. Research. (1–12) Graduate student research. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

*1395. Botanical Teaching. (2) One 2-hour lecture per week. Prerequisite: open to all graduate students in the Department of Botany. The course will cover the aims and methods of teaching botany at the college and university level. All new Teaching Assistants in the department are expected to enroll. Must be taken on a satisfactory/unsatisfactory basis.

431. Techniques of Electron Microscopy for Botanists. (4) One 1-hour lecture and two 3-hour laboratories per week. 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. (W)

602. Individual Study for Doctoral Students. (1–6) Individual study in consultation with the major field advisor, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or resident requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

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**Buddhist Studies**

**THE GROUP IN BUDDHIST STUDIES ADMINISTERED BY AN INTERDEPARTMENTAL E GROUP:**

Office, 4115 Dwinelle Hall

Professors: Robert N. Bellah, Ph.D. (Sociology and Comparative Studies) Delmer N. Brown, Ph.D. (History) James Cahill, Ph.D. (History of Art) Wim Bomhard, Ph.D. (Sociology)

Associate Professors: James E. Bosson, Ph.D. (Oriental Languages) Lewis R. Lancastor, M.T. Ph.D. (Oriental Languages) Wending Tu, Ph.D. (History) Baran A. Van Noote, Ph.D. (South and Southeast Asian Studies)

Chairman: Lewis R. Lancaster

Graduate Adviser: P.S. Jaini

The Group in Buddhist Studies offers an interdisciplinary program of study and research leading to the Ph.D. degree in Buddhist Studies. The Group, which cooperates closely with the Departments of South and Southeast Asian Studies and of Oriental Languages, emphasizes the close ties of religion with the linguistic background and the surrounding civilizations. Students who wish to join the program may choose either an emphasis on Sanskrit or on an East Asian language, e.g., Chinese or Japanese. For those who choose the Sanskrit emphasis, the required secondary language will be Chinese or Tibetan; for the Chinese/Japanese emphasis, the required secondary language will be Sanskrit.

Preparation. For admission to the graduate program the student shall have completed an M.A. in one of the appropriate Asian languages or have equivalent language preparation. Early in the student's doctoral degree, written examinations in two modern languages must be passed. These languages must be relevant to the student's program and have the approval of the graduate adviser.

Further information about the program, including a full statement of the requirements for advancement to candidacy, is available upon request from the Group Office.

212. Advanced Seminar in Buddhist Studies. (4) Three hours of lecture per week. Prerequisite: consent of instructor. Specialized topics in Buddhist Studies, involving the use of Sanskrit, Tibetan, and Chinese materials. May be repeated for credit with consent of instructor. Mr. Lancaster (in charge) (F, W, Sp)

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**Chemistry**

Staff and courses are listed under the College of Chemistry.

**CHOICE OF COLLEGE**

A student can complete a major in chemistry in either the College of Letters and Science (A.B. degree) or the College of Chemistry (B.S. degree). Both curricula are approved by the American Chemical Society, and either is a satisfactory foundation for a career in chemical industry, for teaching of chemistry, or, if completed with high academic standing, for graduate work in chemistry.

**CHEMISTRY MAJOR IN THE COLLEGE OF LETTERS AND SCIENCE**

Major Office, 420 Latimer Hall

Major Advisers: Mr. Rapport, Mr. Cason

**MAJOR REQUIREMENTS**

Mathematics: 1A, 1B, 1C. Physics: 5A, 5B, 5C, 5D, 5E or completion of Physics 4 sequence. Mathematics: 1A, 1B, 1C, 5 or (4A, 4B, 4C); 12A, 12B, 14, 104A, 110A, 110B, 112, and a choice of 105, 106, 107, or 111A–111B. (For students who wish to be certified to the American Chemical Society, this must be 111A–111B.) Enough additional units in upper division chemistry and allied subjects to make a total of 30. For students who wish to be certified to the American Chemical Society, a reading knowledge of scientific German is required. German 1 and 2 will meet this requirement.

Honor Program. In addition to completing the requirements for the major in chemistry, a student in the honors program will (a) earn a grade-point average of at least 3.3 in upper division courses in the major, and (b) be recommended by his major advisor—this would normally be based upon passing H114, H117, or 127 with a grade of B+ or higher and receiving a B+ or higher in at least 3 units of H194. Students interested in the honors program should consult with their major advisor during the junior year.

**FIELD MAJOR IN PHYSICAL SCIENCES**

Students interested in this major please see Physical Sciences for the description of the major program.

**CALIFORNIA TEACHING CREDENTIAL**

For information concerning the California Teaching Credential (Single or Multiple Subject), see the Announcement of the School of Education.

**GRADUATE STUDY IN CHEMISTRY**

Students interested in graduate study are referred to the Chairman of the Department of Chemistry, 419 Latimer Hall, for information.

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**Classics**

Department Office, 5303 Dwinelle Hall


Associate Professors: John M. Dillon, Ph.D. Crawford H. Greenewalt, Ph.D. Stephen G. Miller, Ph.D. Charles E. Mungan, Ph.D. Florence V. Goldstine, Ph.D. (Emeritus) (Emeritus)


NOTE: For key to symbols, see page 34.
or Highest Honors, the level to be determined by the
To be admitted to the honors program, students must
major. They may graduate with Honors, High Honors,
part of both Latin 145 and 150; (b) three quarters of
Sanskrit (see South and Southeast Asian Studies), Art
140A-140B, 141, 144, History 110A-110B.

**Major in Greek.** Greek 1-2 or 1A-1B-1C; 40A-
40B-40C (may be taken concurrently with upper di-
cisions); 100, 101, 102, 103; 12 units chosen from
other upper division Greek courses; 16 units
chosen either from additional upper division courses in
Greek or from recommended upper division courses.
Recommended: Courses in Classics, Latin, Sanskrit
(see South and Southeast Asian Studies), Art 140A,
140B, 141, 144, History 110A-110B.

**Major in Latin.** Latin 1, 2, 20, 30 or equivalent;
40A-40B-40C (may be taken concurrently with upper di-
cision courses); 104, 105, 106, 107; 12 units chosen from
other upper division Latin courses; 16 units
chosen either from additional upper division courses in
Latin or from recommended upper division courses.
Recommended: courses in Classics, Greek, Sanskrit
(see South and Southeast Asian Studies), Art 144,
History 111A-111B.

**The MAJOR IN CLASSICAL LANGUAGES.** Greek 1-2
or 1A-1B-1C; Latin 1, 2, 20, 30 or equivalent; Greek
40A-40B-40C or Latin 40A-40B-40C (may be taken
concurrently with upper division courses); Greek 100,
101, 102, 103; Latin 104, 105, 106, 107; one
additional 4-unit course chosen from Greek 115, 120,
145, 150. Recommended: Courses in Classics, Greek,
Sanskrit (see South and Southeast Asian Studies), Art
144A-140B, 141, 144, History 110A-110B, 111A-
111B.

**Honors Program.** Greek: (a) the major program,
including Greek 150A-150B and at least one part
both Greek 115 and Greek 120; (b) three quarters of
Greek H195 taken during the senior year. Latin: (a)
the major program, including Latin 160 and at least one
part of both Latin 145 and 150; (b) three quarters of
Latin H195 taken during the senior year. The classical lan-
guages: (a) the major program; (b) at least two courses
chosen from Greek 115, Greek 120, Latin 145, Latin 150;
(c) either Greek 150A or Latin 150; (d) three quar-
ters of either Greek H195 or Latin H195 taken during
the senior year.

To be admitted to the honors program, students must
gave a grade-point average of 3.3 or higher overall in the
University and 3.3 or higher in the courses in the major. They
must be recommended with Honors, Highest Honors, or
Highest Honors, the level to be determined by the
Honors Committee of the Department.

**Intercollegiate Center for Classical Studies in Rome.** There will be an opportunity for some clas-
sics majors to attend the Intercollegiate Classical Cen-
ter at Rome. This is an intensive program of class-
sical undergraduates. All students interested in this
program should consult the Major Adviser.

**PREPARATION FOR GRADUATE STUDY.** To enter upon graduate study in Classics, students
should complete the major in Greek or Latin or class-
sical languages (or a satisfactory equivalent). They
are strongly advised also to have an adequate reading
knowledge of French and German, since they must pass examinations in both for the Ph.D. degree, and in
one of them (or in Italian, which is also recommended)
for the M.A. degree; furthermore, without both French
and German they will be greatly handicapped in grad-
uate study of classical subjects (and they will find it
Italian very useful too). Prospective graduate students in
Classics should also take upper division prose com-
position in both languages (Greek 150A-150B and
Latin 160A-160B): they will need competence in both
Greek and Latin composition for the Ph.D. qualifying
examinations.

**THE GRADUATE MAJOR**

The Master of Arts degree may be taken in Greek,
Latin, (each under Plan B: a program of 36 units
graduate and advanced undergraduate courses, and
a dissertation).

The Doctor of Philosophy degree may be taken in clas-
sics or Classical Archaeology. Whatever the graduate
students' principal interest—literature, history, archae-
ology, or other subjects—they should take a broad
program and acquaint themselves with every field of
classical study. Greek and Latin study is essential in
Greek and Latin authors and in Greek and Roman history,
since both M.A. and Ph.D. qualifying examinations require an
extensive knowledge of literature and history. They are
especially advised to develop competence in paleogra-
phy, comparative grammar, and Greek dialects
when they are offered, since the interval between offer-
ings of each is at least three years. The graduate pro-
gram is varied from year to year so that in a normal
period of graduate study students may take courses in
several fields and periods. For details of the M.A. and
Ph.D. programs consult the graduate adviser.

**Letters and Science List:** for regulations governing
this list, see the Announcement of the College of Let-
ters and Science.

**Classics**

Courses that do not require a knowledge of Greek or
Latin. Courses in this group are designated Classics
10A, Classics 10B, etc.

**10A-10B. The Golden Age of Greece.** (4-4) Three
1-hour lectures per week. The greatest period of
Greek civilization (460-323 B.C.) and the reasons for
its greatness. Translations of the Greek classics
studied in their political and social setting will illustrate
the formation of the Roman republic, the achievements of
the great statesmen, poets, and historians. Transforma-
tions of each is at least three years. The graduate pro-
gram is varied from year to year so that in a normal
period of graduate study students may take courses in
several fields and periods. For details of the M.A. and
Ph.D. programs consult the graduate adviser.

**UPPER DIVISION COURSES**

100A-100B-100C. Greek and Latin Literature in
Translation. (4-4-4) Three 1-hour lectures per week.
Enrollment limited. 100B or 100C may be taken first.
100A. Greek literature to 300 B.C. Mr. Sweet (F)
100B. Hellenistic Literature and Latin Literature of
the Roman Republic. Mr. Thwellte (W)
100C. Latin literature under the Roman Empire.
Mr. Goldstine (Sp)

**133. Ancient Comedy.** (4) Three 1-hour lectures per
week. A study of individual plays and of the con-
cept of the comic genre in the works of Aristophanes,
Menander, Plautus, and Terence.

**136A-136B. Socrates and the Socratic Tradi-
tion.** (4-4) Three hours of lecture per week. Study of
what Socrates meant to his times, as seen through the
works of Plato, Xenophon, and Aristophanes. Analysis
of the way later Greek thinkers expanded and altered
Socrates' original significances, and Euripides.

**137. The Ancient Novel.** (4) Three 1-hour lectures per
week. A discussion of the ancient romances (ori-
gins, development, form) including Apuleius' Meta-
morphoses, Longus' Daphnis and Chloe, and Hec-
dorus' Egyptian Tale.

**138. The Greek and Roman Historians.** (4) Three
1-hour lectures per week. The five historians Her-
dotus, Thucydides, Polybius, Livy, and Tacitus. In
English translation: their intellectual background, doc-
umentary sources, and philosophy of history.

170A-170B-170C-170D-170E-170F-170G.
Classical Archaeology. (4-4-4-4-4-4-4-4) Three
1-hour lectures and discussion sessions per week. The
latter parts may be taken before the earlier.

170A. Greek Vase-Painting from 700 B.C. to Ex-
ekusia.
170B. Greek Red-Figure Vase Painting.
170C. Greek Sculpture in the Sixth and Fifth Cen-
turies B.C.
170D. Greek Sculpture in the Fourth Century B.C.
and of the Hellenistic Age. (4-4-4-4) Three
1-hour lectures and discussion sessions per week. The
latter parts may be taken before the earlier.
170E. Survey of Greek Architecture.
170F. Aspects of Roman Art. Mr. J. K. Anderson (Sp)
170G. Roman Wall Painting.

175A-175B-175C-175D. Greek and Roman
Cities and Sanctuaries. (4-4-4-4) Three 1-hour lec-
tures per week.

175A. Ancient Greek Sanctuaries.
175B. Topography and Monuments of Athens.
175C. Topography and Monuments of Rome and
Ancient Italy.
175D. Topography and Monuments of Asia Minor.

176A-176B. Ancient Greek and Roman Rel-
igion. (4-4) Three 1-hour lectures per week: indi-
vidual conferences to be arranged. The worship of
the gods in ancient Greece and Rome: cults and religious
ideas.

176A. Greece.
176B. Rome.

178. Mythology. (4) Two 1 1/2-hour class meet-
ings per week. Prerequisites: course work in myth,
religion, and ancient philosophy, or equivalent; basic
knowledge of content of major Greek myths. Investigations into
the
significance of myth, based upon Greek mythology and the development of Greek political institutions.

**Greek**

**LOWER DIVISION COURSES**
(Courses in this group are designated Greek 1, Greek 2, etc.)

1. Greek for Beginners. (6) Five 1-hour class meetings per week. First part of two-part course in elementary Greek. Mr. Nagler (F)

2. Greek for Beginners. (6) Five 1-hour class meetings per week. Second part of two-part course in elementary Greek.

**UPPER DIVISION COURSES**

100. Xenophon. Anabasis. (6) Three 1-hour class meetings per week. Prerequisite: courses 1-2 or 1A-1B-1C.

101. Homer. (4) Four 1-hour class meetings per week. Mr. Stroud (F)

102. Plato. (4) Four 1-hour class meetings per week. Prerequisite: course 100.

103. Drame: Euripides. (4) Three 1-hour class meetings per week. Prerequisite: course 100.

115. Senior Course in Greek Poetry. (4) Three 1-hour class meetings per week. Mr. Bulloch (Sp)

**Latin**

**LOWER DIVISION COURSES**
(Courses in this group are designated Latin 1, 2, 3, 5, etc.)

1. Latin for Beginners. (3) Three 1-hour class meetings per week plus one additional hour every other week. Mr. Nagler (F)

2. Latin for Beginners. (3) Three 1-hour class meetings per week plus one additional hour every other week. Mr. Nagler (F)

**UPPER DIVISION COURSES**

104. Vergil. (4) Three 1-hour class meetings per week. Prerequisite: course 100.

105. Ciceron. (4) Three 1-hour class meetings per week. Prerequisite: course 100.

107. Cicero. (4) Three 1-hour class meetings per week. Prerequisite: course 100.

**Classics**

**GRADUATE COURSES**

For new students: Classics 200A is prerequisite to all other graduate courses in Greek, without special permission. Classics 200B is prerequisite to all other graduate courses in Latin, without special permission.

Courses vary from year to year and are not necessarily given in alternating years.
sequence of readings and lectures on the Greek literature for which advanced graduate students are held responsible. To be offered in alternate years.

*201A. Early Greek, Homer through Choral Lyric.
*201B. Tragedians and Historians of the Fifth Century.
*201C. From Aristophanes to Hellenistic Literature.

202A--202B--202C. Survey of Latin Literature. (4-4-4) Two 1 1/2-hour class meetings per week. A sequence of readings and lectures on the Latin literature for which advanced graduate students are held responsible. To be offered in alternate years.

202A. Early Latin through Cicero. Mr. Margan (F)
202B. Augustan Literature. Mrs. Goldstine (W)
202C. Post-Augustan Literature.

Mr. W. S. Anderson (Sp)

*210A. The Language of Homer. (4) Two 1 1/2-hour class meetings per week. An introduction to the early history of the Greek language using the evidence of the Linear B tablets and the Homeric poems. Problems of phonology, morphology, and syntax will be studied and an introduction provided to the major dialect divisions and their significance for Homer.

*210B. Homer. (4) Two 1 1/2-hour class meetings per week. Language, meter, and questions of oral poetry.

211. Homosol. (4) Two 1 1/2-hour class meetings per week. Mr. Rosenmeyer (Sp)

212. Greek Lyric Poets. (4) Two 1 1/2-hour class meetings per week.

*212A. Earlier.
*212B. Later.

213. Greek Dramatists. (4) Two 1 1/2-hour class meetings per week.

*213A. Aeschylus.
*213B. Sophocles.

213C. Euripides. Mr. Martinone (W)
213D. Aristophanes.
213E. Menander.

214. Greek Epigraphy. (4) Two 1 1/2-hour class meetings per week. Mr. Stroud (W)

215. Greek Historians. (4) Two 1 1/2-hour class meetings per week.

*215A. Herodotus.
*215B. Thucydides.
*215C. Aristotle's Constitution of Athens.
215D. Polybios.
215E. Plutarch.

216. Greek Philosophers. (4) Two 1 1/2-hour class meetings per week.

216A. Pre-Socratics. Mr. Rabinowitz (Sp)
216B. Plato.
216C. Aristotle.
216D. Later Platonism.

*217. Greek Orators. (4) Two 1 1/2-hour class meetings per week.

*218. Greek and Latin Romance. (4) Two 1 1/2-hour class meetings per week.

219. Orphism and Greek Religion. (4) Two 1 1/2-hour class meetings per week. To be offered winter '77 only.

*221. Introduction to Papyrology. (4) Two 1 1/2-hour class meetings per week. An introduction to reading and editing Greek and Latin papyri, seeking to evoke an appreciation for the historical, legal, social, and literary contributions of papyrology to the knowledge of the classical world.

222. Greek and Latin Linguistics. (4) Two 1 1/2-hour class meetings per week.

222A. Greek Diacritics.
222B. Comparative Grammar.

230. Roman Dramatists. (4) Two 1 1/2-hour class meetings per week.

*230A. Plautus.
*230B. Terence.
*230C. Seneca.

231. Roman Epic Poets. (4) Two 1 1/2-hour class meetings per week.

231A. Lucretius.
*231B. Vergil.
*231C. Ovid.

232. Roman Philosophers and Rhetoricians. (4) Two 1 1/2-hour class meetings per week.

234. Roman Lyric Poets. (4) Two 1 1/2-hour class meetings per week.

*234A. Catullus.
*234B. Horace.

235. Roman Pastoral and Elegiac Poets. (4) Two 1 1/2-hour class meetings per week.

*235A. Vergil.
*235B. Tibullus, Propertius and Ovid.

236. Roman Satirists. (4) Two 1 1/2-hour class meetings per week.

236A. Horace. Mr. W. S. Anderson (Sp)
236B. Persius and Juvenal.

*236C. Petronius.

237. Roman Historians. (4) Two 1 1/2-hour class meetings per week.

*237A. Sallust.
237B. Caesar. Mr. Knapp (W)

*237C. Livy.

*237D. Tacitus.

237E. Suetonius.

237F. Pliny.

245A--245B. Latin Literature of the Middle Ages. (4-4) One 2- to 3-hour class meeting per week.

*245A. Latin Literature of the Early Middle Ages, 500--900 A.D. Special attention will be given to the classical tradition and its influence.

245B. Latin Literature of the High Middle Ages, 900--1300 A.D. Study of the evolution of mediaeval style with special attention to lyrical and satirical poetry.

*246. Roman Society and Roman Law. (4) Two 1 1/2-hour class meetings per week. The social, legal, and administrative background to the literary sources for the Roman Empire.

*247. Roman Politics and Administration. (4) Two 1 1/2-hour class meetings per week. Select problems in Roman imperial history from 69--285 A.D.

270A--270B--270C. Seminar in Classical Archaeology. (4-4-4) Two 1 1/2-hour class meetings per week. Advanced study of ancient Greek art objects and sites.

270A. Mr. J. K. Anderson (F)
270B. Mr. J. K. Anderson (W)
270C. Mr. Greenewalt (Sp)

*271. Pan-Hellenistic and Nemea. (4) One 3-hour meeting per week. In addition to providing an opportunity to study in detail the types of monuments, artfacts, dedications, etc., relevant to the Pan-Hellenic centers, the seminar will investigate the place and significance of the Pan-Hellenic festivals in Greek society, especially as exemplified by the discoveries at Nemea.

289. Special Study. (2--6) Prerequisite: completion of qualifying examination for the Ph.D. degree. This course is normally reserved for students writing the doctoral dissertation.

299. Special Study, (1--6) Special individual study for qualified graduate students.

601. Individual Study for Master's Candidates. (1--8) Individual study for the comprehensive or language requirements in consultation with the field advisor. Units may not be used to meet either unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis.

602. Individual Study for Doctoral Candidates. (1--8) Individual study in consultation with the major field advisor, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

RELATED COURSES IN OTHER DEPARTMENTS

For courses in Sanskrit see Department of South and Southeast Asian Studies.

Readings in Medieval Latin (English 210A--210B). (5--5)

Reading in Renaissance Latin (English 210C). (5--5)

Indo-European Comparative Linguistics (Linguistics 165). (4) Mr. Boeier (W)

Advanced Indo-European Comparative Linguistics (Linguistics 244). (4) Mr. Beeler (Sp)

IDS 213. Studies in the Philosophy of Democracy. (4) See interdepartmental Studies for the complete description of this course.

Medieval Studies. Students who are interested in specializing in medieval studies should consult the Graduate Division section of this catalog, in which the Committee for Medieval Studies is described.

Comparative Literature Department Office, 4401 Dwinelle Hall

Professors:
Paul J. Alexander, Ph.D. (Rhetoric) (Chairperson)
Robert Alston, Ph.D. (Hebrew)
William S. Anderson, Ph.D. (Latin)
Cyril Everest, Ph.D. (Chinese)
Louise George Cubb, Ph.D. (Italian)
Philip Damon, Ph.D. (English)

Assistants:
Michael Andre Bernstein, D.Phil. (English)
Patrick Davis, Ph.D. (English)
Marie-Victoire Huet, Ph.D. (French)

Assistant Professors:
Elsino Hoover, Ph.D. (Spanish)
Jayme Walker, Ph.D. (English)
Kenneth Wielinga, Ph.D. (Classics)

Teaching Assistants:
Daniel Hoak, B.A. (German)
Thomas G. Rosenmeyer, Ph.D. (American)
Hilary P. Conard, B.A. (Scandinavian)

C. Cary McPherson, Ph.D.

Committee for Medieval Studies is described. Students specializing in medieval studies should consult the Department Office, 4401 Dwinelle Hall

IDS 213. Studies in the Philosophy of Democritus. (4) See interdepartmental Studies for the complete description of this course.

Comparative Literature

Department Office, 4401 Dwinelle Hall

Professors:
Eric O. Johannesson, Ph.D. (French)
James T. Monroe, Ph.D. (English)
L. Janette Richardson, Ph.D. (Romance) (Chairperson)
Thomas G. Rosenmeyer, Ph.D. (Greek)
Robert P. Hughes, Ph.D. (French) (Chairperson)
John S. Coolidge, Ph.D. (English)
Joseph J. Duggan, Ph.D. (French)
Marie-Victoire Huet, Ph.D. (French)

Graduate Studies Committee:
Michael Andris, B.A. (English)
Porphyry, Ph.D. (Philosophy)

Teacher Training: consult Mr. Anderson.

The undergraduate major in the Department of Comparative Literature is based on the theory that responsible literary criticism requires both a serious knowledge of at least one national literature and the close study of literary masterpieces written in more than one language, place, and time. It offers students an opportunity (1) to develop their ability to read literature critically and responsibly, (2) to study one literature in depth and at least one other in areas immediately relevant to their aims and interests, (3) to acquire a broader sense of literary history and tradition than may be derived from the study of a single literature, and (4) to prepare themselves for the methodical investigation of problems involving more than one literature. The junior course (CL 100) is designed to introduce students to a variety of fundamental approaches to literature and to encourage them to formulate their own critical standards. The senior course (CL 190) is designed to permit students to apply the principles of literary criticism which they have studied separately in the preceding quarters. The specific requirements for the A.B. with a major in comparative literature are listed below.

The MAJOR

There are no specific lower division requirements beyond completion of the Letters and Science reading and composition requirement and sufficient work in at least one foreign language to qualify for admission to upper-division literature courses in that language. Two quarters from the Comparative Literature 41 series and two other literature courses are recommended but not required. Students potentially interested in the A.B. with honors should note the re-
quirement for upper-division work in both a vernacular foreign language and either Greek or Latin.

Upper Division. A minimum of 45 approved upper-division units in literature, including (1) CL 100 in the junior year and a section of CL 180 in the senior year, (2) at least four courses totaling not fewer than 8 units in one literature read in the original language and with emphasis on the classic works of that literature, (3) at least two courses totaling not fewer than 8 units in another literature read in the original language and (4) at least two courses in upper division classical Greek and Latin in translation to be selected from the offerings of the Department of Classics, or one upper-division course in Greek (courses numbered 101 or higher). Note that, although only four foreign languages are required (for example, English–French) are required for the A.B. degree, an adequately prepared student may find it advantageous to work in three literatures (for example, English–Latin–French).

Honors Program. Students who have attained junior standing may be admitted to the honors program if (1) they have accumulated at least an overall 3.0 grade-point average and at least a 3.3 grade-point average in courses in the major, (2) have completed at least 16 upper-division units in literature, including Comparative Literature 100 or the equivalent, and (3) are prepared to do upper division work in both one vernacular foreign language and either classical Greek or Latin before graduation. Attention is called to the special honors course (H198), which is designed to allow students who have completed H1A–H1B with distinction to prepare for honors throughout their entire undergraduate career.

In addition to the requirements for the regular program outlined above, candidates for the A.B. with honors in Comparative Literature must (1) accumulate at least a 3.3 grade-point average in the major by the time of their graduation, (2) do upper division work in both a vernacular foreign language and either classical Latin or classical Greek including two courses beyond Greek 100, (3) demonstrate, through either examination or course work, a sense of the historical development of the major language family, and (4) earn a grade of B or higher for the writing of an honors thesis in Comparative Literature H198. Students interested in the honors program are urged to consult an adviser in the Department of Comparative Literature at their earliest opportunity.

THE GRADUATE PROGRAM

The M.A. program normally prepares students for doctoral work in a particular area of interest, or, when taken in conjunction with the appropriate teaching credential, leads to teaching at the high school or junior college level. The Ph.D. program prepares students for teaching and research in the ancient and modern foreign languages and literatures; it is especially designed to encourage research involving the study of literary documents in more than one language. Additional information may be sought from the instructor in charge of graduate studies in the Department of Comparative Literature.

Undergraduate Preparation. Students interested in the graduate program in Comparative Literature are advised that a background in at least one foreign language will speed up their work on the graduate level. A reading knowledge of two foreign languages is required for the M.A. degree, and a reading knowledge of four or five foreign languages (including both Greek or Latin and French or German or Russian) is required for the Ph.D.

Requirements for the M.A. Degree. A minimum of 36 approved graduate and upper-division units including 15 graduate units. (2) At least two introductory graduate courses in Comparative Literature, and (3) in work in at least two separate ancient or modern literatures (for example, English and Italian), one course must be taken in depth and the other in areas relevant to the student’s aims and interests. The required course work in individual literatures depends upon the student’s previous training but must include at least two courses at the graduate level not fewer than 8 units in the minor literatures and three courses (totalling not fewer than 10 units and including two or more graduate courses) in the major literature. Courses on foreign literature in English translation may not be counted in satisfaction of the requirements listed above. The first year of graduate study is usually spent preparing for the M.A. written examination on a list of approved topics, with the responsibility of preparing themselves, through course work and reading, for the written and oral doctoral qualifying examination on (1) the development of one literature with heavy emphasis on one period of specialization or one major genre and (2) two foreign literatures in only one period each. After consultation with the adviser, students may request to be examined on only two literatures if the examination covers the development of both in addition to the period or periods of specialization. In either case, the comparative questions are usually limited to the period or periods of specialization, and all the texts presented must have been read in their original languages. Examinations may not be taken until all four foreign-language reading requirements have been satisfied. There is a final oral examination on the dissertation and its immediate area.

LOWER DIVISION COURSES

1A–1B. English Composition in Connection with the Reading of World Literature. (4–4–4) Three 1-hour lectures and discussion periods and one tutorial meeting per week. Prerequisite: A 1A examination is required for 1A. Expository writing based on analysis of selected masterpieces of ancient and modern literature.

H1A–H1B. English Composition in Connection with the Reading of World Literature: Honors Section. (3–3–3) Three 1-hour lectures and one tutorial meeting per week. Prerequisite: A Subject A examination, a 3.0 grade-point average in high school English, and English 11A (or the equivalent) and the consent of the instructor. Credit and grade will be assigned upon completion of the full sequence. The honors section is limited to 10 qualified freshmen who meet as a group for three 1-hour meetings per week and attend weekly tutorial sessions. In addition to the core reading, individual assignments provide each student with opportunity to exploit his linguistic and literary training.

2A–2C. Composition in Connection with the Reading of World and French Literature. (5–5–5) Three 1-hour lectures per week. Prerequisite: Three years of high school French or two years with a B average. Course open only to entering freshmen. Exposition and interpretation of elements of a selected major work from a period or a national culture with emphasis on the methods used in this type of comparative analysis.

40A–40B–40C. Women and Literature. (4–4–4) Three 1-hour lectures and one hour of discussion per week. A study of women as portrayed in literature, and of women writers. The topic will vary from quarter to quarter; a student may take no more than two topics.

GROUP II: RESTRICTED COURSES

UPPER DIVISION COURSES

GROUP I: UNRESTRICTED COURSES

(Open to all students in the upper division; enrollment not limited.)

120. The Biblical Tradition in Western Literature.

(4) Three 1-hour lectures per week. Examination of selected aspects of the Biblical tradition and their relevance to the study of later literature.

Mr. Coolidge (Sp)

145A–145B. Byzantine Literature. (4–4) Three 1-hour lectures and discussion periods per week. Survey of the development of the principal literary genres. 145A: early Byzantine literature from the fourth to the mid-ninth century. 145B: later Byzantine literature from the mid-ninth to the fifteenth century. Mr. Alexander

The Period Courses, 151–155 Prerequisite: upper-division standing or permission of the instructor; in addition, graduate students in World Literature wishing to enroll in one of these courses must know at least one foreign language relevant to the primary materials studied during the term. Lectures and discussions in relation to one period of literary history in related literatures.

151A–151B–151C. The Ancient Mediterranean World. (4–4–4) Three 1-hour lectures and discussion periods per week. Mr. Alter (F)

152A–152B–152C. The Middle Ages. (4–4–4) Three 1-hour lectures and discussion periods per week. Mr. Deth (Sp)

153A–153B–153C. The Renaissance. (4–4–4) Three 1-hour lectures and discussion periods per week. Miss Howard (W)

154A–154B–154C. Enlightenment and Romanticism. (4–4–4) Three 1-hour lectures and discussion periods per week. Mr. Nemoni (F)

155A–155B–155C. The Modern Period. (4–4–4) Three 1-hour lectures and discussion periods per week. Miss Walker (W)

156A–156B. Modern Literature and the Arts. (4–4) Three 1-hour lectures and discussion periods per week. Prerequisite: one introductory course in one foreign language and at least two quarters in lower division or upper division literature. Comparative investigation of modern poetry and modern painting and sculpture with particular emphasis on the period from 1880 to 1950. Discussion of the methods used in this type of comparative analysis.

Mr. Augst (W)

160. Western Literary Crosscurrents in Twentieth Century China. (4) Three 1-hour lectures per week. The impact of western literature on modern China and China’s response in literary theory, movements, and creation. When not given see Oriental Languages 206. Mr. Birch

165. Myth and Literature. (4) Two 1 1/2-hour lectures and discussion periods per week. Study of the earliest myth-texts on record and the progressive expansion of myth literature up to the present day. Myth and oral composition. Emphasis on the timeless meanings of myth as reflected in various cultures.

Mr. Spath (Sp)


Mr. Coolidge

180. Manerism in Art and Literature. (4) Two 1 1/2-hour lectures and discussion periods per week. The phenomenon of manerism, both as a literary and artistic constant as well as an historical developmental period, will be studied by means of examples drawn from the art and literature of Italy, France, and Germany. An attempt will be made to define and illustrate modern manerism.

Mr. Spahr (Sp)

185. Women’s Perspective in Literature. (4) Three 1-hour lectures plus one hour of discussion (to be arranged) per week. Comparative study of works by several women writers or the portrayal of women in the literature of various national cultures. Topics vary from year to year. May be repeated for credit with consent of instructor.

Miss Huef (F)

GROUP II: RESTRICTED COURSES

(Designed primarily for students whose major subject is Comparative Literature; sections limited to fifteen students.)

The Junior Courses

100. Introduction to Comparative Literature. (4) Three 1-hour lectures and one tutorial meeting per week. Prerequisite: one upper-division literature course

NOTE: For key to symbols, see page 34.
in a foreign language or consent of the instructor. Selection of topics in consultation with field adviser. Application of methods of Comparative Literature to the study of poetry.

**1900.** Comparison of Authors: English, Spanish, Italian. (4) Three 1-hour lectures and discussion periods per week. Prerequisite: course 100 or equivalent, and at least four quarters in upper division literature, including at least one quarter in Spanish or Italian. Comparison of three important authors, English, Spanish, Italian; one foreign author must be read in the original language; examination and substantial comparative paper required.

**1901.** Comparative Study of Linguistics. (2) Three 1-hour lectures per week. Prerequisite: preparation in two foreign languages, at least one of which must be French or Latin. 299A is not prerequisite to 299B. Comparative study of linguistics. Mr. Nagler (F).

**1902.** Approaches to Dramatic Literature. (4) Two 1 1/2-hour lectures and discussion periods per week. Prerequisite: admission to graduate standing in Comparative Literature; advanced undergraduates may be admitted with consent of instructor. Application of the methods of Comparative Literature to the study of dramatic literature. Mr. Johannesson (W).

**1903.** Approaches to the Novel. (4) Two 1 1/2-hour lectures and discussion periods per week. Prerequisite: admission to graduate standing in Comparative Literature; advanced undergraduates may be admitted with consent of instructor. Application of the methods of Comparative Literature to the study of the novel. Mrs. Goldstine (Sp).

**1904.** Approaches to Lyric Poetry. (4) Two 1 1/2-hour lectures and discussion periods per week. Prerequisite: admission to graduate standing in Comparative Literature; advanced undergraduates may be admitted with consent of instructor. Application of the methods of Comparative Literature to the study of lyric poetry. Mrs. Goldstine (Sp).

**1905.** Approaches to Epic Poetry. (4) Two 1 1/2-hour lectures and discussion periods per week. Prerequisite: admission to graduate standing in Comparative Literature. Required of all candidates for the M.A. degree. The Staff (F, W). 198. Directed Group Study for Upper Division Students. (1-4) One to four hours lecture per week. Tutorial instruction in areas not covered by regular schedule. The Staff (Mr. Larson in charge) (F, W, Sp).

**199.** Supervised Independent Study and Research. (1-5) Enrollment is restricted to students admitted on page 34. Must be taken on a passed/not passed basis. The Staff (Mr. Larson in charge) (F, W, Sp).

**GRADUATE COURSES**

**Introductory Graduate Courses**

**200. Methods of Study in Comparative Literature.** (4) Two 2-hour meetings per week. Prerequisite: Honors course in Comparative Literature, including at least one quarter in French or German. Comparison of three important authors, English, French, German; one foreign author must be read in original language; examination and substantial comparative paper required. Mr. Larson (F, M. Bernstein (Sp).

**190B. Comparison of Authors: English, French, Latin. (4) Three 1-hour lectures and discussion periods per week. Prerequisite: course 100 or equivalent, and at least four quarters in upper division literature, including at least one quarter in French or Spanish. Comparison of three important authors, English, French, Spanish; one foreign author must be read in the original language; examination and substantial comparative paper required.**

**190C. Comparison of Authors: English, French, Spanish. (4) Three 1-hour lectures and discussion periods per week. Prerequisite: course 100 or equivalent, and at least four quarters in upper division literature, including at least one quarter in French or Spanish. Comparison of three important authors, English, French, Spanish; one foreign author must be read in the original language; examination and substantial comparative paper required.**

**190D. Comparison of Authors: English, Spanish, Italian. (4) Three 1-hour lectures and discussion periods per week. Prerequisite: course 100 or equivalent, and at least four quarters in upper division literature, including at least one quarter in Spanish or Italian. Comparison of three important authors, English, Spanish, Italian; one foreign author must be read in the original language; examination and substantial comparative paper required.**

**190E. Comparison of Authors: English, Latin, Greek. (4) Three 1-hour lectures and discussion periods per week. Prerequisite: course 100 or equivalent, and at least four quarters in upper division literature, including at least one quarter in a relevant foreign language. Comparison of two or three important authors, including at least one belonging to a literature until the other 190 courses. The works belonging to the literatures until in the other 190 courses must be read in the original languages. Substantial comparative paper required.**

The Staff (Miss Richardson in charge) (F, W, Sp).

**Tutorial Courses**

**H196. Special Honors.** (1) Prerequisite: course H194-H18 with a grade of B or higher, and permission of the instructor in charge of undergraduate studies in Comparative Literature. Weekly by special arrangement. The Staff may be repeated each quarter until the senior year.

The Staff (Mr. Duggan in charge) (F, W, Sp).

**H198. Honors Course.** (1-4) Prerequisite: honors standing, 12 units in upper division literature courses including course 100 or the equivalent, and a knowledge of a vernacular foreign language or Latin. Preparation and writing of an honors thesis under the supervision of a member of the faculty. The Staff (Mr. Larson in charge) (F, W, Sp).

**199B. Honors Course.** (1-4) Prerequisite: honors standing, 12 units in upper division literature courses including course 100 or the equivalent, and a knowledge of a vernacular foreign language or Latin. Preparation and writing of an honors thesis under the supervision of a member of the faculty. The Staff (Mr. Larson in charge) (F, W, Sp).

**200A. Approaches to Epic Poetry.** (4) Two 1 1/2-hour lectures and discussion periods per week. Prerequisite: admission to graduate standing in Comparative Literature. Required of all candidates for the M.A. degree, including at least one quarter in French or German. Comparison of three important authors, English, French, German; one foreign author must be read in the original language; examination and substantial comparative study of the poetry. Mr. Duggan (F).

202A. Approaches to Lyric Poetry. (4) Two 1 1/2-hour lectures and discussion periods per week. Prerequisite: admission to graduate standing in Comparative Literature; advanced undergraduates may be admitted with consent of instructor. Application of the methods of Comparative Literature to the study of lyric poetry. Mr. Johannesson (W).

202C. Approaches to the Novel. (4) Two 1 1/2-hour lectures and discussion periods per week. Prerequisite: admission to graduate standing in Comparative Literature; advanced undergraduates may be admitted with consent of instructor. Application of the methods of Comparative Literature to the study of the novel. Mr. Johannesson (W).

202D. Approaches to Dramatic Literature. (4) Two 1 1/2-hour lectures and discussion periods per week. Prerequisite: admission to graduate standing in Comparative Literature; advanced undergraduates may be admitted with consent of instructor. Application of the methods of Comparative Literature to the study of dramatic literature. Mr. Anderson (F).

210A-**210B. Studies in Medieval Literature.** (4-4) One 3-hour lecture and discussion period per week. Prerequisite: preparation in two medieval languages. 210A is not prerequisite to 210B. Comparative investigation of a topic in Western literature involving study of post-classical documents. Mr. Anderson (F).

210A-**210B. Studies in Medieval Literature.** (4-4) One 3-hour lecture and discussion period per week. Prerequisite: preparation in two medieval languages. 210A is not prerequisite to 210B. Comparative investigation of a topic in Western literature involving study of post-classical documents. Mr. Anderson (F).

225A-**225B. Studies in Symbolist and Modern Literatures.** (4-4-4) One 3-hour lecture and discussion period per week. Prerequisite: preparation in two foreign languages, at least one of which must be French or Latin. 225A is not prerequisite to 225B. Comparative investigation of a literary topic requiring the study of both Oriental and Western documents. Topics and texts will vary from year to year. May be repeated for credit.

231A-231B. Studies in Relations Between Near Eastern and Western Literatures. (4-4) One 3-hour lecture and discussion period per week. Prerequisite: preparation in two foreign languages, at least one of which must be Greek or Latin. Undergraduates may be admitted upon consent of the instructor. 231A is not prerequisite to 231B. Comparative investigation of a literary topic requiring the study of both Near Eastern and Western documents. Since topics and texts vary from year to year, the course may be repeated for credit.

**245A-**245B. Studies in Comparative Literature. (4-4) One 3-hour lecture and discussion period per week. Prerequisite: preparation in two foreign languages. 245A is not prerequisite to 245B. Comparative investigation of a topic in contemporary Western literature. Mr. Nagler (F).

245A-**245B. Studies in Comparative Literature.** (4-4) One 3-hour lecture and discussion period per week. Prerequisite: preparation in two foreign languages. 245A is prerequisite to 245B. Comparative investigation of a topic in the history of literature. Mr. Augst (Sp).

**250A-**250B. Studies in Critical Theory. (4-4) One 3-hour lecture and discussion period per week. Prerequisite: preparation in two foreign languages. 250A is not prerequisite to 250B. Comparative investigation of a topic in the history of literary criticism.

255A-**255C. Comparative Byzantine Studies.** (4-4-4) One 3-hour lecture and discussion period per week. Prerequisite: preparation in Greek and one other foreign language. Comparative investigation of a topic in Byzantine Literature. When the course is offered during more than one quarter, credit and grade will be assigned upon completion of sequence.

270-274. Continuing Seminars. (2) One 2-hour meeting per week. Prerequisite: restricted to students who have received the M.A. and are studying for the qualifications for the Ph.D. Applications for seminars must be submitted for available seminars. Mr. Duggan (in charge) (F, W, Sp).

**299. Directed Research.** (6-10) When used for doctoral study, the course may be repeated for credit. Mr. Duggan (in charge) (F, W, Sp).

**Graduate Tutorial Courses**

**296. Special Study.** (1-5) Primarily for students engaged in preliminary exploration of a restricted field, involving the writing of a report. May not be substituted for available seminars. The Staff (Mr. Duggan in charge) (F, W, Sp).

299. Directed Research. (6-10) When used for doctoral study, the course may be repeated for credit. Mr. Duggan (in charge) (F, W, Sp).

**601. Individual Study for Master’s Students.** (1-8) Individual study for the comprehensive or language requirements in consultation with the field adviser. Units may be repeated for credit in preparation for a master's degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (Mr. Duggan in charge) (F, W, Sp).

**602. Individual Study for Doctoral Students.** (1-8) Individual study in consultation with the major field adviser, intended to provide opportunity for qualified students to work on their own in preparation for the Ph.D. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (Mr. Duggan in charge) (F, W, Sp).
**Computer Science**

**CHOICE OF COLLEGE**

Undergraduates who wish to major in computer science may do so either through the College of Letters and Science (A.B. degree) or through the College of Engineering (B.S. degree). Details of the computer science and engineering program in the Department of Electrical Engineering and Computer Sciences may be found in the Engineering section of the Catalog.

**COMPUTER SCIENCE MAJOR IN THE COLLEGE OF LETTERS AND SCIENCE**

Computer Science Division Office, 573 Evans Hall

**Major Advisers:** Ms. Graham, Mr. Parlett

The major in computer science offers the undergraduate a background in computers and information processing suitable either for a career in computers or for further study in computer science.

Any student in the College of Letters and Science who has a grade-point average of at least 2.0, (2) has completed 90 units, and (3) has passed Computer Science 1, 2, 40, and 41, Mathematics 1A–1B–1C (or equivalents) may elect to major in computer science.

An increasing number of students are coming to Berkeley with junior standing. While the College of Letters and Science requires them to declare a major during their first quarter, those wishing to major in computer science may need at least two quarters to fulfill condition (3) above. To ease the situation of such students, the College will accept an Intent to Major form, available in the Computer Science office, provided that the student makes maximum progress toward fulfilling (3) and formally declaring a major in computer science.

**REQUIREMENTS FOR THE MAJOR**

**Lower Division.** Computer Science 1, 2, 40, 41, Mathematics 1A–1B–1C, 51A or 51B or equivalents.

**Upper Division.** Compulsory Courses: Programming (courses 153, 154); Computers (either 107 or the sequence 150, 152A); Mathematics (either Computation and Mathematics 113A, followed by one of the Mathematics courses in the elective list).

Electives. The student may complete the required 36 upper division units by any reasonable program which is approved by an adviser. Any selection from the following elective list is hereby approved. **Elective List:** Any upper division Computer Science or Electrical Engineering and Computer Science lecture courses except Computer Science 101, 103, 118, 120A; Mathematics 104A, 104B, 112, 113B, 113C, 125A, 125B, 125C, 126, 128, 128A, 128B, 128C, 129A, 129B, 131A-131B, 134A, 134B, 135A, 135B, 147, (the sequence 133 and 135A); Linguistics 120, 121; Business Administration 147.

Honors Program. Requirements to enter the program: (1) a 3.3 grade-point average in computer science requirements already taken; (2) a 3.9 grade-point average overall.

**Requirements to graduate with honors:** (1) a 3.3 grade-point average in all computer science major requirements. This includes mandatory courses and the elective units; (2) a 3.3 grade-point average overall; (3) Computer Science 155; (4) Computer Science 163 or 164; (5) two terms of Computer Science 198 in the senior year. This includes completion of a two-quarter project chosen by the student with the approval of a faculty member who will supervise the project (in coordination with the instructor of H198). For graduation with high honors or highest honors, see the Announcement of the College of Letters and Science.

**GRADUATE PROGRAM**

Graduate degree programs are available as preparation for research and teaching (Master of Science and Doctor of Philosophy in Computer Science or in Engineering) and for careers in design, development and management (Master of Engineering and Doctor of Engineering). For details on graduate programs and procedures see the Electrical Engineering and Computer Sciences Graduate Orientation Notes, available from Electrical Engineering and Computer Sciences, 197 Cory Hall.

**COMPUTER SCIENCE COURSES**

Computer Science course descriptions can be found under Electrical Engineering and Computer Sciences.

1. Introduction to Programming for Engineering and Physical Sciences. (4)
2. Self-Paced Introduction to Programming for Engineering and Physical Sciences. (1–4)
3. Introduction to Computers. (1)
4. Introduction to Digital Systems. (4)
5. Self-Paced Introduction to Programming. (1–4)
6. Programming Style. (3)
8. Individual Study and Research for Undergraduates. (1–2)
10. Self-Paced Introduction to Computing for Engineering and Physical Sciences. (1–4)
11. System Architecture. (3)
12. System Simulation. (3)
13. Introduction to Theoretical Computer Science. (4)
14. Introduction to Programming. (4)
15A. Computer Memory and Storage Devices. (4)
15B. Input-Output Techniques and Terminals and Design. (4)
15C. Introduction to Computer Organization. (3)
15D. Computer Organization. (3)
15E. Data Structures. (4)
16. Programming Languages and Compilers. (4)
18. Finite State Machines. (4)
19. Models of Computation. (3)
20. Graph Theory. (3)
21. Introduction to Combinatorics. (3)
22. Directed Group Studies for Advanced Undergraduates. (2–5)
23. Special Topics in Computer Science for Honor Students. (3)
24. Supervised Independent Study and Research. (1–5)
27. Digital Systems Engineering (4–24)
28. Computer System Design. (4)
29. Design of Programming Languages. (4)
30. Advanced Topics in Operating Systems. (4)
31. Computer Graphics. (3)
32. Implementation of Programming Languages. (4)
33. Computer System Performance Evaluation. (3)
34. Fault-Tolerant Programming and Software Architecture. (4)
35. Parallel and Pipeline Computer Systems. (4)
36. Algebraic Automata Theory. (3)
37. Error Correcting Codes. (3)
38. Theory of Formal Languages. (3)
39. Effective Computability and Complexity. (3–3)
40. Combinatorial Computing. (3)
41. Theorem Proving and Computational Models. (3)
42. Efficient and Optimal Algorithms. (3)
43. Automaton-Based Computational Complexity. (3)
44. Theory of Parsing and Translating. (3)
45. Artificial Intelligence. (4)

29A. Advanced Graduate Study in Computer Science. (2–8)
29B. Theory of Discrete Linear Systems. (3)
29C. Advanced Theory of Formal Languages. (4)
29D. Asynchronous Computation. (3)
29E. Sorting and Searching. (3)
29F. Correctness of Programs. (4)
29G. Advanced Programming Language Design. (3)
29H. Computer System Performance Evaluation. (3)
29I. Robotic Algorithms. (3)
29J. Digital Computers in Experimental Systems. (3)
29K. Advanced Computer Graphics. (3)
29L. Computer Speech Processing. (4)
29M. Data Base Management Systems. (3)
29N. Advanced Computational. (3)
29O. Group Studies, Seminars, or Group Research. (1–8)
29P. Individual Research. (1–12)
29Q. Individual Study for Doctoral Students. (1–8)

**Development Studies**

A group major in development studies has received approval by the College for offering in 1976–77. However, the California Postsecondary Education Commission reviewed all group majors, and their final determination regarding the group major in development studies was not available at press time for the General Catalog. Students interested in the major are referred to the Division of Interdisciplinary and General Studies, 301 Campbell Hall, for a description of the program and the status of the approval process.

**Dramatic Art**

Department Office, 101 Dwinnelle Annex

**Professors:**

Travis Baggett, Ph.D. 
Robert W. Goldsteyn, M.F.A. 
Henry May Jr., B.A. 
Fred Oho Harris, M.F.A.

**Associate Professors:**

Dunbar H. Ogden, II, Ph.D.

**Assistant Professor:**

George S. House, Ph.D.

**Associate Professor:**

Mark A. Roth, M.A. (Acting)

**Senior Lecturer:**

George Uric, B.A.

**THE MAJORS**

**Dramatic Art**

**Lower Division.**


**Upper Division.** Forty-five units of upper division courses in the Department of Dramatic Art including: ten units chosen from courses 122, 123A, 123B, 124, 125, 126, 127; at least 2 and not more than 5 units of 170, 171, or 170 in the junior year, 120; in the senior year, 129. All candidates for the B.A. degree with a major in Dramatic Art are required to include Physical Education 12 (Theatrical Fencing) in their major programs. See also Tryout Regulations, below.

**Dramatic Art—Dance**

(Students are required to take a dance technique course each quarter.)

**Lower Division.**


**Upper Division.** Forty-five units of upper division courses in the Department of Dramatic Art including: five units chosen from courses 122, 123A, 123B, 124, 125, 126, 127; 141A–141B–141C; 142A–142B–
142C; 143A–143B–143C, 144A–144B, 145A–150A; at least 2 and not more than 5 units of 170, 171 or 170. See also Tryout Regulations, below.

**Honors Program.** Majors in the Department of Dramatic Art—Dance.
matics Art with an overall grade-point average of 3.3 in the University and in the major may, with the approval of the departmental major adviser and the honors program, apply for a minor in Theatre. 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 courses 295A-295B; intensive critical study of problems of dramatic literature, acting, playwriting, directing, or designing; and 1195B, development of studies begun in courses 295A, either under circumstances of actual theatrical production or as a senior thesis.

No course in Drama or Theatre offered in satisfaction of undergraduate major requirements may be taken on a pass/not passed basis except Drama 40A-40B-40C, 142A-142B-142C, 143A-143B-143C, 170, 171, and 190.

**GRADUATE PROGRAMS**

Preparation for Graduate Study. The background of a student undertaking work toward an advanced degree should approximate that of an undergraduate major student in the Department of Dramatic Art at Berkeley. Applicants for admission who need extensive preparatory work either in dramatic literature or in performance arts are eligible to take the necessary courses while enrolled for two or three quarters as students in limited status in the College of Letters and Science, or for course work in the Graduate Division. In some cases, a one-year course of study for a second bachelor's degree may be in order.

Advancing and Evaluation of Student Program. Graduate students will be assigned to a team of two advisors with whom they will evolve their program from year to year. In addition to the regular indications of the progress of the students in their instructors and advisers, students will receive at regular intervals evaluations, made by the entire departmental staff, of their general progress toward their degree and on completion of the approved program. Evaluation is to ensure, insofar as such assurance is possible, that each student is working at maximum capacity toward a professional goal.

Requirements for the M.A. Degree. Students enrolled in the graduate program in Dramatic Art are generally assumed to be training as stage directors and working toward the Ph.D. degree. They will be eligible to apply for the M.A. degree upon completion of the degree and on approval of the Graduate Program. A student is to earn thirty-six units, including at least one unit in directing and one in playwriting or design, minimum thirty-six units of graduate work. The program in each area is to include the University Theatre and the University Dance Theatre. The University Dance Theatre presents an annual concert of works choreographed by the faculty and performed by the students. Students work are presented at quarterly choreographic workshops. The Bay Area Repertory, a professional theatre company, an in-house dance group, gives concerts and demonstrations throughout the year in schools and community centers on the West Coast. Unit credit may be earned for work in dance and performance design.

For further information inquire at the office of the Department of Dramatic Art.

**TRYOUT REGULATIONS**

General Tryouts for faculty-directed productions, and for student-directed productions under course 295 and course 215 (when scheduled) are held each quarter. All major and graduate students in the department are required to tryout at the General Tryouts in the fall quarter and if cast, to perform in a given production. Those not cast in the Fall are required to participate in subsequently scheduled General Tryouts during the academic year and to perform if cast. Special Tryouts for a student-directed productions under courses 215B and 216B-216C are scheduled at intervals throughout the academic year and are announced on the departmental bulletin boards. In addition to attending General Tryouts, students enrolled in an acting class, with the exception of course 10, are required to tryout each quarter to attend until cast all Special Tryouts and to perform if cast. Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

**DRAMATIC ART**

**LOWER DIVISION COURSES**

10. Introduction to Acting. (F) Five 1-hour sessions per week. Prerequisite: consent of instructor. Team Teaching: Ms. Evans, Mr. Berman, Ms. Sussel (F, W, Sp)

11A–11B. Beginning Scene and Voice Work. (5–5) Five 1 1/2-hour sessions per week. Prerequisite: consent of instructor. Courses to be taken consecutively, beginning winter quarter. Team Teaching: Ms. Evans, Mr. Berman, Ms. Sussel (W, Sp)

25A–25B–25C. Introduction to Dramatic Literature. (5–6–5) Five 1-hour lectures per week. Prerequisite: Subject A, examination or course. Course 25A is prerequisite to 25B, 25B is prerequisite to 25C. Course work in the arts of the theatre, Western and Eastern, including voice and speech training, and consent of instructor. Team Teaching: Mr. Roth (F, W), Ms. Sussel (Sp)

*25. Introduction to Playwriting. (5) Three 1 1/2-hour lectures. (S–S) Five 1-hour lectures per week. Prerequisite: 25A is prerequisite to 25B. Consent of instructor is required for all courses.

45A. Scene construction from designer's concepts to physical realization. Consent of instructor is required for all courses.

45B. Stage practice

45C. Stage management. Mr. Ulin (F, W, Sp)

**UPPER DIVISION COURSES**

ACTING

110A–110B–110C. Intermediate Acting. (3–3–3) Two 4-hour sessions per week. Prerequisite: one year of undergraduate work in acting, and consent of instructor. Courses to be taken consecutively, beginning fall quarter. May be repeated for credit. The credit may not be used to fulfill major requirements.

Team Teaching: Ms. Evans, Mr. Berman, Ms. Sussel (F, W, Sp)

111A–111B–111C. Advanced Acting. (5–5–5) Two 4-hour sessions per week. Prerequisite: two years of undergraduate work in acting instruction or the equivalent, including voice and speech training, and consent of instructor. Courses to be taken consecutively, beginning fall quarter. May be repeated for credit. The credit may not be used to fulfill major requirements.

Team Teaching: Ms. Evans, Mr. Berman, Ms. Sussel (F, W, Sp)

112A–112B–112C. Advanced Study of Voice and Speech. (2–2–2) Two 1 1/2-hour sessions per week. Prerequisite: consent of instructor. Must be taken concurrently with 110A–110B–110C. Courses to be taken consecutively, beginning fall quarter.

Team Teaching: Ms. Evans, Mr. Berman, Ms. Sussel (F, W, Sp)

LITERATURE

120. Dramatic Theory. (5) Five 1-hour lectures per week. Prerequisite: junior standing. Major documents of dramatic criticism and theory, studied in historical sequence and related to analysis of important plays. Mr. Berman (F, W, Sp)

*122. Dramatic Literature of Western Civilization: The Ancient Greek and Roman Drama. (5) Five 1-hour lectures per week.

123A–123B. Dramatic Literature of Western Civilization: British Drama to 1700. (5) Five 1-hour lectures per week.

123B. Medieval Drama to 1600. Mr. Bogard (W)

123C. The Seventeenth Century Drama. Mr. Bogard (Sp)

*124. Dramatic Literature of Western Civilization: Continental Drama, 1500–1700. (5) Five 1-hour lectures per week.

125. Dramatic Literature of Western Civilization: European Drama, 1700–1850. (5) Five 1-hour lectures per week. Mr. Roth (F, W)

*126. Dramatic Literature of Western Civilization: European Drama, 1850–1918. (5) Five 1-hour lectures per week. Mr. Roth (Sp)

127. Dramatic Literature of Western Civilization: European Drama and American Drama, 1918 to Present. (5) Five 1-hour lectures per week. Mr. House (W)

129. Senior Prossemorne. (5) Five 1-hour lectures per week. Prerequisite: course 120, senior standing. Sections limited to 20 students. Studies in a single play or playwright. Designed primarily for senior students majoring in Dramatic Art. Mr. Rosenberg (F, W), Mr. Roth, Mr. Bogard (Sp, W)

PLAYWRITING

*139A–**139B–**139C. Playwriting. (5–5–5) Three 1 1/2-hour lectures per week. Prerequisite: course 39 or consent of instructor. Students may take 139A–139B with credit and grade assigned upon completion of the sequence or they may take 139C. Participation of the student is required. In either French or German. Team Teaching: Mr. Gogard (F, W), Mr. Roth, Mr. Ogard (Sp, W)

*39. Introduction to Playwriting. (5) Three 1 1/2-hour lectures. Consent of instructor is required for all courses.

45A. Scene construction from designer's concepts to physical realization. Consent of instructor is required for all courses.

45B. Stage practice

45C. Stage management. Mr. Ulin (F, W, Sp)

**DRAMATIC ART-PAINTING**

Students intending to complete the major in Dramatic Art and Painting may combine the two majors, or take courses in either Dramatic Art or Painting, or take courses in both. The Department of Dramatic Art and Painting offers a major and workshop program in theatre, theatre history, and painting. Students who complete the major in Dramatic Art will be awarded a Bachelor of Arts degree in Dramatic Art. Students who complete the major in Painting will be awarded a Bachelor of Arts degree in Painting. Students who complete the major in both Dramatic Art and Painting will be awarded a Bachelor of Arts degree in Drama and Painting. Students who complete the major in either Dramatic Art or Painting may combine the major with a minor in another field of study. Students who complete the major in both Dramatic Art and Painting may combine the major with a minor in either Dramatic Art or Painting. Students who complete the major in either Dramatic Art or Painting may combine the major with a minor in both Dramatic Art and Painting. Students who complete the major in both Dramatic Art and Painting may combine the major with a minor in either Dramatic Art or Painting.
Art-Dance and students proposing to include dance as part of a multi-subject major must consult with Mr. Wood prior to enrollment.

LOWER DIVISION COURSES

40A-40B-40C. Beginning Modern Dance Technique. (1-1-1) Five 1 1/2-hour studios per week. Prerequisites: courses 40A-40B-40C or consent of instructor. Development of physical control through off-center movement and its utilization in spatial exploration. May be taken on a passed/not passed basis. (Mr. Wood, F, W, Sp)

41. Rhythmic Analysis for Dancers. (3) Two 1 1/2-hour studios and one 1 1/2-hour laboratory per week. Prerequisites: courses 40A-40B-40C or concurrent enrollment or consent of instructor. Study in elementary basis technique. The study of musical structure with emphasis placed on note values, rhythmic patterns and dictation, score reading and phrasing. All work will be activated through structural improvisation. (Mr. Wood, F, W, Sp)

UPPER DIVISION COURSES

141A-141B-141C. Intermediate Modern Dance Technique. (1-1-1) Five 1 1/2-hour studios per week. Prerequisite: courses 40A-40B-40C or consent of instructor. Development of physical control through off-center movement and its utilization in spatial exploration. Must be taken on a passed/not passed basis. May be repeated for credit. (Mrs. Wood, F, W, Sp)

142A-142B-142C. Advanced Modern Dance Technique. (1-1-1) Five 1 1/2-hour studios and one 1-hour laboratory per week. Prerequisite: courses 40A-40B-40C or concurrent enrollment. An historical overview of the different periods of music in specific relation to dance. May be repeated for credit. (Mr. Wood, F, W, Sp)

143A-143B-143C. Company Class. (1-1-1) Five 1 1/2-hour studios and one 1-hour laboratory per week. Prerequisite: courses 40A-40B-40C or consent of instructor. Exploration of existing styles and forms of movement and their manipulation in the context of group awareness. Must be taken on a passed/not passed basis. May be repeated for credit. (Mr. Wood, F, W, Sp)

144A-144B. Sources of Movement. (3-3) One 1 1/2-hour lecture and two 1 1/2-hour studios per week. Prerequisite: courses 40A-40B-40C. Beginning application of dance technique as a means of communication in the theatre. Use of basic technical fundamentals as a means of extending natural movement in rhythm, energy, space, and quality. May be taken individually or in group directed. (Mr. Wood, F, W, Sp)

145A-145B. Music Resources for Dancers. (3-3) Two 1 1/2-hour studios and two 1 1/2-hour laboratories per week. Prerequisites: courses 40A-40B-40C or consent of instructor. Exploration of the history of music and its relationship to dance. May be repeated for credit. (Mr. Wood, F, W, Sp)

146A-146B-146C. Choreography. (8-5-5) Two 1 1/2-hour lectures and three 1 1/2-hour studios per week. Prerequisite: courses 444A-444B. Analysis of theories of form and structure and their practical application in relation to content. Course 146A is directed towards solo; 146B towards duets and trios; 146C towards groups. (Mr. Wood, F, W, Sp)

147A-147B. Dance Analysis. (5-5) Three 1 1/2-hour seminars and two 1 1/2-hour studios per week. Prerequisite: courses 142A-142B-142C, 144A-144B, and consent of instructor. Instruction in the methods and principles of class construction with emphasis placed on movement development. (Mr. Wood, F, W)

148A-148B-148C. Introduction to Dance Techniques for Actors. (1-1-1) Five 1 1/2-hour laboratories per week. Prerequisites: courses 110 and consent of instructor. Must be taken on a passed/not passed basis. 144A-148B-148C. May be repeated for credit, however, repeated units may not be used to fulfill major requirements. (Mr. Wood, F, W, Sp)

149. Repertory and Production. (5) Five 1 1/2-hour studios per week. Prerequisite: consent of instructor. Advanced study of dance technique. Repertory and production. Courses are to be organized as a company for the development of a dance repertory for public performance, the creation of dances and dance works, and the study of those already created. May be repeated for credit. (Mr. Wood, F, W, Sp)

150A-150B. Dance History. (5-5) Three 1-hour lectures and two 1-hour studios per week. Prerequisite: consent of instructor. 150A. Primitive to Renaissance. Mrs. Wood (W) 150B. Renaissance to Twentieth Century. Mrs. Wood (Sp)

HISTORY OF THE THEATRE

151A-151B-151C. History of the Theatre. (5-5-5) Five 1-hour lectures per week. Prerequisite: consent of instructor. The development of theatrical production in its cultural setting, including theatre architecture, genre, the stage, scenery and set design, costume, acting, and directing. (Mr. May (F), Mr. Travis (W))

151A. The beginning to 1600. 151B. 1600 to 1800. 151C. 1800 to present. (Mr. Ogdon (Sp))

152. History of the American Theatre. (3) Three 1 1/2-hour lectures per week. Prerequisite: consent of instructor. The development of the American Theatre from colonial times to the twentieth century.

DIRECTING

160A-160B-160C. Beginning Directing. (5-5-5) Five 1-hour lectures per week. Prerequisite: consent of instructor. 160A: junior standing and consent of instructor; 160B: 160A or consent of instructor; 160C: 160B or consent of instructor. (Mr. Prindle, F, W, Sp)

DESIGN AND LIGHTING

173A-173B-173C. Scenography: Scene Design for the Theatre. (5-5-5) Five 1-hour lectures and five 1-hour seminars per week. Prerequisite: courses 142A-142B-142C or consent of instructor. The study of musical phrasing. All work will be activated through structural improvisation. (Mr. Ulman, F, W, Sp)

173A. One 1-hour lecture per week. 173B: 1 1/2-hour studios and 1 1/2-hour laboratory per week. Prerequisite: consent of instructor. 173A is prerequisite to 173B; 173B is prerequisite to 173C. Credit and grade will be awarded upon completion of the full sequence. (Mr. Lewis (F), Mr. Travis (W))

175A-175B-175C. Scenography: Lighting Design for the Theatre. (5-5-5) Five 1-hour lectures and five 1-hour seminars per week. Prerequisite: consent of instructor. 175A: one 1-hour lecture and two 1 1/2-hour studios per week. Prerequisite: consent of instructor. 175A is prerequisite to 175B; 175B is prerequisite to 175C. Credit and grade will be awarded upon completion of the full sequence. (Mr. Ulman, F, W, Sp)

177. Visual Arts in Theatre. (3) Two 2-hour lectures per week. Prerequisite: consent of instructor. Survey of visual arts as components of style in theatre.

SPECIAL COURSES

Performance — University Theatre

170. Theatre Laboratory. (1-5) To be arranged. Prerequisites: courses 145A or consent of instructor. Practice in theatre design, lighting, playwriting, and acting in student-directed productions. May be repeated for credit. Must be taken on a passed/not passed basis. (The Staff, F, W, Sp)

171. Theatre Performance. (1-5) To be arranged. Prerequisite: consent of instructor. Practice in acting in faculty-directed productions. May be repeated for credit. Must be taken on a passed/not passed basis. (The Staff, F, W, Sp)

190. University Theatre. (1-5) To be arranged. Prerequisite: consent of instructor. Practice in theatre design, lighting, playwriting, and acting in student-directed productions. May be repeated for credit. Must be taken on a passed/not passed basis. (The Staff, F, W, Sp)

H195A. Honors Course. (5) To be arranged. Prerequisite: candidacy for honors in the Department of Dramatic Art. Individual conferences leading to the development of subject studied in H195A either as a bachelor’s thesis or a laboratory project in acting, directing, playwriting, or design. (Mr. Wood, F, W, Sp)

Individual Studies

195. Directed Group Study for Undergraduates. (1-5) To be arranged. Prerequisite: consent of instructor. Group studies of selected topics which will vary from quarter to quarter. (The Staff, F, W, Sp)

Graduate Courses

196A. Directed Study for Graduates. (1-5) To be arranged. Prerequisite: enrollment is restricted by regulations listed on page 34. Twelve or more units in the Department of Dramatic Art with an average grade of B or better. Reading and conference. Restricted to senior honor students. Must be taken on a passed/not passed basis. (The Staff, F, W, Sp)

199. Supervised Independent Study and Research. (1-5) To be arranged. Prerequisite: enrollment is restricted by regulations listed on page 34. Twelve or more units in the Department of Dramatic Art with an average grade of B or better. Reading and conference. Restricted to senior honor students. Must be taken on a passed/not passed basis. (The Staff, F, W, Sp)
Dutch Studies

Professors:
Svetlana Alois, Ph.D. (History of Art)
Blake Lee Sphasr, Ph.D. (German and Comparative Literature)
Mary F. Beeler, Ph.D. (Linguistics)
William J. Bowes, Ph.D. (Gerhard Professor of Dutch)

Associate Professors:
Jan de Vries, Ph.D. (History)
Johan P. Snapper, Ph.D. (German, Princess Beatrix Professor of Dutch)

Acting Instructor:
Louk M. P. T. Wijnen, cand. phil.

GROUP MAJOR IN DUTCH STUDIES

Group Major Office, 5329 Dwinelle Hall
Adviser: Mr. Snapper.

The group major in Dutch studies is designed to present a balanced curriculum of the language, literature, history, and culture of The Netherlands. Since the program is both specialized (in dealing with one country) and broad (in its many-sided approach to the subject), it is recommended that the student also prepare a strong related discipline so that the group major in Dutch studies may constitute the focal point to a larger area of interest. Suggested related fields of concentration are Comparative Literature, German, History, History of Art, Linguistics, and South and Southeast Asian Studies (e.g., Indonesian).

See Department of German for a detailed listing of courses.

THE MAJOR

Lower Division. Dutch 1-2-3 or 12 or equivalent.

Upper Division. The student is expected to complete a minimum of 45 upper division units, but no more than 54, from those courses listed below. Of these the following are required:

Language courses: Dutch 110 and 130.

Culture courses: Dutch 170 or one History of Art course (170B, 174, 175).

Senior Thesis: Dutch 190.

Additional courses are to be selected from the following list to complete the major: Dutch (See German Department for complete description of these courses) 100, 110, 120, 140A-140B-140C-140D-140E-140F-150, 160, 190, 191, 192, 198; German 104, 105A-105B; Comparative Literature 180, 190UL, 210A; Linguistics 165; History 128A, 128B, 1306, 142; History of Art 170B, 174, 175.

Honor Program. Students accepted in the honors program will enroll in Dutch H196 (1-6 units) for a total of 6 units and will be expected to write a senior thesis (Dutch 180) with distinction.

For additional information, consult the adviser for the group major in Dutch studies, 5329 Dwinelle Hall.

Economics

Department Office, 250 Barrows Hall

Professors:
George F. Breake, Ph.D., LL.D. (Economics)
Howard S. Ellis, Ph.D., LL.D. (Economics)
Robert A. Gordon, Ph.D. (Economics)
Sidney T. George, Ph.D. (Economics)
Charles A. Gulick, Ph.D. (Economics)
Ewald T. Grether, Ph.D., LL.D. (Economics)
Charles J. Hitch, M.A., LL.D. (Economics)
John B. Condliffe, Sc.D. (Economics)
Sidney S. Hoos, Ph.D. (Economics)
Abba P. Lerner, Ph.D. (Economics)
George M. Kuznets, Ph.D. (Economics)
Paul S. Taylor, Ph.D., LL.D. (Economics)

Assistant Professors:
Robert D. Coote, Ph.D. (Economics)
Gerard Huisman, Ph.D. (Economics)
Lovell S. Jarvis, Ph.D. (Economics)
Andreu Mas-Colell, Ph.D. (Economics)

Assistant Lecturers:
Richard J. Gilbert, M.A. (Acting)

Lecturers:
Margaret S. Gordon, Ph.D. (Economics)
Eugene M. Swann, M.A., LL.B. (Economics)

THE MAJOR

Students may elect to graduate under one of two plans:

Plan A: recommended for students interested in a broad liberal arts approach to economics.

Plan B: recommended for students interested in a more formal, theoretical approach to economics.

Because resources are limited it may be necessary to restrict the number of economics majors. In the event restriction is necessary, demonstrated ability in previous college work will be considered in evaluating applicants for admission to the major.

Plan A. Prerequisites for admission to the major under Plan A are: Economics 1; two additional courses (4 units each) chosen from the lower division offerings in Economics, History, Political Science, Psychology, or Sociology; and one course (four units) chosen from the following: Mathematics 1A, 5A, 16A, Statistics 1A-1B, 2, or 20.

The requirements for the major include 36 quarter units in upper division or graduate economics courses. The 36 units must include Economics 100A-100B; at least one course in applied economics chosen from the following: 121, 131, 136, 151, 161, 171, 181; and at least one course in economic history or history of thought from the following: 108, 111, 113, 115, 116. Of the remaining 16 units, no more than five units may be courses numbered 197, 198, and 199.

Students graduating under Plan A are strongly recommended to take:

1) Economics 100A-100B in the sophomore year.
2) Upper division electives in one or more special fields.
3) Courses in accounting and in economic statistics.
4) An undergraduate seminar course in the senior year.

Plan B. Prerequisites for admission to the major under
Plan B are: Economics 1; Mathematics 1A–1B; and one additional course (4 units) chosen from among the lower division offerings in Economics, History, Mathematics, or Statistics.

The requirements for the major include 36 quarter units in upper division or graduate economics courses. The 36 units must include Economics 101A-101B; either Economics 141 or 240; and either Economics 102 or 138. No more than five units from courses 197, 198, and 199 may be included in the required 36.

Students graduating under Plan B are strongly recommended to take:
1) A specialization within the major by taking a two-course sequence in a core field of economic endeavor. Typically such a sequence would include one lecture course and one seminar course.
2) A statistics course such as 20, 131, or 135A–135B.
3) Mathematics 111 or equivalent.
5) Upper division electives in other social sciences.

Students may switch plans during the course of the major. For this purpose, the sequence 100A–100B–100C will be treated as equivalent to 101A–101B in satisfying the theory requirement.

**Law and Economics**

The School of Law and the Department of Economics sponsor a concurrent program which permits students to study for the degree of Juris Doctor while preparing for the Ph.D. in economics. In four years a well-prepared student can receive the law degree and also complete the pre-thesis requirements for the Ph.D. Further information may be obtained from the Chair of the Graduate Committee of the Department of Economics.

**LOWER DIVISION COURSES**

1. **Introduction to Economics.** (5) Hours of lecture and two hours of section meeting per week. A survey of the economy, one needed to give an overview of the field: supply and demand, resource allocation in a market economy, national economic policy. Sutich (F); Swan (W); Leitich (Sp)

2. **Law and Economics.** (4) Hours of lecture and one hour of section meeting per week. Prerequisite: course 1. An analysis of the law and the legal process, emphasizing the impact of law on economic behavior and economic institutions. Staff (W)

3. **Economic Policy Issues.** (4) Hours of lecture and one hour of section meeting per week. Prerequisite: course 1. A review of a number of economic problems of current interest directed toward a critical analysis of policy alternatives. Wiseman (F); Swan (Sp)

4. **World Population and Economics.** (4) Three hours of lecture per week. An introduction to the way for the Industrial Revolution. Cipolla (F)

**UPPER DIVISION COURSES**

100A–100B. Economic Analysis. (5–5) Three hours of lecture and two hours of section meeting per week. Prerequisite: course 1. 100A is a prerequisite for 100B. Students who have taken Economics 101A may not receive credit for 100A. Students who have taken 101B may not receive credit for 100B.

100A. Resource allocation and price determination. Cooter, Jarvis (F); Keeler, Peck (W); Keeler (Sp)

100B. National income accounts, national income analysis, and national economic policy. Peck (F); Wiseman (W); Cooter (Sp)

100C. Topics in Economic Analysis. (4) Three hours of lecture per week. Staff (W, Sp)

101A–101B. Economic Theory. (5–5) Three hours of lecture and one and one-half hours of discussion per week.

101A. Prerequisite: course 1 and Mathematics 1A–1B; students who have taken course 100A may not receive credit for 101A. Basic economic theory with an emphasis on microeconomic principles, consumer theory, theory of the firm, equilibrium, distribution of income, competition and monopoly. Gilbert (F); Goldman (W); Gilbert (Sp)

101B. Prerequisite: course 101A; students who have taken 100B may not receive credit for 101B. Problems of general equilibrium, income distribution and economic justice. Kelso (F); Keeler (Sp)

121. Industrial Organization. (4) Three hours of lecture per week. Prerequisite: course 101A or 101B. The regulation of public utilities. (F)

122. Aggregate Economic Theory and Policy. (5) Three hours of lecture and two hours of conference per week. Prerequisite: course 100B or 101B. Basic macroeconomic theory, the Keynesian model, and monetary and fiscal policy. Alternatives to promote economic stability and growth. Hansen (W, Sp)

104. Advanced Economic Theory Seminar. (5) Three hours of seminar per week. Prerequisite: course 101A–101B and consent of instructor. Enrollment will be limited. Students who have completed 104 during or prior to Spring 1974 may receive credit for this course. A seminar paper will be required.

**History of Economic Thought**

1) Three hours of lecture per week. Offered in alternate years. Prerequisite: course 100A–100B or 101A–101B. A critical analysis of neoclassical economic theory. Cipolla (F); Cooter (Sp)

2) Seminar on Pre-industrial Europe. (5) Three hours of seminar per week. Prerequisite: course 111 and consent of instructor. Enrollment will be limited. A seminar paper will be required.

113. American Economic History. (4) Three hours of lecture per week. Prerequisites: course 111 and consent of instructor. Enrollment will be limited. Students who have completed Economics 114 during or prior to Spring 1974 may receive credit for this course. A seminar paper will be required.

115. The Industrial Revolution. (4) Three hours of lecture per week. Prerequisite: students who have completed 111 and 112 may receive credit for this course. General survey of the Industrial Revolution with emphasis on Europe since 1760. Hsiao (W, Sp)

116. The International Economy of the Twentieth Century. (4) Three hours of lecture per week. Prerequisite: course 111 and 112 and consent of instructor. Enrollment will be limited. Students who have completed Economics 114 during or prior to Spring 1974 may receive credit for this course. A seminar paper will be required.

117. Modern Economic History Seminar. (5) Three hours of seminar per week. Prerequisite: course 115 or 116 and consent of instructor. Enrollment will be limited. A seminar paper will be required.

121. Industrial Organization Seminar. (5) Three hours of seminar per week. Prerequisite: course 121 and consent of instructor. Enrollment will be limited. A seminar paper will be required.

122. Government Regulation of Industry. (4) Three hours of lecture per week. Prerequisite: course 121. Problems of public policy in the field of industrial organization. (F)

124. Economics of Transportation. (4) Three hours of lecture per week. Offered in alternate years. Prerequisite: course 100A or 101A. Principles of pricing

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**L&S: Economics / 119**

**NOTE:** For key to symbols, see page 34.
126. Economic of the Environment. (4) Three hours of lecture per week. Prerequisite: course 100A or 101A. A theoretical analysis of the sources of environmental degradation and of public policy measures designed to promote desirable environmental outcomes. A number of case studies will be examined. Jarvis (Sp)

131. Public Finance. (4) Three hours of lecture per week. Prerequisite: course 100A-100B or 101A-101B. Analysis of the incidence and effects of taxation, government expenditure programs, and public debt operations. Enrollment limited to 25. A seminar paper will be required. Economics 130 prior to Spring 1974 may not receive credit for this course.) Rolph (W)

132. Public Finance Seminar. (5) Three hours of seminar per week. Prerequisite: course 100A-100B or 101A-101B. Enrollment will be limited. A seminar paper will be required. Rolph (Sp)

133. Economics of State and Local Governments. (4) Three hours of lecture per week. Prerequisite: course 100A-100B or 101A-101B. Offered in alternate years. Revenue and expenditure policies of state and local governments, problems of government operations, administration, revenue sharing. Break (Sp)

134. Cost-Benefit Analysis. (4) Three hours of lecture per week. Prerequisite: course 100A or 101A. Methods of project evaluation, program budgeting, economics of pollution. Offered in alternate years. Break (Sp)

136. Monetary Theory and the Banking System. (4) Three hours of lecture per week. Prerequisite: course 100A or 101A. Surveys of monetary, interest and income theories. Commercial banks, financial intermediaries, the Federal Reserve System, and the supply of money. Students who received credit for Economics 135 prior to Spring 1974 may not receive credit for this course.) Akrelo (F); Pierce (Sp)

137. Aggregate Economics Seminar. (5) Three hours of seminar per week. Prerequisite: course 102 or 136 and consent of instructor. Enrollment will be limited. Students who have received credit for Economics 135 prior to Spring 1974 may receive credit for this course.) A seminar paper will be required. Pierce (F)

141. Economic Statistics and Econometrics. (6) Three hours of lecture and one and one-half hours of laboratory per week. Prerequisite: course 100A-100B or 101A-101B, and an introductory statistics course such as Statistics 2 or 20, or 130A. Introduction to problems of observation, estimation, and hypothesis testing in economics through the study of the theory and application of time series, regression, and other econometric techniques. Evaluation of selected topics of empirical economic research and exercises in applied econometrics. Staff (F, W)

151. Labor Economics. (4) Three hours of lecture per week. Prerequisite: course 100A-100B or 101A-101B or consent of instructor; students who have taken Business Administration 154 may not receive credit for this course. Analysis of labor supply and labor demand, labor force participation of women with particular reference to the delineation and measurement of employment status, labor markets and problems in local government finance. (F)

152. Wage Theory and Policy. (4) Three hours of lecture per week. Prerequisite: course 100A-100B or 101A-101B. Theoretical and empirical analysis of wage and unemployment problems. National wage and manpower policy. Staff (S)

153. Labor Economics Seminar. (5) Three hours of seminar per week. Prerequisite: course 151 or 152 and consent of instructor. Enrollment will be limited. Students who received credit for Economics 151 prior to Spring 1974 may receive credit for this course.) A seminar paper will be required. (W)

154. Women in the Labor Force. (4) Three hours of lecture per week. Prerequisite: course 151 or 152. An analysis of the changing patterns of labor force participation of women with particular reference to the delineation and measurement of employment status. Staff (F)

155. Urban Economics. (4) Three hours of lecture per week. Prerequisite: course 100A or 101A. An analysis of the economic problems of the city, with special attention to housing, transportation, urban pollution, labor markets and selected problems in local government finance. Staff (S)

156. Urban Economics Seminar. (5) Three hours of seminar per week. Prerequisite: course 155 and consent of instructor. Enrollment will be limited. A seminar paper will be required. (W)
course.) The role and impact of money and financial intermediaries and demand for money, portfolio behavior; the financial system; inflation theory.

Pierce (W)

**203. Analytic Methods in Economics.** (3) Two hours of lecture per week. Prerequisite: 220A or equivalent. Theory of non-linear programming, Kuhn-Tucker theorems in static and dynamic settings, dynamic programming and control theory, selected topics.

**204. Special Topics in Advanced Economic Theory.** (3) Two hours of lecture per week. Prerequisite: consent of instructor. Topics to be announced annually. May be repeated for credit.

**205. History of Economic Thought.** (4) Three hours of lecture per week. Analysis of the relationships between historical conditions, economic theory, and economic policy from the Greeks to modern times.

207A–207B–207C. Mathematical Economics. (3–3–3) Two hours of lecture per week. Prerequisite: Mathematics 104A and 111 and Statistics 100A or equivalents. 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 choice, personal probability, general equilibrium, games, growth, and stability.

Pierce (F, W), Radner (Sp)

208. Seminar in Mathematical Economics and Advanced Microeconomic Theory. (4) Two hours of meetings per week. Prerequisite: consent of instructor. May be repeated for credit.

210A. Introduction to Economic History. (4) Three hours of lecture per week. A brief survey of some central figures in the development of economic thought, both in the classical tradition and in the modern era.

210B. Selected Topics in European Economic History. (3) Two hours of lecture per week. Prerequisite: course 210A. Sutch (W)

211. Seminar in Economic History. (4) Two hours of meetings per week. Prerequisite: consent of instructor. May be repeated for credit.

212. Economics of Public Enterprise. (3) Two hours of lecture per week. Prerequisite: 220A is prerequisite to 220B; 220B is prerequisite to 220C. Market structure, conduct, and performance in the unregulated sector of the American economy. The characteristics and economic problems of regulated public utilities and the policies related to promotion of competition. Peck (F); Mosk (W)

213. Seminar in Industrial Organization, Regulated Industries, and Public Enterprise. (4) Two hours of meeting per week. Prerequisite: consent of instructor. May be repeated for credit. Gilbert, Mosk, Peck (W, Sp)

214. Economics of Social Choice. (3) Two hours of lecture per week. Prerequisite: 220A is prerequisite to 220B; 220B is prerequisite to 220C. The theory of social choice, with special emphasis on the issue of Pareto optimality and on the measurement of social welfare.

215. Seminar in Economic Policy. (3) Two hours of meeting per week. Prerequisite: consent of instructor. May be repeated for credit. Fishlow, Hansen.

220A–220B–220C. Industrial Organization. (3–3–3) Two hours of lecture per week. Prerequisite: 220A is prerequisite for 220B; 220B is prerequisite for 220C. Market structure, conduct, and performance in the unregulated sector of the American economy. The characteristics and economic problems of regulated public utilities and the policies related to promotion of competition. Peck (F); Mosk (W)


230A–230B–230C. Public Finance. (3–3–3) Two hours of lecture per week. Prerequisite: 230A is prerequisite to 230B; 230B is prerequisite to 230C. Public finance in the Turf of public policy, public debt and public debt policy, public choice, public policy with respect to taxation. Rolph (F), Break (W); Coolter (Sp)

231. Seminar in Public Finance and Urban Economics. (4) Two hours of seminar per week. Prerequisite: consent of instructor. May be repeated for credit. Coolter, Rolph, Break (F, W, Sp)

238A–238B–238C. Aggregate Economics. (3–3–3) Two hours of lecture per week. Prerequisite: 238A is prerequisite to 238B; 238B is prerequisite to 238C. Macroeconomic theory of aggregate economic policy; short term planning models; fiscal and monetary policy in practice. Akerof (F), Hansen (W), Pierce (Sp)

237. Seminar in Advanced Macroeconomics and Money. (4) Two hours of seminar per week. Prerequisite: consent of instructor. May be repeated for credit.

240. Introduction to Econometrics. (4) Three hours of lecture per week. Prerequisite: Statistics 131 or equivalent. Students who have received credit for Economics 241A need not take this course. A survey course designed for graduate and undergraduate students in economics and related disciplines. Problems in the application of statistical methods in economics illustrated by a representative selection of empirical studies.

241A. Econometrics. (4) Three hours of lecture and one and one half hour section per week. Prerequisite: Statistics 104A or 105B–106B or 205A–205B or equivalent. Mathematics 111 or equivalent. Students who have received credit for Economics 240 may receive only partial credit for 241A. Intended for students specializing in econometrics and others with strong mathematical backgrounds. Introduction to the linear statistical model and its applications in econometrics. Special problems in analyzing data from non-controlled experiments.

Hsiao (F)

241B–241C. Econometrics. (3–3) Two hours of lecture per week. Prerequisite: course 240 or 241A and Statistics 200A–200B–200C. Course 241B is prerequisite for 241C.

241B: Econometric theory, including parameter identification, asymptotic approximations. Simultaneous equations models, and time-series models. Hsiao (W)

241C: Applied econometrics, including model specification, data sources, and a critical analysis of representation. Usage of the Stata computer package. Table learning.

McFadden (F)

242. Applied Econometrics Seminar. (4) Two hours of seminar per week. Prerequisite: course 240 or 241A. May be repeated for credit. Seminar in applied econometrics for non-specialists. A number of empirical studies will be analyzed and some advanced statistical techniques will be discussed.

Wiseman (W)

243. Topics in Econometric Theory. (4) Two hours of lecture per week. Prerequisite: consent of instructor. May be repeated for credit. Offered in alternate years.

250A–250B–250C. Labor Economics. (3–3–3) Two hours of lecture per week. Prerequisite: course 250A is prerequisite for 250B; 250B is prerequisite for 250C. Analysis of labor market behavior.

Ullman (F, W, Sp)

251. Seminar in Labor Economics. (4) Two hours of seminar per week. Prerequisite: consent of instructor. May be repeated for credit.

252. Urban Economics. (4) Three hours of lecture per week. Prerequisite: course 252A or equivalent. Consent of instructor. An analysis of problems of public policy in urban areas. Topics vary from year to year; in recent years, urban issues covered include urban public finance, public sector management, crime, education, welfare, and housing.

253. Urban Economics. (4) Three hours of lecture per week. Prerequisite: course 253A or equivalent. Consent of instructor. An analysis of problems of public policy in urban areas. Topics covered will vary from year to year; in recent years, urban issues covered include urban public finance, public sector management, crime, education, welfare, and housing. The effect of governmental form on the delivery of public services will also be considered.

260A–260B–260C. International Economics. (3–3–3) Two hours of lecture per week. Prerequisite: course 260A is prerequisite to 260B; 260B is prerequisite to 260C. Students who received credit for Economics 260A, 260B, or 260C prior to Spring 1974 may receive credit for this course.

275A–275B–275C. Economic Demography. (3–3–3) Two hours of lecture per week. Prerequisite: course 275A is prerequisite to 275B; 275B is prerequisite to 275C. Techniques of demographic analysis, economic influences upon population and labor force growth, relationship between population changes and economic development.

Fishlow (W), Mosk (Sp)

280A–280B–280C. International Economics. (3–3–3) Two hours of lecture per week. Prerequisite: course 280A is prerequisite to 280B; 280B is prerequisite to 280C. (Students who received credit for Economics 280A, 280B, or 280C prior to Spring 1974 may receive credit for this course.) The world economy as a general equilibrium system. The theory of international economics, international economic institutions, trade policy.

296. Special Topics in Economics. (3–5) Two to three hours of lecture per week. Prerequisite: consent of instructor. Topics of different sections to be announced annually. May be repeated for credit.

The Staff (F, W, Sp)

298. Directed Group Study for Graduates. (1–9) Prerequisite: consent of instructor. Meetings to be arranged. Seminars for the group study of selected topics which will vary from year to year. Offered on passed/not passed basis. The Staff (F, W, Sp)

299. Supervised Independent Study and Research. (1–9) 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 partic

NOTE: For key to symbols, see page 34.
The Department of English offers undergraduate and graduate study in the classical and/or the biblical backgrounds of English literature. Students are required to include the following six items in their program: (1) English 1A–1B; (2) one course in American literature (English 30 is strongly recommended, but with the consent of a major adviser this requirement may also be fulfilled by one of the following courses: (a) English 147A–147B–147C [which should be taken in their historical sequence]; (5) an upper division course in Shakespeare (but not English 117E); and (6) English 151 (a period or type course appropriate as background for the major author to be studied in 151 is strongly recommended).

Honors Program. Students with an overall grade point average of 3.3 or better and a 3.3 or better in the courses completed in the major may apply for admission to the honors program not later than in the second quarter of their senior year. Candidates for the A.B. degree with honors in English are required to write a bachelor's thesis (for which 5 units of credit are given under English 195) in their senior year. The thesis may be an extension of the students' work in English 151 or may deal with another area already familiar to them. A member of the department must agree to direct the thesis. Interested students may obtain application forms for the program in the Department of English Office.

Please Note: The quarter in which a particular course will be given is indicated in the catalog. Courses as specified in this catalog, may have to be changed in a minimum of two languages.

LOWERING DIVISION

1A–1B, First-Year Reading and Composition. (5–5) 1A–1B, 4 1/2 hours of lecture per week. Prerequisite: a passing grade in Subject A (examination or course). Prerequisite for the English major. Training in writing expository prose. (Students may enroll in the 1A–1B sequence with credit and grade to be assigned upon completion of the sequence.)

1A. Instruction in writing and reading of expository prose.

1B. Further instruction in expository writings in conjunction with reading literature. (The Staff, F, W, Sp)

10. Methods and Materials of Literary Study. (5) Four to 4 1/2 hours of lecture per week. Study of literary and critical texts, and of critical methods and theory. (The Staff, F, W, Sp)

*20. Modern British and American Literature. (5) Four to 4 1/2 hours of lecture per week.

25. Language. (5) Four to 4 1/2 hours of lecture per week. Prerequisite. Designed for sophomores, but open to any student who has acquired a clear command of English, and symbols of human speech; pattern, change, and growth in language with emphasis on English; interrelations of language and thought. (The Staff, F, W, Sp)

PREPARATION FOR GRADUATE STUDIES

Those interested in graduate study in English at Berkeley should familiarize themselves with the regulations of the Graduate Division. The prospective graduate student is strongly advised to gain a solid background in foreign languages; the Department of English requires candidates for the Ph.D. to pass examinations in a minimum of two languages.

PREPARATION FOR GRADUATE STUDIES

Those interested in graduate study in English at Berkeley should familiarize themselves with the regulations of the Graduate Division. The prospective graduate student is strongly advised to gain a solid background in foreign languages; the Department of English requires candidates for the Ph.D. to pass examinations in a minimum of two languages.

GRADUATE STUDY

The Ph.D. Program. Students are admitted to graduate study only in the fall quarter. The program requires successful completion of twelve letter-graded courses, including an introductory course in literary scholarship, and a two-quarter seminar (250), before advancement to candidacy. The first two years of study must include the three courses designed to demonstrate comprehensive knowledge of five fields of study: Medieval and Renaissance; Restoration and Eighteenth Century; Nineteenth- and Twentieth-Century British Literature; and American Literature. Comprehensive knowledge may be demonstrated by a series of field examinations or successful completion of wide-reading courses in each period arranged in consultation with graduate advisers. The balance of the graduate program consists of a passage of an oral qualifying examination of two to three hours, and the writing of a dissertation. Additional details on requirements for the doctorate in English, including language requirements, are contained in the English graduate office, Room 319 Wheeler Hall.

The M.A. Program. The M.A. program in English is separate from the Ph.D. program. It welcomes a broad range of applications, including older students, from a variety of academic and cultural backgrounds. It is possible for complete students to undertake one year's intensive graduate study in the general field of English and/or American literature, or who wish to pursue a special interest that lies within or across the traditional fields. A student's course of study will be determined individually at the beginning of the year with the major adviser, and may or may not include a short thesis or approved special project. In special cases, study for the M.A. degree may be extended into a second year. The M.A. program requires successful completion of eight courses (or 36 units), at least four of which must be in the graduate division, at least three of these in English; (b) a final examination, for which the student must agree to the direction of the major adviser and the Graduate Chairman, and which may vary from a written comprehensive examination to an oral examination in the general area of an approved project topic. The M.A. program requires no general language requirement for all M.A. students.

Teacher Training. Consult department office and the department's teacher training advisers; see also the Announcement of the School of Education.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits/Hours</th>
<th>Enrollment Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>104A-104B</td>
<td>Irish Literature</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Prerequisite: 104A is prerequisite to 104B.</td>
</tr>
<tr>
<td>104A</td>
<td>Gaelic Literature</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Prerequisite: 104A is prerequisite to 104B.</td>
</tr>
<tr>
<td>110A-110B</td>
<td>The English Language</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. 110A is prerequisite to 110B.</td>
</tr>
<tr>
<td>110A</td>
<td>Structure of the English Language</td>
<td></td>
<td>Mr. Boyd (F)</td>
</tr>
<tr>
<td>110B</td>
<td>History of the English language</td>
<td></td>
<td>Mr. Renoi (W)</td>
</tr>
<tr>
<td>1114A-114B</td>
<td>English Drama</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Prerequisite: 1114A is prerequisite to 114B.</td>
</tr>
<tr>
<td>1114A</td>
<td>English drama</td>
<td></td>
<td>Four to 4 1/2 hours of lecture per week. Prerequisite: 1114A is prerequisite to 114B.</td>
</tr>
<tr>
<td>1114B</td>
<td>English drama</td>
<td></td>
<td>Four to 4 1/2 hours of lecture per week. Prerequisite: 1114A is prerequisite to 114B.</td>
</tr>
<tr>
<td>1115A</td>
<td>English literature</td>
<td></td>
<td>Mr. Zwerdling (W)</td>
</tr>
<tr>
<td>1115B</td>
<td>British and American history</td>
<td></td>
<td>Mr. Portales (Sp)</td>
</tr>
<tr>
<td>1116</td>
<td>The English Bible as Literature</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Mr. Jordan (W)</td>
</tr>
<tr>
<td>1117A-117B</td>
<td>Shakespeare</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. A survey of Shakespeare's career.</td>
</tr>
<tr>
<td>1175</td>
<td>Shakespeare and Film</td>
<td>2.5</td>
<td>Two hours of lecture per week. Studies in filmed versions of Shakespeare's plays. Discussion and analysis of films. Cinematic and theatrical influences of film technique on interpretation of dramatic texts. The course will be offered in conjunction with a regular course in Shakespeare. Enrollment will be limited to students currently enrolled in the lecture course. Mr. Galton (W)</td>
</tr>
<tr>
<td>1176</td>
<td>Shakespeare for Nonmajors</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Mr. Altman (W)</td>
</tr>
<tr>
<td>120A-120B</td>
<td>Medieval Literature</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Students may receive credit for 120A without taking 120B. Mr. Scott (F)</td>
</tr>
<tr>
<td>122A-122B</td>
<td>Victorian Period</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Mr. Miyosh (W)</td>
</tr>
<tr>
<td>122B</td>
<td>British literature from about 1840 to 1901</td>
<td></td>
<td>Mr. Traugott (W)</td>
</tr>
<tr>
<td>132C</td>
<td>The Nineteenth-Century British Prose</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Mr. Traugott (W)</td>
</tr>
<tr>
<td>132D</td>
<td>The Novelist</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Mr. Traugott (W)</td>
</tr>
<tr>
<td>132D</td>
<td>The European Novel</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Mr. Traugott (W)</td>
</tr>
<tr>
<td>132E</td>
<td>The 20th Century Novel</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Mr. Traugott (W)</td>
</tr>
<tr>
<td>132F</td>
<td>Regional Literature: California and the West</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Ms. Buckeck (W)</td>
</tr>
<tr>
<td>130A</td>
<td>American Literature Before 1800</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Mr. Grabo (Sp)</td>
</tr>
<tr>
<td>130B</td>
<td>The American Renaissance</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Mr. Sulz (W)</td>
</tr>
<tr>
<td>130C</td>
<td>American Literature: 1868-1900</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Mr. Hart (W)</td>
</tr>
<tr>
<td>130D</td>
<td>American Literature: 1900 to Present</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Ms. Porter (Sp)</td>
</tr>
<tr>
<td>131A</td>
<td>American Poetry</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. A survey of American poetry and its background from Puritan times until the present. The special emphasis of the course will be on historical, with particular attention to such poets as Bradstreet, Taylor, Frenneau, Bryant, Emerson, Longfellow, Poe, Whitman, Dickinson, Frost, Pound, Eliot, and Stevens. Mr. Broslin (Sp)</td>
</tr>
<tr>
<td>132A</td>
<td>American Autobiography</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. A study of autobiography as a genre and the history of its development in America from current times to the present. Mrs. White (F)</td>
</tr>
<tr>
<td>132B</td>
<td>Major American Writers: The American Renaissance</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Enrollment limited to 25 students. Not open to students who have completed course 130B. Mr. Portales (Sp)</td>
</tr>
<tr>
<td>137C</td>
<td>Major American Writers: American Literature</td>
<td>1000 to Present.</td>
<td>Four to 4 1/2 hours of lecture per week. Enrollment limited to 25 students. Not open to students who have completed course 130C. Mr. Harper (W)</td>
</tr>
<tr>
<td>149</td>
<td>The English Lyric</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Mr. Shumaker (W)</td>
</tr>
<tr>
<td>155A-155B</td>
<td>Age of Chaucer</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Not open to students who have taken English 155A-155B. Mr. Stroud (F)</td>
</tr>
<tr>
<td>155B</td>
<td>Langland and late Chaucer</td>
<td>5-5</td>
<td>Mr. Mckinney (W)</td>
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<tr>
<td>156</td>
<td>Backgrounds of English Literature in the Continental Renaissance</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Mr. Paterson (F)</td>
</tr>
<tr>
<td>158A-158B</td>
<td>The English Renaissance and Literature of the sixteenth century</td>
<td>5-5</td>
<td>Mr. Barish (Sp)</td>
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<tr>
<td>158B</td>
<td>Literature of the seventeenth century</td>
<td></td>
<td>Mr. Friedman (F)</td>
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<tr>
<td>160</td>
<td>British Literature</td>
<td>1900 to 1945</td>
<td>Four to 4 1/2 hours of lecture per week. Mr. Stroud (F)</td>
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<tr>
<td>161</td>
<td>British and American Poetry</td>
<td>1900 to 1945</td>
<td>Four to 4 1/2 hours of lecture per week. Mr. Bernstein (F)</td>
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<tr>
<td>162</td>
<td>British and American Poetry</td>
<td>1945 to the Present.</td>
<td>Four to 4 1/2 hours of lecture per week. Mr. Zwerdling (W)</td>
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<td>163</td>
<td>Contemporary Literature</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Studies in the relationship of English literature to the arts. May be repeated for credit with a different topic and permission of the instructor. Mr. Stroud (W)</td>
</tr>
<tr>
<td>172</td>
<td>Literature and Sexual Identity</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Studies in the relationship of English literature to the arts. May be repeated for credit with a different topic and permission of the instructor. Mr. Brealin (Sp)</td>
</tr>
<tr>
<td>173</td>
<td>The Language and Literature of Films</td>
<td>5-5</td>
<td>Four to 4 1/2 hours of lecture per week. Studies in film as a mode of representing reality; cinematic techniques and the &quot;language&quot; of film. Lectures, class discussions, and film viewings. May be repeated for credit with a different topic and permission of the instructor. Mr. Brealin (Sp)</td>
</tr>
</tbody>
</table>
180C. Comedy, (5) Four to 4 1/2 hours of lecture per week. Study of representative comic forms, techniques, and points of view. Mr. Traugott (Sp)

180C. The Epic, (5) Four to 4 1/2 hours of lecture per week. Reading and discussions of epic, considering their cultural and historical contexts, the nature of their composition, and the development of the form.

180R. The Romance, (5) Four to 4 1/2 hours of lecture per week. Study of the romance as a literary genre. Topics may vary from quarter to quarter; focus may be historical or narrative, e.g., medieval, modern. May be repeated for credit with permission of the instructor.

180S. Satire, (5) Four to 4 1/2 hours of lecture per week. Study of representative satiric forms, techniques, and points of view. Mr. Stout (W)

180T. Tragedy, (5) Four to 4 1/2 hours of lecture per week. Study of representative tragic forms, techniques, and points of view. Mr. Alsmar (Sp)

GROUP II: RESTRICTED COURSES

100. Methods and Materials of Literary Criticism. (5) Four to 4 1/2 hours of lecture per week. (Sections limited to 25 students.) The Staff (W, Sp)

108. Special Topics. (5) Four to 4 1/2 hours of lecture per week. (Sections limited to 20 students each.) Designed primarily for English majors. Topics vary from year to year. May be repeated for credit with different topic. Students should consult the department’s Announcement of Courses for offerings in the current academic year.

109. Special Topics—Reading Courses. (2.5) Two hours of lecture per week. Readings in selected literary topics. Topics vary from year to year. Extensive readings; written examinations. Permission of the instructor and the completion of the reading will be at the discretion of the instructor. May be repeated for credit with a different topic and permission of the instructor.

147A—147B—147C. Major British Writers. (5—5—5) Four to 4 1/2 hours of lecture per week. Prerequisite: course 1A—1B. Majors and prospective majors should plan to begin the 147A—C sequence as early as possible after completing course 1A—B; three segments of 147 should be taken in normal sequence. (Students may enroll in the 147A—C sequence with credit and grade to be assigned upon completion of the sequence or of two contiguous segments of it. Students who have completed 147A may enroll in 147B; students who have completed 147A and 147B may enroll in 147C.) Close study of typical works of major authors from Chaucer through the twentieth century, with consideration of the major trends in English literature. 147A, Chaucer through the twelfth century; 147B, Milton through the eighteenth century; 147C, nineteenth and twentieth centuries. The Staff (W, Sp)

Special Seminars

96. Sophomore Seminar: Great Books of the Western Tradition. (5) Four to 4 1/2 hours per week. Intensive study of major works, for example: Orestes; The Republic; Augustus; Confessions; Divine Comedy; King Lear; Montaigne; Essays; The Prince; Don Quixote; Paradise Lost; Brothers Karamazov; The Interpretation of Dreams. Limited to 15 students. Not normally open to sophomores with a grade-point average of 3.5 or better. (Not limited to English majors.) Admission by faculty nomination and selection by the seminar staff. The Staff (W)

96A. Junior Seminar: Great Books of English and American Literature. (5) Four to 4 1/2 hours per week. Intensive study of major works, for example: Canterbury Tales; King Lear; Hamlet; Paradise Lost; Gulliver’s Travels; Preludie; Middlemarch; Bleak House; Ulysses; Leaves of Grass; Scarlet Letter; Moby Dick. Normally open only to junior students with a grade-point average of 3.5 or better. (Not limited to English majors.) Admission by faculty nomination and selection by the seminar staff. The Staff (W)

148B, 148C. Advanced Composition. (5) Four to 4 1/2 hours of lecture per week. May be repeated for credit with different instructors. Prerequisite: consent of instructor. Special section in advanced prose for teaching assistants, readers, and honors students in departments other than English.

144. Advanced Composition. (5) Four to 4 1/2 hours of lecture per week. Prerequisite: consent of instructor. Special section in advanced prose for teaching assistants, readers, and honors students in departments other than English.

144D. Advanced Prose. (5) Four to 4 1/2 hours of lecture per week. Prerequisite: consent of instructor. Special section in advanced prose for teaching assistants, readers, and honors students in departments other than English.
Environmental Studies

GROUP MAJOR IN ENVIRONMENTAL STUDIES

Group Major Programs Office, 245 Campbell Hall
Lecturer: Doris Sloan

Major Advisers: Mr. Clyde Wahrhaftig, Head Adviser; Area I, Physical Science: Mr. James Gason, Jr.; Area II, Biological Science: Mr. Harte; Area III, Social Science: Mr. Orman Granger.

A student may elect to follow one of three distinct areas in the group major in environmental studies, namely physical science, biological science, or social science. Details of course listings appear below. In each of these areas, there is a substantial amount of common ground, so that students will be able to talk with one another and to work together. Each program emphasizes broad and comprehensive training in the elementary forms of physics, chemistry, and biology, and in those areas of social science directly related to environmental questions. Such training is regarded as indispensable for those who wish to acquire more than a superficial understanding of the impact of science and technology on society, and who wish to contribute to the solution of environmental problems.

While many environmental problems have an urban focus (especially air pollution), this field does not include all urban problems. It is concerned with the interaction of urban people with the physical and biological environments created by cities but stops short of the problems stemming from the interaction of people with other people in cities; such matters must be left to the fields of urban and of ethnic studies.

The senior seminar (Environmental Studies 196A-196B) is an important feature of the group major in environmental studies. Typically, a group of fifteen seniors, including students from each of the three groups, works under the faculty guidance intensively for two quarters on a practical environmental problem. The technical, economic, and political background is studied thoroughly, and then detailed model solutions are worked out.

AREA I, PHYSICAL SCIENCE

Lower Division Courses. Mathematics 1A-1B; Chemistry 1A-1B; Physics 1A-1B; or Mathematics 6A-6B, 8A-8B, or Physics 12A-12B, Chemistry 1A-1B; or Mathematics 11A-11B, Economics 1; or Geology 5. Recommended electives: Mathematics 5C, Physics 5C, 5D.

Upper Division Courses. Biology 150; Public Policy 186; Environmental Studies 195-196A, 196B, Senior Seminar in Environmental Studies; Chemistry 109A-109B, Geology 130.

20 units from the following list of courses: Anthropology 148; Civil Engineering 144, 167; Environmental Studies 102, 123, 124, 125; Geography 131, 144, 146, 188; Economics 100A, Geology 117, 145, 150; Physics 124; Public Health 150, Soil Science 103, 101, 103.

AREA II, BIOLOGICAL SCIENCE


Upper Division Courses. Anthropology 148 or Geography 103 or Sociology 160; Biology 150; Public Policy 186; Environmental Studies 196A-196B, Senior Seminar in Environmental Studies.

Seven courses (28 units) to be selected with the Adviser's concurrence from the following list: Anthropology 110, 111; Biology 151, 167; Botany 115, 124, 125, 154; Civil Engineering 143, 144; Entomological Science 103 and 103L, 105, 106, 110, 113, 130; Environmental Studies 102, 125; Forestry 122, 123A-123B-123C, 144, 170, 173, 175, 177; Geography 130, 131, 139, 148, 188; Nutritional Science 160; Physical Education 105A-105B; Physiology 132; Pest Management 151; Plant Pathology 20; Public Health 150, 156 and 156L; Soil Science 100, 101, 103; Zoology 107A-107B, 131 and 131L, 138, 139, 140, 141, 142.

Recommended electives: Economics 100A; Environmental Studies 123, 124; Geography 132; Geology 5, 15; Interdepartmental Studies 100, 190.

AREA III, SOCIAL SCIENCE

Lower Division Courses. Mathematics 16A-16B or Mathematics 1A-1B-1C-5; Computer Science 3; Physics 5A-5B, 6A-6B, Chemistry 1A-1B; Biology 1A-1B; Economics 1.

Upper Division Courses. Biology 150; Public Policy 186; Sociology 140; Geography 130; Environmental Studies 196A-196B, Senior Seminar in Environmental Studies; Economics 100A.

Fifteen units from the following list of courses: Anthropology 148; Economics 100B, 125; Environmental Studies 100A, 101, 103, 131, 132, 188; PENR 100; Sociology 1, 160.

Recommended electives: Economics 121, 175; Environmental Studies 123, 124, 125; Geography 10, 151; Interdepartmental Studies 180; Public Health 150 or Civil Engineering 144; Sociology 178; Statistics 2, 20, 130A-130B, 131 and 131L.

102. Quantitative Aspects of Global Environmental Problems. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: Physics 40 or 50, or Physics 6C plus Biology 150, consent of instructor. Topics: the fate of persistent pollutants, the processes governing sources and fate of petroleum in the oceans, impact of human activities on climate, a sampling of solutions to environmental problems. The course is highly technical, but no previous knowledge of physics or chemistry is necessary.

Ms. Harte (F)

123. The Bay Area Environment: Physical Problems. (3) Either two hours of lecture or six hours of field trips per week. Prerequisite: enrollment limited to 20 students. Selected topics concerning geological hazards, water management and air pollution.

Mr. Wahrhaftig in charge (F)

124. Land Use Problems of the Bay Area. (3) Either two hours of lecture or six hours of field trips per week. Prerequisite: enrollment limited to 15 students. Problems of land use: open space, outdoor recreation. Bay filling and solid waste management: modification of the Bay by reclamation.

Mr. Wahrhaftig in charge (W)

125. The Bay Area Environment: Biological Problems. (3) Either two hours of lecture or six hours of field trips per week. Prerequisite: enrollment limited to 20 students. Students are required to do 20 hours of field work on a project to be agreed upon before the beginning of the quarter. Students majoring in Environmental Studies can elect Field Seminars in Environmental Studies.

Mr. Wahrhaftig in charge (W)

196A-196B. Senior Seminar in Environmental Studies. (3-5) Field work plus one 2-hour meeting per week. Prerequisite: Enrollment limited to students majoring in Environmental Studies. Joint seminar for majors representing the physical, biological and social science areas. A detailed consideration of a specific environmental problem. A substantial project grade will be awarded upon completion of the sequence.

Mr. Wahrhaftig (W, Sp)

Film

A group major in film has received approval by the College for offering in 1976-77. However, the California Postsecondary Education Commission reviews all new major programs, and their final determination re-opens the group major in film. The program is not available at press time for the General Catalog. Students interested in the major are referred to the Division of Interdisciplinary and General Studies, 301 Campbell Hall, for a description of the program and the status of the approval process.

NOTE: For key to symbols, see page 54.
LOWER DIVISION COURSE

1. Basic Film Techniques. (4) Two hours of lecture and two hours of discussion per week. Prerequisite: enrollment limited. A course for intending majors. The techniques of film editing will be studied in conjunction with the historical evolution of editing. Other topics include camera and lenses, film stock, lighting, special effects. Examples chosen from silent and documentary films. Ms. Fabe (F, Sp)

UPPER DIVISION COURSES

100. Theory of Film. (5) Four to four and a half hours of lecture and two to four hours of laboratory per week. Prerequisites: Film 1 or equivalent. The study of major theorists of film such as Eisenstein, Bazin, Kracauer, Truffaut, the animated film, film noir, the musical. Topic for upper division courses.

UPPER DIVISION COURSES

5-5) Four to four and a half hours of lecture and two to four hours of viewing per week. Prerequisites: Film 100 or equivalent. (4 quarters of foreign language and a change in the particular director). May be repeated if auteur changes. The study of a single director is studied in relationship to each other, to film history. Ms. Snow in charge (F, W, Sp)

151. Autour Theory. (5) Four to four and a half hours of lecture and two to four hours of viewing per week. Prerequisite: Film 100 or equivalent. (4 quarters of foreign language and a change in the particular director). May be repeated if auteur changes. The works of a single director are studied in relationship to each other, to director's development, to film history. Ms. Bascom in charge (F, W, Sp)

188. Independent Group Study. (1–5) One to five hours of lecture per week. Prerequisites: Consent of the instructor and Film 100 or equivalent. Group study selected from topics which vary from year to year. Field shall not be an academic requirement of Film 195A–195B. Students shall be specific enough to enable the student to write an essay based upon his study. Ms. Nestrick in charge (F, W, Sp)

198. Supervised Independent Study for Advanced Undergraduates. (1–5) Prerequisites: Film 100 or equivalent. Open to film majors with the consent of the instructor, an adviser in the major in Film. Reading and conference with the instructor in a field in which the student is not specifically trained and shall be specific enough to enable the student to write an essay based upon his study. Must be taken on a passed/not passed basis. Ms. Nestrick in charge (F, W, Sp)

FOLKLORE PROGRAM

This program is designed to provide graduate students with a competent knowledge of both the materials of folklore and of the various methods of studying these materials. The program includes introductory and advanced courses which faculty members from both the humanities and the social sciences participate. The scope of the courses is international and worldwide. However, students may specialize in a particular genre, e.g., folktale; or in a particular area, such as Russian folklore.

THE MAJOR

There is no undergraduate major in folklore.

PREPARATION FOR GRADUATE STUDY

The best preparation for graduate study in folklore is a strong undergraduate background in one of the theoretical fields with which folklore is closely affiliated. Since it is a study of the human expression which is handed down by tradition rather than by writing, it is related to all the departments that deal with literature, art, music, and religion. Since folklore also deals with the entire traditional culture of man as manifested in customs and beliefs, it has close affiliations with anthropology, design, history, linguistics, philosophy, psychology and sociology. Consequently, a good undergraduate record in any of these disciplines is highly desirable though not necessarily required.

THE GRADUATE MAJOR

The requirements for the M.A. in folklore include 30 units of which at least 12 must be graduate level (200 level) number, and an M.A. thesis based upon folklore and some other research project. (No course credits are allowed for the thesis.) Students must take at least one course in two of the following three areas: folk narrative, folk or ethnic music, folk or primitive art. As an introduction to the discipline, students must take Anthropology 195, The Forms of Folklore, and Anthropology 260, Narrative Folklore, or present evidence of having taken equivalent courses at other institutions. In addition, all students are required to take the interdisciplinary Folklore 250A–250B, Folklore Theory and Techniques. The student must also demonstrate proficiency in reading at least one foreign language. German is perhaps the most useful language for folklore studies, but French, Spanish or some language intimately connected with the M.A. thesis may be acceptable. Students should complete these courses before the spring of their second year. Questions on the requirements for the M.A. in folklore should be addressed to the graduate adviser, Folklore Program, in 201 Kroeber.

250A–250B. Folklore Theory and Techniques. (3–3) One 2-hour meeting per week. An interdisciplinary consideration of diverse topics related to folklore and research in folklore. Ms. Dundes (F, W)

266A–266B. The Folktale and Allied Forms. (3–3) Three 2-hour meetings per week. The study of folk narrative including motif and type classifications, theories of myth and folktale, and methods of analyzing prose narrative. Ms. Dundes (W, Sp)

298. Readings In Folklore. (3–5) Individual conferences to be arranged. The Staff (Mr. Bascom, Mr. Dundes in charge) (Su, F, W)

299. Directed Research. (3–5) Individual conferences to be arranged. The Staff (Mr. Bascom, Mr. Dundes in charge) (Su, F, W)

RELATED COURSES IN OTHER DEPARTMENTS

The Forms of Folklore (Anthropology 195)
Narative Folklore (Anthropology 250)
Folklore Seminars (Anthropology 260)
260A. Problems of folklore
260B. Psychology and folklore
260C. North American Indian folklore
260D. Additional seminars on specific topics to be announced.

Mythology (Classics 178)
Myth and Literature (Comparative Literature 165)
Children's Literature: Oral Interpretation (Librarianship 228C)

298A. shops and social events (160A)

THE BALLAD (Spanish 208A, 208B, 208C)

Russian Oral Tradition (Slavic 229)
Slavic Folklore (Slavic 137)
Folklore and Society (Sociology 164)
Introduction to the Ballad (Spanish 108)

French Department Office, 4125 Dwinelle Hall

Professors:
Leo Bersani, Ph.D. (Chairman)
Alexandra E. Caneta, Licent de Langue et Cultures Langues 
Alvin A. Eustis, Jr., Ph.D.
Erik Gale, Ph.D.
Ivar Putter, Ph.D.
Walter R. Rex, Ph.D.
Clifford H. Risell, Ph.D. (Emeritus)
Claire D. Brenner, Ph.D. (Emeritus)
French J. Carmody, Ph.D. (Emeritus)

Assistant Professors:
Bertrand P. Augat, Ph.D.
R. Howard Bloch, Ph.D.
Joseph J. Dugan, Ph.D.

Lecturers:
Esther Aben, Ph.D.
Usuele Dukar, Licence de Langues et Cultures Langues 
Suzanne Klimaszewicz, Ph.D.
Denis Holler, Doctorat de Langue et Cultures Langues

Gerald Jan, M.A.

The Department places primary emphasis on instruction in French at all levels, and the majority of its upper division courses are conducted entirely in that language. Non-majors, however, may write their exercises in English and receive credit for them.

Please Note: For courses in which topics vary from year to year, students should consult the departmental Announcement of Courses.

THE MAJOR

Courses 1, 2, 3, 4, 5, 6, and 35 or their equivalents; 44 upper division units in French (of which 16 units must be taken in residence).

There are two options in the major, which share a common base in language study and the acquisition of competence in spoken and written French. Option A (Literature) offers, in addition, a strong concentration in literature and is especially suitable as preparation for further literary study. Option B (Civilization) aims to include literature in the broader study of French civilization in its historical, social, and artistic dimensions; it is especially suitable for those who desire a background for careers other than the teaching of French literature.

Option A: Two courses from the 103 series; at least one must be from 103A–103B–103C. Four courses in the series 112–120 covering the centuries, and one additional course from 121A–121B–121C, 122, 126A–126B–126C, or 198A–198B. Four elective upper division French courses. Courses 140 and 145 do not count for the major.

Option B: Two courses from the 103 series; at least one must be from 103A–103B–103C. Five courses in 150–189, including two from the series 180A–180B–180C to be taken in the senior year. Four elective upper division courses, two of which may be taken in departments other than French in related fields such as History or History of Art. 

Honors Program: Students may enroll in the honors program only with the consent of their major advisor. It is open to students with an overall grade-point average of at least 3.0 and a grade-point average of at least 3.5 in major courses. Students in the honors program must complete two quarters of H198A–B as seniors. Option A majors will write an essay on a topic relating to French literature; Option B majors will choose a subject
relating to other aspects of French culture. This essay will be written under the supervision of a member of the faculty. Credit and grade will be awarded upon completion of the H198A-B course.

GRADUATE STUDY

The M.A. Program. A minimum of 36 units in French is required, including at least 18 units of graduate courses. With permission of the graduate adviser a maximum of 6 units of upper division or graduate work in other departments may be substituted for work in French. Out of a minimum of 18 units of graduate French courses, 12 must be in 200-level or above. The M.A. Program requires a written thesis, written in French, of about 50 pages. In Plan I, 5 units of course work in a seminar or a 298 course.

An intensive course in beginning French, equivalent to French 1 and French 2. (F. W, Sp)

The M.A.T. Program. A new program leading to a M.A. in French is required. The program asks students to demonstrate competence in three of the above chronological periods by a written examination. A fourth period may be tested either by written examination or by the completion of two quarters of course work; the fifth period is tested by independent study in a seminar or a 298 course.

The Ph.D. Program. Language requirements: a reading knowledge of five of the foreign languages other than French is required. The program asks students to choose three defined areas of study within French literature, with the additional choice of an adjacent field germane to these studies: (1) the work of a single major author; (2) a historical period in French literature; (3) the development of a form or genre. The candidates will take such courses as they and the adviser consider necessary. For further information, consult the graduate adviser and the department guide to higher degrees.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSES

1. Elementary French. Beginner's Course. (5) Five 2-hour classes and at least one laboratory session per week. Prerequisite: course 1 or equivalent. (W; F, Sp)

2. Elementary French (Continuation of 1). (5) Five 3-hour classes and at least one laboratory session per week. Prerequisite: course 1 or equivalent. (W; F, Sp)

3. Intermediate French. (5) Five hours of lecture and one hour of laboratory per week. Prerequisite: course 2 or equivalent. (W; F, Sp)

4. Intermediate French (Continuation of 3). (5) Five hours of lecture per week. Prerequisite: course 2 or equivalent. (W; F, Sp)

5. Advanced French. (5) Five hours of lecture per week. Prerequisite: course 4 or equivalent. Composition, reading, and grammar review. (W; F, Sp)

6. Advanced French. (5) Five hours of lecture per week. Prerequisite: course 5 or equivalent. Composition, reading, and grammar review. (W; F, Sp)

12A. Accelerated Beginning French. (10) Five 2-hour classes and four laboratory sessions per week. An intensive course in beginning French, equivalent to French 1 and French 2. (W; F, Sp)

12B. Accelerated Intermediate French. (10) Five 2-hour classes and four laboratory sessions per week. An intensive course in intermediate French, equivalent to French 3 and French 4. (W, F, Sp)

13. Intermediate Conversation. (2) Two 1-hour classes and one 1-hour laboratory period per week. Prerequisite: course 3 or equivalent. Recommended for prospective majors. (F, W, Sp)

14. Advanced Conversation. (2) Two 1-hour classes and one 1-hour laboratory period per week. Prerequisite: completion of course 4 or course 13. Recommended for prospective majors. (F, W, Sp)

35. Practical Phonetics. (2) Two 1-hour classes per week. Prerequisite: course 4 or equivalent. Phonetics as an aid to pronunciation. Required for the major; in special cases, students may be excused from this requirement. The Staff (F, W, Sp)

41. Woman's Voice in French Literature. (4) Three hours of lecture per week. The course will treat the dual theme of female sexuality and female writing through the examination of texts by modern French authors including Wittig, De Beauvoir, Le Duc, Collote. (F)

45. Composition and Grammar Review. (4) Three hours of lecture per week. Prerequisite: course 6 or equivalent. Students with an A or B in course 6 may proceed directly to course 103. Those with a lower grade intending to major in French must take this course - junior transfers intending to major in French, who fail the validation examination, must take this course before proceeding to course 103. Ms. Fleischman (W)

UPPER DIVISION COURSES

Courses 112-120 are designed to present a fairly comprehensive view of French literature from the Middle Ages to the present. Courses 140 and 145 do not count for the French major. The 150 series is chiefly concerned with the representation and contribution of various social groups in French literature and life. Courses in the 160 series are concerned with the importance of history for an understanding of French civilization, and with the richness of French historical writing. Courses 170-179 will treat arts other than literature, the other arts, or between literature and other intellectual disciplines. The 180 series treats literature and society, especially the significance of literature as a social institution throughout French history.

103A-103B-103C-103D-103E-103F. Language and Culture. Three hours of lecture per week. Prerequisite: two quarters of 103, one of which must be 103A, 103B or 103C, or the equivalent. The development of concepts of history in French society, especially the significance of literature as a social institution throughout French history. (F. W, Sp)

112A-112B. Medieval Literature: from the Chanson de Roland to the Roman de la Rose. (4-4) Three hours of lecture per week. Prerequisite: course 6 (with a grade of B or better) or 46. Transfer students must pass placement examination or take 46 before enrolling in 103. Literature and culture in the Middle Ages, with an emphasis on the works of the troubadours and trouvères. (F, W; Sp)

116A-116B-116C. Sixteenth Century Literature: Erasmus to Montaigne. (4-4-4) Three hours of lecture per week. Prerequisite: two courses from 103, one of which must be 103A, 103B or 103C, or the equivalent. Mr. Duggan (W); Mr. Groch (Sp)

117A-117B-117C. Seventeenth Century Literature. (4-4-4) Three hours of lecture per week. Prerequisite: two courses from 103, one of which must be 103A, 103B or 103C, or the equivalent. Ms. Smock (W)

119A—119B—119C. The Nineteenth Century. (4-4-4) Three hours of lecture per week. Prerequisite: two courses from 103, one of which must be 103A, 103B or 103C, or the equivalent. Mr. Stahl (F); Mr. Rex (W, Sp)

120A—120B—120C. Twentieth Century Literature: Tradition, Renewal, and Revolt. (4-4-4) Three hours of lecture per week. Prerequisite: two courses from 103, one of which must be 103A, 103B or 103C, or the equivalent. Topics will vary from year to year. Ms. Sackoff (W; Sp)

121A—121B—121C. Literary Themes, Genres, and Structures. (4-4-4) Three hours of lecture per week. Prerequisite: two courses from 103, one of which must be 103A, 103B or 103C, or the equivalent. Topics will vary from year to year. Ms. Sackoff (W; Sp)

122A. Modern Theater. (2) Two 1-hour classes per week. Prerequisite: two courses from 103, one of which must be 103A or 103C or 103F, or the equivalent. The history and literary criticism of Modern Theatre. Specific topics will vary from year to year. Ms. Smock (F)

123A—123B. French and English: Translation and Stylistics. (4-4) Three hours of lecture per week. Prerequisite: two quarters of 103 or the equivalent. The development of a good prose style and an understanding of the power of translation. Ms. Sorgen (W)

130. Writing in French. (4) Three hours of lecture per week. Prerequisite: two quarters of 103 or the equivalent. Ms. Smock (F)

131A—131B. Literary Themes, Genres, and Structures. (4-4) Three hours of lecture per week. Prerequisite: two quarters of 103, or the equivalent. The Staff (F; W, Sp)

133. Introduction to French Linguistics. (4) Three hours of lecture per week. Prerequisite: one quarter of 103, or the equivalent. Ms. Fleischman (W)

135. French Dialogic Theory. (4) Three hours of lecture per week. Prerequisite: two quarters of 103, or the equivalent. The Staff (F; W; Sp)

145A—145B—145C. French Literature in English Translation. (4-4-4) Formerly 112. Three hours of lecture per week. A reading course on the works of such French authors as Flaubert, Balzac, and Stendhal. Ms. Sackoff (F; W, Sp)

150A—150B—150C. Women in French Literature. (4-4-4) Three hours of lecture per week. Prerequisite: two courses from 103, one of which must be 103A, 103B or 103C, or the equivalent. Ms. Smock (Sp)

160. French Historical Writing. (4) Three hours of lecture per week. Prerequisite: two courses from 103, one of which must be 103A, 103B or 103C, or the equivalent. The development of concepts of history in French writing. The Staff (F; W, Sp)

NOTE: For key to symbols, see page 34.
128 / L&S: French

Voltaire, Michélet are examples of authors who may be studied. Topic varies from year to year. Mr. Guy (Sp)

161A–161B. A Year in French History. (4–4) Three hours of lecture per week. Prerequisite: two courses from 103, one of which must be 103D, 103E or 103F, or the equivalent. The study of a significant year in French history from many points of view—political, sociological, intellectual, and artistic, as well as literary. Topic varies from year to year. Mr. Longree (W)

162. Perspectives on History. (4) Three hours of lecture per week. Prerequisite: two courses from 103, one of which must be 103D, 103E or 103F, or the equivalent. This course will study both contemporary and subsequent reaction to historical events or figures. The Wars of Religion, the Fronde, the Commune, Louis XIV, Napoleon are examples of topics which may be studied. Topic varies from year to year. Mr. Calame (F)

170A–170B. French Films. (4–4) Three hours of lecture per week. Prerequisite: two courses from 103, one of which must be 103D, 103E or 103F, or the equivalent. This course will study both contemporary and subsequent reaction to historical events or figures. The Wars of Religion, the Fronde, the Commune, Louis XIV, Napoleon are examples of topics which may be studied. Topic varies from year to year. Mr. Calame (F)

193. Lexical Grammar. (4–4) Three hours of lecture per week. Prerequisite: two courses from 103, one of which must be 103D, 103E or 103F, or the equivalent. The analysis to literary texts. Concepts of fantasy, of the narrative structures and theories of rhetoric in the French literature; the changing status of literature as a social institution; literary reflections of social differences. Designed primarily for MAT candidates.

204. Oral Argumentation In French. (4–4) Formerly 236. Three hours of lecture per week. Study of narrative structures and theories of rhetoric in the French language through close analysis of texts. Ms. Sorgen (F)

205A–205B. Literary Criticism and Literary Scholarship. (4–4) 205A: A study of various critical approaches to literature, including the most recent techniques of the traditional branches of literary history; bibliography, historiography, biography, stylistics, exegesis, textual criticism, and modern editions. Preparation of theses, articles, monographs and books. Mr. Bersani (F); Mr. Calame, Mr. Eustis (Sp)

206. Morphological and Syntactical Analysis of French Texts. (4–4) Formerly 238A, 238B. Three hours of lecture per week. A formalist and stylistic analysis of French and English grammatical structures as well as of basic phonological differences. Designed primarily for MAT candidates.

201A–201B–201C. Studies in Medieval Literature. (4–4–4) Formerly 202A–202B–202C. Three hours of lecture per week. Offerings vary from year to year. Students should consult the department’s Announcement of Courses for offerings in the current academic year. Mr. Duggan (F); Mr. Bloch (Sp)

202A–202B–202C. Studies in Medieval Literature. (4–4–4) Formerly 202A–202B–202C. Three hours of lecture per week. Offerings vary from year to year. Students should consult the department’s Announcement of Courses for offerings in the current academic year. Mr. Duggan (F); Mr. Bloch (Sp)

211A–211B. Reading and Interpretation of Old French Texts. (4–4) Formerly 238A. Three hours of lecture per week. Offerings vary from year to year. Students should consult the department’s Announcement of Courses for offerings in the current academic year. Ms. Fleischman (F); Mr. Bloch (W)

212A–212B–212C. Old Provencal Literature. (4–4–4) Three hours of lecture per week. Reading and analysis of twelfth and thirteenth century texts written in the langue d’oc with special emphasis on troubadour lyric poetry.

218A–218B. Studies in Late Medieval Literature. (4–4) Three hours of lecture per week. Students should consult the department’s Announcement of Courses for offerings in the current academic year. Ms. Huet (W)


231A–231B. Baroque Literature. (4–4) Two hours of lecture per week. Seminar study and discussion of baroque poetry, drama, and novel, treating one genre each year. With emphasis on the period 1600–1660. Baroque themes and stylistic and structural elements. Relations with other literatures and the fine arts. Language and usage, the doctrines of monadism,漳 noticing, preciosity, and classicism. Mr. Eustis (Sp)

234A–234B–234C. The Eighteenth Century Novel. (4–4–4) Two hours of lecture per week. Offerings vary from year to year. Students should consult the department’s Announcement of Courses for offerings in the current academic year. Mr. Eustis (Sp)

235A–235B–235C. Studies in Eighteenth Century Literature. (4–4–4) Two hours of lecture per week. Offerings vary from year to year. Students should consult the department’s Announcement of Courses for offerings in the current academic year. Mr. Eustis (Sp)

240A–240B–240C. Studies in Eighteenth Century Literature. (4–4–4) Two hours of lecture per week. Offerings vary from year to year. Students should consult the department’s Announcement of Courses for offerings in the current academic year. Mr. Eustis (Sp)

250A–250B–250C. Studies in Nineteenth Century Literature. (4–4–4) Formerly 219A–219B. Two hours of lecture per week. Offerings vary from year to year. Students should consult the department’s Announcement of Courses for offerings in the current academic year. Mr. Eustis (Sp)

254–254B–254C, Nineteenth Century Poetry (4–4–4) Formerly 208A–208B and 215A–215B. Two hours of lecture per week. Offerings vary from year to year. Students should consult the department’s Announcement of Courses for offerings in the current academic year. Mr. Longree (W)

260A–260B–260C. Studies in Twentieth Century Literature. (4–4–4) Two hours of lecture per week. Offerings vary from year to year. Students should consult the department’s Announcement of Courses for offerings in the current academic year. Mr. Todorov (F); Ms. Smock (W)

268A–268B. Modern Theatre and Cinema. (4–4) Two hours of lecture per week. Offerings vary from year to year. Students should consult the department’s Announcement of Courses for offerings in the current academic year. Mr. Augst (Sp)

282. French Literary and Cultural History. (4) Three hours of lecture per week. An analysis of patterns and trends in the literature and culture of France, considered in relation to their counterparts in the United States and elsewhere. Primarily for M.A.T. candidates, but open to all graduate students.

283. Special Study. (1–5) Variable hours of meeting. Designed for students engaged in exploration of a restricted field, involving the writing of a report. May not be substituted for available lecture or seminar courses. The Staff (F, W, Sp)

299. Individual Research. (5–9) Individual appointments. Normally reserved for students directly engaged upon the doctoral dissertation. The Staff (F, W, Sp)

601. Special Study for Graduate Students. (1–8) Individual study for the comprehensive in consultation with the field adviser. Units may not be used to meet either unit or residence requirements for a master’s degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

602. Individual Study. (1–8) Prerequisite: an M.A. or completion of at least 24 units beyond the B.A. Individual study for the major adviser; intended to provide an opportunity for qualified students to prepare for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

16. French for Graduated Students, Beginning. (0) Three hours of lecture per week. Course must be taken on a passed/not passed basis. a. Preparation for graduate reading examinations in fields of A, B, B Preparation for graduate reading examinations in all other disciplines. (F, W, Sp)

26. French for Graduated Students, Advanced. (0) Three hours of lecture per week. Prerequisite: course 16 or equivalent. Course must be taken on a passed/not passed basis. a. Preparation for graduate reading examination in field of English; b. Preparation for graduate reading examinations in all other disciplines. (F, W, Sp)

TEACHERS’ COURSES

301A–301B. Teaching French In College. (2–2) Three hours of lecture and one hour of laboratory per week. Prerequisite: for graduate students teaching at the college level. Required for new T.A.’s Bi-weekly lectures on methodology, grading and testing, demonstration class with required attendance three times a week; language laboratory observations; supervised classroom practice. Additional seminars and discussion sessions on methodology. Mr. Jian (F, W, Sp)

301C. Teaching French in College. (2) Three hours of lecture and one hour of laboratory per week. Continuation of 301A and B. Semi-weekly seminars on methods and techniques of teaching French at the college level. Mr. Jian (Sp)

IDS 117. Music and the Philosophers. (4) See Interdepartmental Studies for complete description of this course.

IDS 118. Enlightenment and the Visual Arts In 18th Century France. (5) See Interdepartmental Studies for complete description of this course.

Genetics

Staff, graduate programs, and courses are listed under the College of Natural Resources.

CHOICE OF COLLEGE

A student can complete the group major in genetics in the College of Letters and Science (A.B. degree) or can elect genetics as an emphasis in the biology of natural resources major in the College of Natural Resources (B.S. degree).
Group Major in Genetics

Group Major Program Office, 245 Campbell Hall
Undergraduate Major Adviser: Mr. Spieht.
Honor Program Adviser: Mr. Kelly.

The major in genetics is designed to provide a broad foundation in biology, centered around a core of emphasis on genetics. The field of genetics encompasses most areas of biological research. Consequently, major requirements range from molecular to populational levels. Students are designed to take advantage of the diversity of course offerings at Berkeley so as to allow students with interests as varied as bacterial genetics, human genetics or population biology to fulfill the requirements in a manner suited to their personal interests. The intent of the program is to be rigorous in the breadth of its requirements and flexible in the means of fulfilling them.

Lower Division Courses. Required: Biology 1A, 1B; Chemistry 1A, 1B, 1C; Chemistry 8A-8B (or 12A-12B-112); Physics 6A-6B; Mathematics 16A-16B. Recommended: Physics 6C.

Upper Division Courses. A minimum of 40 units of upper division (or graduate) course work is required. The courses must be in genetics, statistics, or from the list in Part II below and must meet the minimum requirements of Parts I and II below.

Part I. Required courses: Genetics 100 (5) (or equivalent); 101 (4), 102 (4), 111, 112; and one of the following: Genetics 130 (4), or 140 (5), or 159 (5). Note: Genetics 100L may be waived by the adviser for Honors Students who have had substantial laboratory work elsewhere.

Part II. A minimum of one course in each of the following five categories is required:

Biochemistry
Biochemistry 102 (5)
Biochemistry 103 A-C
(4-4-4)

Cell Biology and Physiology
Bacteriology 100B (4)
Nutrition 160 (3)
Bacteriology 103 (3)
Physiology 101 (5)
Biology 152 (3)
Physiology 152 (4)
Botany 130 (5)
Plant Nutrition 115 (3)
Molecular Biology 110A
Zoology 104 (4)
(5)
Molecular Biology 110B
Zoology 110 A-B (3-3)

Ecology
Biology 150 (4)
Zoology 178
Biology 151 (4)
Botany 124 (10)
Public Health 106 (4)
Botany 154 (3)
Zoology 140 (3)
Entomology 105 (4)
Zoology 141 (4)
Forestry & Conserv. 123
Zoology 142 (4)
A-B-C (5-5-5)
Forestry & Conserv. 144
Zoology 143 (10)

Evolution
Anthropology 102 (5)
Paleontology 101 (4)
Anthropology 108 (5)
Zoology 109 (4)
Genetics 191 (5)

Organismal Diversity and Form
Bacteriology 100A (4)
Forestry & Conserv. 142
Bacteriology 102 (4)
(4)
Botany 101 (5)
Botany 102 (4)
(4)
Botany 105 (5)
Plant Pathology 100 (4)
Botany 110 (5)
Plant Pathology 114 (3)
Botany 120 (4)
Plant Pathology 120 (4)
Botany 124 (10)
Zoology 106 (4)
Entomology 100 (5)
Zoology 107A-B (5-5)
Forestry & Conserv. 121
Zoology 108 (6)
(3)
Zoology 143 (10)

Note: Either Botany 124 or Zoology 143 may be used to fulfill simultaneously the Organismal Diversity and Form requirement and the Ecology requirement.

Honor Program. The program consists of a minimum four-term sequence taken in addition to requirements for the major. The sequence commences spring term with Genetics 118B, is followed by at least two terms of Genetics 118S and terminates the following spring with Genetics 118T, during which an honors thesis is written and submitted for review by a committee of three faculty members. A student in the program may elect to leave the program at any time prior to taking Genetics 118T.

Students with an overall grade-point average of 3.0 and an average of 3.3 within the major are eligible to enter the honors program. Only students with an overall grade-point average of at least 3.3 at the time of graduation are eligible to be awarded honors.

Eligible students who complete the program may be awarded honors, high honors, or highest honors. Awarding of honors is introductory. The honors thesis review committee and the honors adviser is based solely upon the merits of the honors thesis.

Geography
Department Office, 501 Earth Sciences Building

Professors:
David J. M. Hooper, Ph.D.
James J. Parsons, Ph.D.
Clarence J. Glacken, Ph.D.
(Chairman)
Alf Pred, Ph.D.
Hilgard O.R. Steinberg, Ph.D.
James E. Vance, Jr., Ph.D.

Associate Professor:
Theodore M. Oberlander, Ph.D.

Assistant Professors:
Rogier Byrnes, Ph.D.
Robert R. Reed, Ph.D.
Orman G. Greaves, Ph.D.
Richard A. Walker, Ph.D.
Risa I. K. Palm, Ph.D.

Lecturer:
Daniel E. Luten, Ph.D.

Graduate Undergraduate Advisers: Mr. Byrne, Mr. Granger.

Graduate Graduate Advisers: Mr. Pred, Mr. Reed.

Advising concerning requirements for undergraduate and graduate students is administered by the departmental advisers; guidance in the student's special field of interest is administered by the appropriate member of the staff. New students entering the Department at any level must consult with the departmental advisers until a specialty adviser has been selected or assigned to them.

The Geography Department aims to provide a broad-ranging education that is both as an inhabitant and as an interpreter of the face of the earth. The search for this kind of understanding involves thorough study of (a) the interlocking systems of the natural environment (climate, landforms, biota) and the evaluation of natural resources; (b) those diverse historical, cultural, social, economic, and political processes which affect the location and spatial organization of population groups and their activities; and (c) significant parts of the real world, whether described as cities, regions, nations, or landscapes, where integrated interpretation can be attempted, and a variety of problems thereby better understood.

The undergraduate major in geography therefore includes the social and cultural aspects of human, physical, and regional geography as well as cartography, quantitative methods, and field work. Backgrounds in the natural and social sciences, history, and statistical methods will be found useful to the geography major, the emphasis depending on the student's particular interests.

The Major

Lower Division. Geography 1, 4, and 7. (Transfer students in their first year of study may substitute the student's major requirements for 168B, unless the student consults with the Departmental Undergraduate Adviser in order to avoid repeating lower division work.)

Upper Division. A minimum of 40 units. The student must select one of four options. The order in which the courses are listed in each option does not imply a sequence:

Option I (Cultural-Environmental). Two courses from Geography 100-104; two courses from Geography 130-139 and 149; Geography 180; Geography 183 or 187.

Option II (Urban-Economic). Five courses from Geography 111-125; Geography 187.

Option III (Physical). Four courses from Geography 140-149 including Geography 100, 144 and 148; Geography 180; Geography 187.

Option IV (General). One course from each of the following groups: Geography 100-104; Geography 110-125; Geography 140-149; Also Geography 180 and 183 or 187.

All geography majors must take Geography 189 and two regional courses numbered 150-171. Seniors with a grade-point average of 3.0 in the major may take graduate courses. Courses numbered 190-199 do not count toward completion of the major.

Honors Program. With the consent of the major adviser, a student with an overall grade-point average of 3.0 or higher and a grade-point average of 3.5 or higher in courses in the major may apply for admission to the honors program. Application for acceptance in the program should be made by the beginning of the senior year. A senior in the honors program must complete Geography 189S, in which a thesis is required, and may take graduate seminars.

Graduate Study

Geography deals with a broad spectrum of questions relating to society, environment, and spatial order. A variety of previous backgrounds may prove useful as a foundation for advanced work in the field. Students entering the graduate program from fields other than geography should expect to take at least one upper division course in each of three areas—cultural, economic, and physical geography—during their first year of residence. Although the department offers graduate training in physical, cultural, economic, urban, and regional geography, it places strong emphasis on the interdisciplinary specialties and related approaches in other disciplines.

The M.A. program involves completion of not less than one year of residence, at least four graduate seminars or courses (not individual research), and an original thesis or a comprehensive examination. Ph.D. candidates must complete a minimum of two years of residence (normally at least three for those entering from other disciplines) and pass a preliminary written examination and an oral qualifying examination. In the preparation of many theses they must also be prepared to spend a year in field or archival research following the oral examination. Further details, including foreign language requirements, are available from the departmental office.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

Lower Division Courses

1. Introduction to Physical Geography. (5) Three 1-hour lectures and two 2-hour laboratory per week. Origin of the Earth's major geological and climatic patterns and their influence upon the characteristics of lands, animals, and soils. Problems relating to the interrelationships between physical factors in the principal natural regions of the Earth. Mr. Oberlander (F); Mr. Byrne (Sp).

4. Introduction to Cultural and Historical Geography. (5) Three hours lecture and one 2-hour section per week. The relations between man and environment through time. Historical background and distribution of population, settlement, and resource utilization; processes which have transformed natural landscapes into cultural landscapes. Mr. Reed (W).

7. Spatial Organization of Human Activity. (5) Three hours lecture and one 2-hour discussion section per week. Interplay of location and social and economic problems. Mr. Pred (F).

*18. Primary Production: Major World Commodity Cycles* (W)
130. Natural Resource and Population. (5) Formerly 130A. A study of the interactions of population growth, technology, and environmental change. Emphasis on current literature. Focus on such issues as agriculture and nutrition, energy use, world resource availability, and economic development. Mr. Walker (F)

140. Principles of Meteorology. (4) Three hours of lecture per week. Weather development in relation to different scales of atmospheric circulation, with examples from the Northern Pacific-Western North America area. Mr. Granger (F)

145. Applied Micrometeorology. (5) Three hours of lecture per week and four days of field trips. Prerequisite: course 144 or consent of instructor. Not open to students who have taken course 124. Micrometeorological phenomena; climates in areas with different topography, vegetation, and man-made structures. Mr. Granger (W)

146. Applied Physical Climatology. (4) Two hours of lecture per week and four days of field work per quarter. Prerequisite: course 144 or consent of instructor. Not open to students who have taken course 124. Energy and water balance of air masses, river and lake basins, particular ocean areas, and glaciers. Mr. Granger (Sp)
17. The Humid Tropics. (5) Four hours of lecture per week. Analysis of the natural vegetation and wet lands of the equatorial regions; the economic potentialities of the tropics and the obstacles to their exploitation inherent in the physical and cultural environment. Mr. Sternberg (F)

180. Field Geography. (5) One hour of lecture per week and nine hours of field work every Saturday. Prerequisite: senior standing. A geographical survey of selected physical and cultural landscapes in the Bay Area and adjacent parts of Northern California. (F, Sp)

**181. Urban Field Geography.** (4) One hour of lecture per week and nine hours of laboratory per week. Application of some elementary concepts of scaling and the measurement of relationships to geographical problems. Topics to be considered may include areal classification, spatial interaction, analysis of networks. Mrs. Palm (Sp)

182. Geographical Problems In Regional Development. (4) Three hours of lecture per week. Principles of medical geography and landscape epidemiology including changing patterns of human health and disease in the context of physical, biotic and sociocultural environments and in relation to human settlement. Analysis of selected specific diseases of global importance. Term research paper required for 5 units credit. Mr. Oberlander and Staff in cooperation with Staff of Department of International Health—Hooper Foundation, UCSF (Sp)

183. Cartographic Representation. (5) Two hours of lecture and six hours of laboratory per week. Problems in the representation of quantitative and qualitative data on thematic maps. Mr. Oberlander (Sp)

187. Introduction to Quantitative Methods In Geography. (4) Two hours of lecture and three hours of laboratory per week. Application of some elementary concepts of scaling and the measurement of relationships to geographical problems. Topics to be considered may include areal classification, spatial interaction, analysis of networks. Mrs. Palm (Sp)

**188. Geography of Human Health and Disease.** (4 and 6) Three hours of lecture per week. Principles of medical geography and landscape epidemiology including changing patterns of human health and disease in the context of physical, biotic and sociocultural environments and in relation to human settlement. Analysis of selected specific diseases of global importance. Term research paper required for 5 units credit. Mr. Oberlander and Staff in cooperation with Staff of Department of International Health—Hooper Foundation, UCSF (Sp)

193. Historical Geography. (4) Three hours of lecture per week. Mrs. Palm (F)

199. Geographical Thought. (6) Three hours lecture and one hour of discussion per week. Prerequisite: three upper division courses in geography. Selected themes in the history of geographical thought from classical times to the present. Mr. Hooson (W)

H185. Honors Course. (1–5) Prerequisite: admission to the Honors Program. Required for honors in Geography. Students will write a thesis. The Staff (F, W, Sp)

197. Field Study In Geography. (1–5) Prerequisite: consent of instructor. Supervised experience in application to geography in off-campus organizations. Regular individual meetings with faculty sponsor and written reports required. The Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1–6) Enrollment is restricted by regulations listed on page 34. Additional limitations: Students must have senior standing and have an overall grade-point average in the major of at least 3.00. Must be taken on a passed or not passed basis. The Staff (F, W, Sp)

GRADUATE COURSES

Admission to graduate courses requires in all cases consent of the instructor. Undergraduate courses are not prerequisite to graduate courses unless so indicated.

**200. Advanced Cultural Geography.** (4) Three hours of lecture per week. Mr. Granger (F)

210. Problems In Modern Human Geography. (4) Three hours of lecture per week. Mr. Vance (F)

**220. Advanced Urban Geography.** (4) Three hours of lecture per week. Mr. Vance (F)

**230. Geographical Problems In Regional Development and Resource Utilization.** (4) Three hours of lecture per week. Practical, biotic, and cultural factors in the development of the tropics. Mr. Sternberg (Sp)

240. Problems In Physical Geography. (4) Three hours of lecture per week. Intensive reading with weekly discussion of selected problems in physical geography. Mr. Oberlander (F)

GRADUATE RESEARCH SEMINARS

251. Cultural Geography. (4) Three hours of lecture per week. Mr. Glacken (W)

**252. Economic Geography.** (4) Three hours of lecture per week. Mr. Fred (W)

253. Urban Geography. (4) Three hours of lecture per week. Mr. Vance (Sp)

254. Natural Resources and Population. (4) Three hours per week. Mr. Walker (W)

255. Historical Geography. (4) Three hours of lecture per week per week. Mrs. Palm (F)

256. Climatology. (4) Three hours of lecture per week. Mr. Granger (Sp)

**257. Geomorphology.** (4) Three hours of lecture per week. Mr. Oberlander (Sp)

258. Biogeography. (4) Three hours of lecture per week. Mr. Byrne (W)

**259. Urban Social Geography.** (4) Three hours of lecture per week. Mrs. Palm (W)

260. History of Geography. (4) Three hours of lecture per week. Mr. Hooson (W)

263. Geography of Transportation. (4) Three hours of lecture per week. Mr. Hooson (W)

271. Latin America. (4) Three hours per week. Mr. Sternberg (Sp)

**275. Soviet Union.** (4) Three hours of lecture per week. Mr. Hooson (W)

280. Advanced Field Study in Geography. (5–10) All day Saturday. Course may be repeated for credit. The Staff (F, W, Sp)

289. Problems in Geographical Thought. (4) Three hours of lecture per week. Mr. Hooson (Sp)

296. Directed Dissertation Research. (1–8) Prerequisite: advancement to Ph.D. Candidacy. Open to qualified students who have been advanced to candidacy for the Ph.D. degree and are directly engaged upon the doctoral dissertation. Must be taken passed/not passed. May be taken passed/not passed. May be repeated for credit. The Staff (F, W, Sp)

297. Directed Field Studies. (1–8) Open to qualified students directly engaged in field studies. May be taken passed/not passed. May be repeated for credit. The Staff (F, W, Sp)

299. Individual Research. (1–8) Individual research for graduate students in consultation with staff member. Mr. Granger (F)

395. Seminar on the Teaching of Geography. (1) One hour of lecture per week. The aims and methods of teaching geography at the college and university levels. Mr. Granger (F)

601. Individual Study for Master's Students. (1–8) Individual study for comprehensive or language requirements in consultation with the field adviser. Units may not be used to meet either unit or residence requirements for the master's degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

602. Individual Study for Doctoral Students. (1–8) Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

Geology and Geophysics

Department Office, 301 Earth Sciences Building

Professors:
- Bruce A. Bolt, Ph.D., D.Sc.
- Ian S. E. Carmichael, Ph.D.
- Charles M. Gilbert, Ph.D.
- Richard L. Hay, Ph.D.
- Thomas V. McKelvey, Ph.D.

Associate Professors:
- Lane R. Johnson, Ph.D.

Assistant Professors:
- Jason B. Saksrud, Ph.D.

Clyde Wahrhaftig, Ph.D.
Lionel E. Weis, Sc.D., Ph.D.
Hans-Runald Weise, Ph.D.
Perry Byerly, Ph.D., LL.D.
Adolf Peletz, Ph.D. (Emeritus)
Francis J. Turner, Sc.D.
Howell Williams, Sc.D., LL.D., LL.D.
Chi-yuen Weng, Ph.D.

The Department of Geology and Geophysics offers the student excellent opportunities to acquire a broad background of knowledge and experience in the study of the structure and evolution of the earth. Three undergraduate degree programs are offered, each leading to the A.B. degree in the College of Letters and Science.

THE MAJOR IN EARTH SCIENCE

The major in earth science includes a broad spectrum of courses in natural science and is designed for stu-
THE MAJOR IN ENGINEERING

THE MAJOR IN GEOLOGY

THE MAJOR IN GEOPHYSICS

UPPER DIVISION COURSES

Courses 100 and 110 are general interest courses with minimum prerequisites and are appropriate for non-science majors in the College of Letters and Science.

*100. Mineralogy. (4) Two 1-hour lectures and two 3-hour laboratory periods per week. Prerequisite: Chemistry 1A or consent of instructor. Introduction to crystallography and systematic mineralogy; mineral identification of hand specimens.

101. Field Geology. (4) Two 4-hour field trips and one 1-hour discussion session per week. Prerequisite: Geology 150. Geology of the Berkeley Hills and vicinity. Not open to students who have completed courses 5 or 101. Mr. Mayer (F); Mr. Crummel (Sp)

102. Optical Mineralogy. (4) Two hours of lecture and two 3-hour laboratory periods per week. Prerequisite: Geology 150 or equivalent. Introduction to optical properties of minerals, rock-forming minerals and rock structures. Mr. Rhinelander (F); Mr. Curtis (Sp)

103. Igneous Petrology. (4) Two 1-hour lectures and two 3-hour laboratory periods per week. Prerequisite: Geology 150. Origin and evolution of igneous rocks. Study of igneous rocks using petrographic microscope. Mr. Carrothers (F)

104. Metamorphic Petrology. (4) Two hours of lecture and two 3-hour laboratory periods per week. Prerequisite: course 150 or equivalent. Mr. Wood (W)

L.S. Geology and Geophysics
Three hours of lecture and one three-hour laboratory period per week. Prerequisite: consent of instructor. 

105A. Sedimentary Rocks. (3-3) Three hours of lecture and three hours of laboratory per week. Prerequisite: 105A: course 150, 105B: course 150 and 152. 105A is not prerequisite to 105B. 105A: Physical processes in sedimentation; sedimentary textures and structures; environmental interpretation of some deposits. Mr. Hay (W) *105B: Chemical processes in the formation of sedimentary rocks; microscopic sedimentary petrography. 

106. Mineral Resources. (4) Three hours of lectures and demonstrations per week, plus two 1-day and one 3-day field trips. Prerequisite: consent of instructor. Non-renewable resources: Geologic environments, economic mineral deposits, stratigraphic and sedimentary deposits. Some emphasis on human affairs. Mr. Meyer (W) 

107. Evolution of Continents and Oceans. (5) Three 1-hour lectures and two 1-hour discussion periods per week. Prerequisite: junior standing; Geology. The structure and evolution of the surface of the earth; history of the continents; problems in developing a geologic time scale; principles of relative dating. Mr. Winn (W) 

110. California. (4) Three hours of lecture and discussion per week, occasional field trips. Prerequisite: consent of instructor. The geology of California in relation to man. Mr. Saleeby (W) 

112A. Stratigraphy and Structure, (3) Two 2-hour lectures and one 2-hour discussion period per week. Prerequisite: consent of the instructor. Interpretation of sedimentary rocks and geologic maps with respect to structural history; types of fold and cross sections; tectonic provinces. Mr. Winn (W) 

112B. Stratigraphy and Structure. (3) Prerequisite: course 112A. A 1- or 2-week independent study from the literature of the sediments of a given time interval over an extensive region, such as a state or province. Mr. Winn (W) 

116A=116B. Geological Structures and Maps. (3-3) Two hours of lecture and two hours of laboratory per week. Prerequisite: course 5 or 101. 

116B. Interpretation of geologic maps and aerial photographs. Mr. Saleeby (Sp) 

117. Geomorphology. (4) Two 1-hour lectures and one 3-hour laboratory per week; two weekend field trips. Prerequisite: consent of instructor; course 5 or 101 and 150 recommended. Weathering, erosion, and development of landscape. Glacial geology and Pleistocene history; interpretation of topographic maps and aerial photographs. Mr. Wahlfelt (W) 

118. Summer Field Course. (8) Prerequisite: course 5 (or 101), 116A=116B, and 150. A detailed investigation of a selected area. Six days in the field and six weeks in the field. Mr. Winn (Sp) 

119. Geologic Field Studies. (2) One to four weekend field trips to localities of geological interest. Prerequisite: course 5 or 101, 150, or consent of instructor. Can be repeated for credit. Mr. Winn, Mr. Saleeby (Sp) *124D. Geochronology. (3) One 3-hour lecture and discussion period per week. Radiocarbon dates in geologic and paleontologic context; radiometric dating; use of radioactive potassium, argon, and other radionuclides in stratigraphy and absolute dating. Mr. Gilbert (F) 

123. Introduction to Theoretical Geochemistry. (3) Three hours of lecture and two hours of laboratory per week. Prerequisite: Chemistry 14 or the equivalent. Thermodynamic and solution chemistry in a geologic context; phase equilibria, interpretation of chemical potentials, prediction of mineral solubilities, computer calculations, etc., with emphasis on practical application to the study of rocks and geochemical processes. Mr. Helgeson (W) 

135. Introduction to X-Ray Crystallography. (3-2) Two 2-hour lectures and one 2-hour laboratory period per week. Elementary methods of X-ray analysis and their application in mineral identification. Emphasis is in practical crystallography; structure determination of lattice constants for cubic crystals. X-ray study of solid solutions and polymorphism. The course is designed for students in chemistry, mineralogy, petrology, metallurgy, and physicists who may wish to use X-ray techniques for identification of minerals and rocks. Mr. Wenk (W) 

144. Fluorite Processes in Geomorphology. (3) Three hours of lecture and one three-hour laboratory period per week. Prerequisite: consent of instructor. 

190. Minerals and Rocks. (4) Two 1-hour lectures and two 1-hour discussion periods per week. Prerequisite: Chemistry 1A; Geology 1 or 10, or equivalent. Laboratory study of minerals and rocks. Mr. Gilbert (F), ________ (W) 

191. The Earth. (4) Three 1-hour lectures and one 2-hour discussion period per week. Prerequisite: course 5 each of college calculus and physics; course 5 or 101. The earth as a whole; its internal constitution and evolution. Mr. Johnson (W) 

195. Senior Honors Course. (3) Prerequisite: limited to Honors candidates. Original research and preparation of an acceptable thesis. May be taken during two consecutive semesters. Senior honors students may substitute for six units of the upper division requirement with consent of the major adviser. Mr. Winn (Sp) 

208. Supervised Independent Study and Research. (1-6) Enrollment is restricted by regulations. Prerequisites: student must be cleared by the instructor. The Staff (W, Sp) 

218. Deformed Rocks and Minerals. (3) One 3-hour laboratory per week. Prerequisite: course 112 or consent of instructor. Structural interpretation of geologic processes. Mr. Wenk (W) 

219A. X-Ray Crystallography. (4) One 2-hour lecture and one 3-hour laboratory period per week. Prerequisite: consent of the instructor. Practical introduction to X-ray diffraction techniques (powder, Dobe-Scherrer, Guinier, diffactometer; single crystal; Laue, precession, Weissenberg, pole-figure goniometer, application in crystal identification, lattice constants determination, point and space-group symmetry. Theoretical part requires previous crystallographic coursework; Fortran I/II, Miller indices, reciprocal lattice). To be offered 1976-77 only. Mr. Wenk (W) 

235. Crystal Structure Determination. (4) One 2-hour lecture and two 2-hour laboratory periods per week. Prerequisite: course 235. Recommended: course 102 or equivalent and some experience in computer techniques. The interpretation of X-ray diffraction data. Some of the classical methods are illustrated with selected examples. The structure factor, Trial and error methods, Heavy atom method, anomalous scattering, Fourier and Patterson methods. Least squares refinement. Direct methods. Mr. Cameron (W) 

236. The Use of the Electron-Microprobe. (3) Eight hours of laboratory per week. Prerequisite: graduate standing; consent of instructor. The operation of an electron-probe, and ancillary equipment, for the analysis of inorganic solids. May be repeated for credit. Mr. Cameron (W) 

250A–205B. Processes of Ore Deposition. (3–4) Two 1-hour lectures per week and two 3-hour laboratory periods per week. Prerequisite: course 112 or consent of instructor. Interpretation of X-ray diffraction data. Some of the classical methods are illustrated with selected examples. Mr. Carlin (F) ??? 

251. Seminar in Geochronology. (4) Two 2-hour discussion periods per week. Prerequisite: consent of the instructor. Principles and problems in geochronology. Mr. Helgeson (Sp) 

254A–256A. Sedimentary Petrology. (2–2) One three-hour laboratory per week and two 3-hour laboratory periods per week. Prerequisite: consent of instructor. Petrology of nonvolcanic sedimentary rocks. Mr. Winn (W) 

255A–*256B–*256C. Sedimentary Petrology. Mr. Winn (W) 

256A–*256B–*256C. Sedimentary Petrology, (4–4–4) Two 1-hour lectures and one 3-hour laboratory period per week. Prerequisite: course 105 or equivalent. Adequate training in the use of the petrographic microscope. Mr. Winn (Sp) 

257A. Processes and Products of sedimentation in water. Mr. Gilbert (F) 

258. Petrology of nonvolcanic sedimentary rocks. Mr. Hay (W) 

259. Petrology of volcanic sedimentary rocks. Mr. Hay (W) 

260. Deformed Rocks and Minerals. (3) Three 1-hour lecture periods per week. Prerequisite: consent of instructor. Introduction to the study of deformed rocks and minerals. Mr. Weiss (F) 

271. Geomorphology. (3) Formerly numbered 213A. Three 1-hour lecture per week and one 3-day field trip. Prerequisite: consent of instructor. Rates and processes of erosion. Mr. Wahlfelt (Sp) 

275A. Environmental Analysis of Pleistocene Sedimentary Rocks. Three 1-hour lecture per week and one 3-day field trip. Prerequisite: one of the following courses: 205A-205B. Must be taken on a satisfactory/unsatisfactory basis. Mr. Johnson (F) 

280. Research. (2-12) The Staff (F, W, Sp, Su) 

290. Seminar, (2-6) Topics will be announced each quarter. The Staff (W, Sp) 

401. The Use of the Electron-Microprobe. (3) Eight hours of laboratory per week. Prerequisite: graduate standing; consent of instructor. The operation of an electron-probe, and ancillary equipment, for the analysis of inorganic solids. May be repeated for credit. Mr. Cameron (W) 

601. Individual Study for Masters' Students. (1–8) Individual study for the comprehensive or language requirements in consultation with the field adviser. Requirements must not be used in residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis. Mr. Bolt (F) 

602. Individual Study for Doctoral Students. (1–8) Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to gain familiarity with advanced topics in the field. May not be used for any residence requirement for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. Mr. Bolt (F) 

IDS 211. Geologic and Engineering Factors in Environmental Planning. (4) See Interdepartmental Studies for the complete description of this course. 

Geophysics

UPPER DIVISION COURSES

104A. Mathematical Methods In Geophysics. (3) Three hours of lecture and computer laboratory per week. Prerequisite: Mathematics 51. Linear differential equations, Laplace transforms, Fourier transforms, and other integral transforms; asymptotic expansions, saddle points; probability and scientific inference; treatment of observational errors; significance tests. Mr. Bolt (F) 

104B. Mathematical Methods In Geophysics. (4) Three hours of lecture and computer laboratory per week. Prerequisite: Mathematics 51. Linear differential equations, Laplace transforms, Fourier series; transform analysis; statistical applications; wave motion and wave propagation. Mr. Johnson (W) 

125. Mineral-Solution Equilibria. (3) Three hours of lecture and laboratory per week. Prerequisite: consent of instructor. High temperature solution chemistry, theoretical prediction of equilibrium constants and activity coefficient model, high temperature constraints, computer analysis of experimental data, and application of computed thermodynamic properties of mineral systems. Mr. Gilbert (F) 

133. Mass Transfer and Kinetics in Geochemical Processes. (3) Three hours of lecture per week. Prerequisite: consent of instructor. Equilibrium constant model for mass transfer resulting from weathering, diagenesis, metamorphism, diabatic expansion of vein fluids, hydrothermal transport of ore metals. Mr. Helgeson (Sp)
120. Mechanics of Earthquakes and Faulting. (3) Two-1-hour lectures and two 2-hour laboratory periods per week. Prerequisite: Earth Sciences 122A or equivalent. Earthquake dynamics and thrust transfer, magnetic and other properties of interest to earth sciences. Content will vary from year to year.

Mr. Wang (F)


Mr. McEvilly (Sp)

218. Seminar in Seismology. (3) Three 1-hour discussion periods per week. Critical study of problems in current seismological research. Topic will vary from quarter to quarter.

Mr. Johnson (F); Mr. Bolt (B)

219. Seminar in Geophysics. (3) Two 1-hour discussion periods per week. Critical study of problems in current geophysical research. Topic will vary.

Mr. Verhoogen (W)

240. Geophysical Fluid Mechanics of the Earth's Interior. (4) Four hours of lecture and discussion per week. Prerequisites: Geophysics 140 or equivalent. Topics in the dynamics of the mantle and core. Free convection, rotating systems, differential heating, motion of a conducting fluid in a magnetic field.

Mr. Corcos (Sp)

285. Research. (2-12) The Staff (F, W, Sp, Su)

1. Study for Master's Students. (1-8) Individual study for the comprehensive or language requirement in consultation with the field adviser. Units may not be used to meet either unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (F, F, W, Sp)

2. Study for Doctoral Students. (1-8) Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirement for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (Su, F, W, Sp)

150. Strong Motion Seismology. (3) Three 1-hour lectures per week. Prerequisite: Geophysics 122A or equivalent and consent of instructor. Generation of seismic waves, instrumentation to measure strong ground motion. Estimation of response motion at a site. Ground motion spectra. Influence of soils and geologic structures. Seismic risk mapping.

Mr. Bolt (W)

140. Mechanics of Geophysical Fluids. (4) Three one-hour lectures per week. Prerequisite: Mathematics 120C or 121A-121B, or consent of instructor. Dynamics of fluids in a geophysical context, hydrostatics, equations of motion, fluid mechanics, and applications. Deterministic and statistical, under- and over-determined, and linear and non-linear problems. Concepts of existence, uniqueness, stability, construction, appraisal, resolution, and hodograph curves. Applications to gravity, magnetic, conduction, seismology, and planetary physics.

Mr. Johnson (W)

GRADUATE COURSES

204A-204B-204C. Elastic Waves. (4-4-4) Three 1-hour lectures per week. Prerequisite: Geophysics 104A or equivalent. Geophysics 121A; Physics 105A. 204A. Stress; infinitesimal and finite strain; wave motion in isotropic solids; water waves; effects of anelasticity, anisotropy; propagation in layered media. 204B. Spherical waves; terrestrial oscillations; Lamb's problem; model earthquake sources. 204C. Alternate years.

Mr. Bolt (Sp)

*204C. Theory of spherical waves; eigenvalues of the earth; diffraction of waves; difference and finite element methods of wave modeling; seismic waves for a spherical earth; dislocation theory; seismotectonics; source models; expansion in multipole; moving sources; effect on surface waves.

Mr. Bolt (Sp)


Mr. Johnson (W)

208. Physical Properties of Rocks and Minerals. (3) Three hours of lecture per week. Prerequisite: consent of instructor. Physical properties of rocks and minerals at high pressure and high temperature, including equation of state, elasticity, fracture and flow, heat transfer, magnetic and other properties of interest to earth sciences. Content will vary from year to year.

Mr. Wang (F)

284. Research. (2-12) The Staff (F, W, Sp, Su)

1. Study for Master's Students. (1-8) Individual study for the comprehensive or language requirement in consultation with the field adviser. Units may not be used to meet either unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (F, F, W, Sp)

2. Study for Doctoral Students. (1-8) Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirement for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (Su, F, W, Sp)

120C or 121A-121B, or consent of instructor. Dynamical analysis, scaling, elementary solutions involving dimensionless groups. Techniques of modern seismometry. Study of current seismological research. Topic will vary from year to year.

Mr. Johnson (Sp) Alternate years.
2. a seminar on the methods and methodology of teaching German as a foreign language. This course will familiarize students with the basic tools of the profession and will provide a critical understanding of the discipline. This course, as well as the 210 series, is strongly recommended.

3. Middle High German (105A) and at least two courses in the field of German linguistics, one of which must be German literature.

4. A test of the candidate's proficiency in the German language.

5. An M.A. reading list, to be submitted to the Graduate Adviser during the fourth quarter of study. It should include the required texts of literature courses taken, as well as titles reflecting the individual interests of the student.

The examination will be administered by a committee of three. Candidates may choose one of the following formats:

1. A three-hour written examination
2. A two-hour oral examination
3. A two-hour written and a one-hour oral examination.

It will be given after the completion of four quarters of graduate study. Time extensions may be granted by the Graduate Committee in exceptional cases. The examination will be based primarily upon the student's work in literature courses.

Initial course work in the complementary language(s) required for the Ph.D. should be undertaken as early as possible.

Master of Arts: Linguistics

Requirements: 36 units in German with a B grade or better, including at least 20 graduate units, 4 of which may be in German literature. A knowledge of Middle High German and of the structure and history of the German language, as well as proficiency in modern German, is required. These requirements may be fulfilled by courses 103A, 103B, 105A, 270, 271, or their equivalents taken at another university.

When these requirements have been met, the student will be given a written examination on advanced linguistics. The examination will cover language (phonology, grammar, morphology, syntax) of German and the history of the German language in all its aspects. A reading list is available for general guidance.

Master of Arts in Teaching (M.A.T.) in German

The program encompasses seven quarters consisting of advanced studies in German language and literature, and theoretical studies and practical training in education. It includes a summer quarter in Germany. The pre-service program includes a three-quarter sequence of student teaching in the schools in the greater San Francisco Bay Area. The program is administered by a joint committee for the Department of German and the School of Education. Candidates must have fulfilled the requirements for a major in German or its equivalent and the requirements for admission set by the Graduate Council. The candidate's program for the M.A.T. degree must include one or more of the courses taught by the joint committee of the Department of German and the School of Education, will be recommended by the faculty of the School of Education to the Graduate Council.

Academic credits for the degree in both departments consist of 58 quarter units: 24 in German, 18 in Education, 12 in the summer program in Germany, and 4 in the seminar in methods of teaching German accompanying the year of teaching.

In German the student's work will be planned on the basis of a diagnostic examination to determine the candidate's competence in speaking, listening comprehension, writing, and linguistics. The residence program in Germany is provided for those candidates who have not already had an initial study and a period of residence in Germany. The following graduate courses in German are required:

237. German Oral Style (4 units)
250. Aspects of German Literary and Cultural History (10 units)
285. Descriptive German Grammar (4 units)
300. The Teaching of German (4 units).

Candidates should consult the School of Education for course requirements of that School.

Doctor of Philosophy: Literature

The Program. An M.A. in German or its equivalent is a prerequisite for admission to the doctorate program. Upon acceptance, students will pursue a program in which the study of German literature is organized around their interests. As soon as possible, students will select an advisory committee of three faculty members from the Graduate Department. Faculty from other departments may be added to the committee. After consulting with the advisory committee, the students will submit for committee approval their intended program of study, a projected reading list, a brief explanation of that program, and a statement arguing its significance. The committee will guide the students' course of study until they take the qualifying examination and will encourage them to do preliminary research for their dissertation.

Complementary Studies. It is considered essential to the Ph.D. program that the student gain competence in an outside field complementary to the major field of concentration in German literature. In the course of this study, the student will be expected to consult with faculty members in other disciplines.

The student must demonstrate fluency in at least one European language or a useful reading knowledge of an equivalent field. This prerequisite may be extended by three hours for further reading in the complementary field.

The Examinations. The Ph.D. qualifying examination emphasizes the initial approved (and amended) program of study and consists of:

1. A written examination in two three-hour periods, to be taken within two weeks; each period may be extended by three hours for further revision;
2. A three-hour oral examination which is to be taken within one month of the written examination and which will emphasize, in addition to the approved program of study, the preliminary work done on the dissertation.

Doctor of Philosophy: Linguistics

An M.A. in German linguistics or its equivalent is a prerequisite for admission to the program. There are no required courses. However, students are expected to consult with the graduate advisor regarding the sequence of courses to be taken. A limited program of study in the area of German literature can be included.

The student must demonstrate fluency in at least one European language, or a useful reading knowledge of two European languages, other than German or English.

The Ph.D. Qualifying Examination for students specializing in German linguistics consists of a written examination of two periods of three hours each and an oral examination (three hours). The examination will be primarily with an emphasis on descriptive (synchronic) and historical (diachronic) aspects of German, its dialects and periods, and of the Germanic language family; one complementary field can be selected by the student.

DUTCH STUDIES

For a description of the group major in Dutch studies see alphabetical listing under College of Letters and Science. Descriptions of the courses comprising the language, literature, history, and culture of the Netherlands, offered by the Department of German, follow German courses.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

GERMAN

LOWER DIVISION COURSES

1. Elementary German. Basic Course. (6) Five 1-hour class meetings and two 1-hour sessions in the Language Laboratory. Open to students who have completed German 14A, 12A, 1R.
   Mr. Mueller in charge (F, W, Sp)

2. Elementary German. (6) Five 1-hour class meetings and two 1-hour sessions in the Language Laboratory per week. Prerequisite: course 1 or its equivalent. Not open to students who have completed German 14B, 12B, 1R.
   Mr. Mueller in charge (F, W, Sp)

3. Elementary German. (6) Five 1-hour class meetings and two 1-hour sessions in the Language Laboratory per week. Prerequisite: course 2 or its equivalent. Not open to students who have completed German 14C, 12C, 1R.
   Mr. Mueller in charge (F, W, Sp)

4. Intermediate German. (5) Five 1-hour class meetings and two 1-hour sessions in the Language Laboratory per week. Prerequisite: course 3 or its equivalent. Open to students who have completed German 14D, 12D, 1R.
   Mr. Mueller in charge (F, W, Sp)

5. Intermediate German (Emphasizing Reading). (5) Five 1-hour class meetings per week. Prerequisite: course 4 or its equivalent. Mr. Seeba in charge (F, W, Sp)

**12A. Elementary German, Intensive Course. (10) Five 2-hour class meetings and two 1-hour sessions in the Language Laboratory per week. Prerequisite: course 1 or its equivalent. Not open to students who have completed German 14A, 14B, 14C, 14D, 12A, 12B, 12C, 12D, 1R.
   Mr. Mueller in charge (F, W, Sp)

**12B. Intermediate German, Intensive Course. (10) Five 2-hour class meetings and two 1-hour sessions in the Language Laboratory per week. Prerequisite: course 2 or 12A or its equivalent. This course will be offered only if 12A is not open to students who have completed German 3, 4, 14C, 14D, 12R, 1R.
   Mr. Hillen in charge (W, Sp)

14A-14B-14C-14D. Individualized Instruction. (1-5; 1-5; 1-5; 1-5) This course covers the material of German 1-4, Basic Course. Students may enter at any level. Divided into 20 units (14A: 1-5 units; 14B: 1-5 units; 14C: 1-5 units; 14D: 1-5 units). A minimum of two units is required. Open to any student whose program including this course, meets the minimum requirements. If a student completes more than the approved number of units than he contracts for, he is given credit for them.
   Mr. Mueller in charge (F, W, Sp)

39. German Literature in Translation. (4) Two 1/2-hour lectures and one hour of discussion per week. Open to students who have completed 1177 topic: The Twentieth Century - East and West. May be repeated for credit when topic changes.
   Ms. Goldstein (W)

40. Women in German Literature. (3) Two hours of meeting per week. A study of women as portrayed in literature, and of women writers. Topic will vary from
101A-101B. Advanced German Grammar and Composition. (3-3) Three 1-hour lectures per week. Not open to native speakers, except with consent of instructor. Staff (F, W, Sp)

102A—102B. Advanced German Conversation. (2-3) Two hours of lecture per week. Each course in the sequence may be repeated if credit is due to 3 times. Total number of units not to exceed 6. Open to graduate students with consent of instructor.
102A: Mr. Tubach, Mr. Kuduszu (F); 102B: Mr. Seeba, Mr. Penzk (W)

103A. Introduction to Descriptive German Grammar. (2) Two 1-hour lectures per week. Phonetics and phonology. Staff (F)

103B. Introduction to Descriptive German Grammar. (2) Two 1-hour lectures per week. Syntax. Staff (W)

104. Introduction to the Linguistic Study of German. (4) Four 1-hour lectures per week. Mr. Brink (Sp)

105A-105B, Middle High German. (3-3) Three 1-hour meetings per week.
105A: Section 1: Linguistic emphasis Staff (F)
105A: Section 2: Literature emphasis Mr. Spahr (F)
105B. Middle High German. Prerequisite 105A or equivalent. Recommended for German 203. Staff (W)

B. Culture Courses

*1110. From 800–1500. (3) Three 1-hour lectures per week. Analysis of the social, political and historical background to Medieval literature from the Age of Charlemagne to the Empire of Charles V. Mr. Tubach (F)

*1111. From 1500–1660. (3) Three 1-hour lectures per week. Political, social and historical background to German literature from the Reformation to the Age of Reason. Mr. Schaefer (Sp)

*1112. From 1660 to the Present. (3) Three 1-hour tutorials per week. The political, social and historical background to German literature since the Enlightenment. Mr. Seeba (W)

C. Period Courses (literary)

120. The Literature of the Middle Ages. (3) Formerly 103A. Three 1-hour tutorials per week. The key literary works of the Hohenstaufen period are selected. Mr. Tubach (Sp)

121. Renaissance, Reformaiton, and Baroque. (3) Three 1-hour lectures per week. Mr. Spahr (W)

*122. Enlightenment and Sturm und Drang. (3) Three 1-hour lectures per week. Mr. Hilden (F)

123. Classicism. (3) Three 1-hour lectures per week. Major authors and their work from the German Classical Period. Mr. Weisinger (F)

124. Romanticism. (3) Three 1-hour lectures per week. Ms. Goldstein (Sp)

125. Realism. (3) Three 1-hour lectures per week. Mr. Seeba (Sp)

*126. The Modern Period. (3) Three 1-hour lectures per week. Specific topics to be announced. The Staff (F)

*127. Contemporary Trends (since 1845). (3) Three 1-hour lectures per week. Mr. Kuduszu (W)

D. Genre Courses

130. Studies in the German Drama. (4) Three 1 1/2-hour lectures per week. Topic will vary from year to year. May be repeated for credit when topic changes. 1976-77 topic: German Drama since 1945 (Formerly course 130B). Mr. Spahr (W)

132. Studies in German Prose. (3) Three 1-hour lectures per week. May be repeated for credit when topic changes. 1976-77 topic: Modern German Prose. Mr. Kuduszu (W)

134. Studies in German Poetry. (1 to 4) Topics and unit value vary from year to year. 1976-77 topic: Readings in German poetry from the Enlightenment to the Present. (3) Two 1 1/2-hour lectures per week. Mr. Politzer (F)

E. Individual Authors

140A. Goethe. To 1808. (3) Three 1-hour lectures per week. Ms. Bonwit (Sp)

140B. Goethe, 1808 to 1832. (3) Three 1-hour lectures per week. Ms. Bonwit (Sp)

*140C. Introduction to the Works of Heinrich Heine. (3) Two 1-hour lectures per week. Mr. Spahr (Sp)

*140D. Readings in Goethe’s Poetry. (2) Two hours of lecture per week. Mr. Jaszi (W)

*140F. The Poetry of Rilke and Hofmannsthal. (3) Three hours of lecture per week. Mr. Jaszi (W)

F. Special Topics

*150A. The Romantic Hero as Artist. (2) Two hours of lecture per week. The thematic approach links this course with the general introduction to romanticism (124) to be given during the same quarter. Must be taken concurrently with course 124. 150A will be organized as an individual study course. Ms. Goldstein (W)

G. Undergraduate Courses

*155. Philosophical Approaches to German Literature. (3) Three 1-hour lectures per week. Prerequisite: consent of instructor. Specific topics to be announced. Mr. Mann (Sp)

156. Sociological Approaches to German Literature. (3) Three 1-hour lectures per week. Prerequisite: consent of instructor. Specific topic to be announced. Mr. Mann (Sp)

157. Psychological Approaches to German Literature. (3) Three 1-hour lectures per week. Prerequisite: consent of instructor. Topic: The Modern Period. Mr. Kuduszu (Sp)

158. Special Topics. (1–4) Two 1 1/2 hour lectures per week. Prerequisite: consent of instructor. Topic 1976-77: „Märchen und phantastische Literatur. (3) Three hours of meeting per week. May be repeated for credit when topic changes. Mr. Spahr, Mr. Tubach (Sp)

H. 195A—B. Honors Seminars for Undergraduates. (3–3) Three hours of meeting per week. Prerequisites: 3.5 GPA in at least 20 units of upper division German; 3.3 overall GPA. Course normally open only to students participating in the Honors program; if enrollment warrants and instructor consents, other students may be admitted. Topics vary from year to year. 1976-77 topics:

195A. E.T.A. Hoffmann and Kafka Ms. Jasi (F)
195B. Interpretation of Poetry Mr. Politzer (W)

196. Honors Studies in German. (2) Supervised independent study and research course for honors students who are writing honors thesis for completion of the requirements for the Honors Program. May be repeated up to a maximum of four units. Prerequisite: H195A–B. Mr. Politzer (Sp)

198. Directed Group Study. (1–4) Group studies of selected topics which will vary from quarter to quarter. Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1–4) Enrollment is restricted by regulations listed on page 34. Additional limitation: final grade-point average of at least 3.0. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

GRADUATE COURSES

LITERATURE

200. Proseminar in German Literature. (5) Three hours of seminar and one hour of tutorial per week. Prerequisites: graduate standing. Introduction to the bibliography, history, and methods of German Studies (Germanistik). Recommended primarily for M.A. candidates. Staff (F, Sp)

203. Studies in Middle High German Literature. (4) Two hours of lecture and one hour of required tutorial per week. Prerequisite: consent of instructor. Topic: Wolfram von Eschenbach. Mr. Pollitzer (Sp)

*206. German Literature of the Renaissance and Reformation. (4) Three hours of meeting per week.

209. German Literature of the Seventeenth Century. (4) Three hours of meeting per week.

210A—210B—210C. Major Problems in German Literature. (4) Two hours of lecture and one hour of tutorial per week. Prerequisite: graduate standing. Recommended primarily for M.A. candidates. Staff (F, W, Sp)

210D. Middle Ages. Mr. Tubach (Sp)
210B. The Baroque. Mr. Hilden (W)

*210C. Romanticism and Realism. Mr. Seeba

212. Lossing. (4) Three hours of meeting per week. Mr. Hilden (Sp)

*215. Goethe to 1808. (4) Three hours of lecture per week. Mr. Jaszi

*216. Goethe, 1808–1832. (4) Three hours of lecture per week. Mr. Jaszi

*224. Schiller. (4) Three hours of meeting per week. Mr. Mann

*227. German Romanticism. (4) Three hours of meeting per week.

*230. Kleist, Büchner, Grubbo. (4) Three hours of meeting per week. Mr. Spahr (Sp)

*233. Grillparzer and the Austrian Drama of the Nineteenth Century. (4) Three hours of meeting per week. Mr. Politzer

236A. German Realism. (4) Two hours of lecture per week. Topic: Kierkegaard, Meyer. Ms. Bonwit (W)

236B. German Realism. (4) Two hours of lecture per week. Topic: Fontane, Storm, Rasbo. Ms. Bonwit (W)
visor to provide an opportunity for Ph.D. candidates to prepare for the qualifying examination. Must be taken on a satisfactory/unsatisfactory basis. May not be used for unit or residence requirements for the doctoral degree.

The Staff (F, W, Sp)

COURSES IN THE TEACHING OF GERMAN

300. The Teaching of German in Elementary and Secondary Schools. (4) Four 1-hour meetings per week; either lecture, demonstration class, or Language Laboratory. For credential candidates. Open to seniors and graduate students. Mr. Mueller (Sp)

301A—301B—301C. The Teaching of German in Colleges. (2—1—1) Lecture and demonstration class. Language Laboratory. For all new teaching assistants. Open to all graduate students. Mr. Mueller (F, W, Sp)

303A—303B—303C. The Teaching of German. (2—1—1) One hour class per week. A seminar designed for the discussion of specific teaching problems and theories during the period of employed teaching. The seminar fulfills the residence requirement in which the writing project is completed. Not open to students taking 300A—300B—300C.

Mr. Mueller (F, W, Sp)

COURSES TO PREPARE GRADUATE STUDENTS FOR READING EXAMINATIONS

Each course: one hour daily five times a week. No unit credit for these courses. Must be taken on a passed/not passed basis.

1G. Elementary German. (0) Mr. Mueller (in charge) (F, W, Sp)

2G. Intermediate German. (0) Mr. Mueller (in charge) (F, W, Sp)

Dutch

For a description of the group major in Dutch studies, see alphabetical listing under College of Letters and Science.

1. Elementary Dutch. (5) Five hours of lecture and one hour of discussion per week.

Mr. Snapper (in charge) (F)

2. Elementary Dutch. (5) Five hours of lecture and one hour of discussion per week.

Prerequisite: course 1 equivalent.

Mr. Snapper (in charge) (F)

3. Intermediate Dutch. (5) Five hours of lecture and one hour of discussion per week.

Prerequisite: course 2 or equivalent.

Mr. Snapper (in charge) (F)

112. Intensive Dutch. (10) Formerly 112. Ten hours of lecture and two hours of laboratory per week. An intensive course in the language and linguistic approach. Course is equivalent to course 1 and 2.

Mr. Snapper (in charge) (F)

110. Advanced Dutch. (4) Three hours of lecture per week. Prerequisite: course 3 or consent of instructor.

Mr. Snapper (in charge) (F)

120. Advanced Dutch Conversation. (4) Three hours of lecture per week. Prerequisite: course 110 or consent of instructor. An intensive course in the development of oral language style.

Mr. Snapper (in charge) (F)

130. Advanced Grammar and Composition. (4) Three hours of lecture per week. Prerequisite: course 110 or consent of instructor. An intensive course in Dutch grammar and written style.

Mr. Snapper (in charge) (F)

140A***—140B—140C—140D***—140E**—140F***. Readings in Dutch Literature.

40B (2—2—2) Two hours of lecture per week. Prerequisite: course 110 or consent of instructor. This course is designed to read Dutch texts from Middle Dutch to contemporary literature, to analyze and evaluate them. Topics vary from year to year. 1976-77 topics: 140A (F) Medieval Dutch Literature; 140B (W) and 140C (Sp) Prose in the 17th Century; 140D (F) Literature in the 18th Century.

Mr. Snapper (in charge) (F, W, Sp)

150. Introduction to the Literature of the Netherlands. (4) Three hours of lecture and one hour of tutorial per week. Prerequisite: course 3 or consent of instructor. A literary-historical survey of Dutch literature from the Middle Ages to the present. Selective readings in poetry, prose, and drama. Open in Dutch. Mrs. Houser (Sp)

Professor of History

Comparative Literature 210A—210B. Studies in Medieval Literature.

History

Department Office, 32215 Nellie Hall

Professors:

Richard M. Abrams, Ph.D.

Paul J. Alexander, Ph.D.

Thomas G. Barnes, Ph.D.

Gustaf P. Barth, Ph.D.

Ehrman Professor

Thomas N. Blom, Ph.D.

Wolfgang W. Borchardt, Ph.D.

Edward E. Bachman, Ph.D.

Heinrich K. Blumenberg, Ph.D.

Renee C. Blum, Ph.D.

Lawrence Levine, Ph.D.

Leonard J. Maier, Ph.D.

Morgan R. Mau, Ph.D.

Robert L. Middletaste, Ph.D.

Robert D. Titow, Ph.D.

Nicholas V. Rasnovsky, Ph.D.

Christopher S. Reynolds, Ph.D.

Professors:

London and Michigan

Analytical, 1965

Emeritus

Walter A. McDougall, Ph.D.

George C. Hammond, Ph.D.

Lawrence A. Kaplan, J.D.

Charles M. Larson, Ph.D.

Hans W. Rosenberg, Ph.D.

Dr. Lawrence H. Investigation Committee

Emma Mcmillan, Ph.D.

Woodrow W. Borah, Ph.D.

Stuart A. Lumley, Ph.D.

Walter A. McDougall, Ph.D.

E. Marion B. Williams, Ph.D.

Paul J. Alexander, Ph.D.

William B. Stiefel, Ph.D.

Woodrow W. Borah, Ph.D.

Norma L. Bell, Ph.D.

George C. Hammond, Ph.D.

Lawrence A. Kaplan, J.D.

Charles M. Larson, Ph.D.

Hans W. Rosenberg, Ph.D.

Dr. Lawrence H. Investigation Committee

Emma Mcmillan, Ph.D.

Woodrow W. Borah, Ph.D.

Stuart A. Lumley, Ph.D.

Walter A. McDougall, Ph.D.

E. Marion B. Williams, Ph.D.

Paul J. Alexander, Ph.D.

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E. Marion B. Williams, Ph.D.

Paul J. Alexander, Ph.D.

William B. Stiefel, Ph.D.
The major program in history shall total at least 60 quarter units, or the equivalent (usually 12 courses), and shall include the following:

1. By the end of the sophomore year: (a) two upper division courses in European history, at least one of which must be in a period before 1800. One at least must be from the following: 4A, 4B, 4C, or 4D (by permission of the major adviser, History 5 may be substituted for one of these courses, but it should be noted that History 4D and 5 cannot both be taken for credit); one may be a seminar (History 39) in American, Latin American, African, or Asian history.

2. In the junior and senior years: four upper division lecture courses chosen by the student in consultation with the departmental major adviser. Consult Undergraduate Office.

The major program is designed for students of high ability in history who have the necessary grade-point averages (at least 3.3 in the major and 3.3 overall) who will profit from individual work with a member of the faculty and discussions with students of similar interests. It is a one-year program for senior majors, but certain prerequisites should be fulfilled in the junior year. Junior majors should notify the chairman of the Committee of their interest in the program. They must take History 101A-101B in their junior year if they are on campus.

Seniors will take History H102 unless exempted by the Committee. Students will also spend two quarters writing a senior essay, which will normally be the product of original research into a historical question, under the supervision of a member of the Department who has consented to direct it. For this purpose students will plan and submit a statement of their interest in History H102A-H102B or, with consent of the instructor, a two-quarter graduate research seminar, History 285. After completing their essays, they will receive a grade for these courses from the faculty supervisor. The Honors Committee will determine if the essay and record in history courses fulfill the requirements for Honors, High Honors, or Highest Honors in the honors program. The result will be noted on the student’s transcript.

Teaching Training. See the Announcement of the School of Education.
130A. ancient and medieval science. Mr. Hahn (F) 
130B. Scientific Revolution (1450-1750). 
(5) Three hours of lecture and 1 hour of consultation per week. Mr. Hahn (W) 
130C. Science since 1750. Mr. Heilbronn (Sp) 
31. Topics in the History of the Physical Sciences. (5) Three hours of lecture and 1 hour of consultation per week. Prerequisite: high school or college physics. Interesting studies using primary sources where possible, of a closely related series of episodes in the development of scientific thought.
Mr. Heilbronn (W) 
132. Topics in the History of Biological Science. (5) Three hours of lecture and 1 hour of consultation per week. Mr. Halperin (F, W) 
131A–135B. European Jewish History Since 1700. (5–5) Three hours of lecture and one optional hour of consultation per week. A two-quarter pro-seminar course in social and political thought, with attention to the literature and philosophy of eighteenth century to 1700. Open to qualified graduates and undergraduates. Limited to 30 students. Mr. Riasanovsky, Mr. Malia (Sp) 
140A–140B. History of Monarchy and Succession States. (5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Slottman (F, W) 
141A. Medieval France. (5) 
141B-141C. Modern France. (5–5) Three hours of lecture and 1 hour of consultation per week. Emphasis will be placed on constitutional and intellectual developments. Mr. Brentano (W) 
142. The Netherlands. (5) Three hours of lecture and one optional hour of discussion per week. The Lowlands from the earliest times to the present monarchy. Mr. Calhoun (Sp) 
143B–143C. Modern Germany. (5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Feldman (W), Mr. Sauer (Sp) 
144. Modern Italy. (5) Three hours of lecture and 1 hour of consultation per week. Mr. Webster (F) 
151A–150B–150C. Medieval England. (5–5–5) Three hours of lecture and 1 hour of consultation per week. Emphasis will be placed on constitutional and intellectual developments. Mr. Brentano (W) 
151B–151C–151D. Modern Britain. (5–5–5) Three hours of lecture and 1 hour of consultation per week. Prerequisite: an elementary knowledge of the history of Western Europe. 
151B. Britain, 1485–1603. Mr. Keightley (F) 
151C. Britain, 1603–1714. (W) 
151D. Britain, 1714–1832. Mr. Rothblatt (F) 
151E. Britain, 1832 to Present. Mr. Riasanovsky (Sp) 
154. British Empire and Commonwealth. (5) Three hours of lecture and one hour of optional discussion per week. 
155. Modern Ireland. (5) Three hours of lecture and one hour of discussion per week. An examination of modern Irish society and culture with emphasis on political and economic developments since 1800. The nature of Britain and the British Empire and the settlement of Ireland is examined in the context of the nationalist struggle for independence. 
160A–160B. Social History of Latin America. (5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Malia (Sp) 
157A–157B. The Central Andean Region. (5) Three hours of lecture and 1 hour of consultation per week. History of the Andean region, the area that now comprises modern Peru, Bolivia and Ecuador, from the Indian period to the present. 
160A**–160B. Mexico. (5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Malia (Sp) 
162A–162B. Caribbean Area. (5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Borah (Sp) 
163A–163B. Brazil. (5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Halperin (Sp) 
164. Modern Argentina. (5) Three hours of lecture and 1 hour of consultation per week. Mr. Borah (Sp) 
165A. The Colonial Period and American Revolution. (5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Kettner (F) 
165B. The American Revolution. Mr. Kettner (W) 
166. The United States, 1787–1845. (5) Three hours of lecture and 1 hour of consultation per week. Emphasis will be placed on political and economic developments since 1787, including an emphasis on the philosophy of history and its relation to political and economic developments. Mr. Blauvelt (Sp) 
167A. Era of Secessional Conflict. (5) Three hours of lecture and 1 hour of consultation per week. Mr. Stampp (F) 
167B. Reconstruction and the New Nation. (5) Three hours of lecture and 1 hour of consultation per week. Mr. Stampp (F) 
168A–168B–168C. Recent United States History. (5–5–5) Three hours of lecture and one hour of discussion per week. Mr. Amsel (W) 
168A. 1900–World War I. Mr. Abrams (W) 
168B. World War I–World War II. Mr. Jablonski (W) 
168C. Post World War II. Mr. Stampp (F) 
169. History of Black People and Race Relations in the United States, 1400 to the Present. (5) Three hours of lecture and one hour of consultation per week. Mr. Zelnik (F) 
170A–170B. The West in United States History. (5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Blauvelt (Sp) 
171. California. (5) Three hours of lecture and one hour of consultation per week. Emphasis will be placed on political and economic developments since 1800, including an emphasis on the philosophy of history and its relation to political and economic developments. Mr. Bean (Sp) 
173A–173B. Diplomatic History of the United States. (5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Clements (F, W) 
174A–174B. Social History of the United States. (5–5) Three hours of lecture and one optional hour of discussion per week. Mr. Jordan (W) 
174B. Since 1865. Mr. Litwack (Sp) 
175A–175B. Intellectual History of the United States. (5–5) Three hours of lecture and one hour of discussion per week. Mr. Haver (F, W) 
176. Religion in American Society. (5) Three hours of lecture and one hour of optional discussion per week. Mr. Hays (W) 
177A–177B. The Age of the City. (5–5) Three hours of lecture and one hour of discussion per week. The social history of urban life in America, with emphasis on the interaction of the city, the suburbs, and the rural areas. Mr. Breyer (F) 
180A–180B. Africa. (5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Malia (Sp) 
181. Northwest and West Africa to 1900. (5) Three hours of lecture and one hour of consultation per week. Mr. Halperin (W) 
182A–182B. Islamic History. (5–5) A history of the Middle East from the 7th to the 13th centuries, the Arab conquests, the Islamic empires, the successor states, and the civilization of Islam as a political and cultural phenomenon. Three hours of lecture and 1 hour of consultation per week. Mr. Lapidus (F, W) 
183A–183B. The Middle East. (5–5) The background, origins, and role of the Ottoman Empire, its Arab provinces, Persia and the modern Middle East. Three hours of lecture and 1 hour of consultation per week. Mr. Smith (W, Sp) 
184A–184B–184C. China. (5–5–5) Three hours of lecture and one hour of consultation per week. Mr. Keightley (W) 
184B. China 906 to 1796. (Sp) 
184C. China 1796 to present. Mr. Chang (Sp) 
185A–185B–185C. Japan. (5–5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Brown (F), Mr. Smith (W), Mr. Schelker (Sp) 
186. America in Historical Texts: The Early Period. (5) Three hours of lecture and one hour of discussion per week. Prerequisite: 2 or 3 years of modern Chinese. Mr. Smith (W) 
187A–187B–187C. India. (5–5–5) Three hours of lecture and one hour of discussion per week. The intellectual development of modern China from the Opium War to the People's Republic. Issues to be explored include "culturalism," nationalism, socialism. Mr. Tu (Sp) 

GROUP II—RESTRICTED COURSES

Courses in Historical Method and Thought

(Designed primarily for students whose major Subject is History.)

101. Historiography. (5) Three hours of lecture and/or seminar per week. The problems of writing history; the philosophy of history; and historical method. This course is intended for history majors to enrich their studies and to enable them to apply in a general framework for understanding theory. Mr. Sauer (F)

101A–101B. Introduction to Historical Method. (5–5) Longitudinal research projects carried on in seminar sections in limited historical fields, with readings, discussions, etc., on general problems of historical inquiry. The two hours must be taken consecutively. Credit and grade will be assigned only upon completion of the full sequence.

110. Colloquium on Historical Thought. (5) Conferences of the major schools of historical thought as manifested in major historical figures and the selected historical problems. Required of honors program seniors; open, by permission of instructor, to non-honors program seniors upon completion of History 101A–101B.

Mr. Malia (Sp)

Proseminars in History

103. Proseminar: Problems in Interpretation and Research in the Several Fields of History. (5) One 2 to 3-hour meeting or two 1 1/2-hour meetings per week. Directed primarily on the given subject in history elementary training in historical criticism and research. Emphasis will be placed on writing and discussion. With permission of instructor may be repeated without duplication of credit. Prerequisite: prior consent of instructor. For precise schedule of offerings see department catalog during preenrollment week each quarter. 103A, Ancient; 103B, Europe; 103C, England;
103D, United States; 103E, Latin America; 103F, Asia; 103H, Africa; 103S, History of Science.

Limited Enrollment Lecture Courses

104. Special Topics in the Various Fields of History. (5) Three to four hours per week. Designed primarily to permit the instructor to deal with a topic with which he is especially concerned, usually more restricted than the subject matter of a regular lecture course. A combination of informal lectures, class discussions, term papers, and examinations. Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis. The Staff (F, W, Sp).

Honors Courses

H198A-H198B. Senior Honors. (5-5) Limited to senior honors candidates. Directed study centering upon the preparation of an honors thesis. Supervision will be assigned to each student after consultation with the honors committee. Credit and grade will be assigned upon completion of the full sequence. The Staff (F, W, Sp).

Special Individual Study

199. Supervised Independent Study and Research. (1-6) Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis. The Staff (F, W, Sp).

GRADUATE COURSES

GROUP I. BIBLIOGRAPHY AND HISTORIOGRAPHY COURSES

280. Advanced Studies in the Sources and Gener

1306. Interdisciplinary and General Studies

1307. History of Science. The Committee on Medieval Studies. The Committee on Medieval Studies in conjunction with the Department of History and Boeot School of Law plans to conduct interdisciplinary work in medieval studies during the academic year 1975-76.

IDS 213. Renewal ideas and Movements from the Age of the Barbarian invasions to the Carolingian Age. (4) See Interdepartmental Studies for the complete description of this course.

Other Interdepartmental Studies Courses.

IDS 39A-39B. Freshman Seminars. (2-2-2)

IDS 44A-44B-44C. European History and Lit

IDS 137. The High Renaissance under Pope Julius II, (1503-1613). (6)

IDS 136. Michelangelo and His Age, 1475-1664. (6)

IDS 180. Philosophies of China. (3)

See Interdepartmental Studies for the complete descriptions of these courses.

Interdisciplinary and General Studies

Division Office: 301 Campbell Hall

Professor: William B. Sloatman, Ph.D. (Associate Dean)

Lecturers: Paul Von Blum, J.D. Edward V. Hyman, Ph.D.

Instructor: Arthur Eckstein (Acting)

The Division of Interdisciplinary and General Studies (DIGS) was established in 1968. It offers courses interdisciplinary in nature, for which no individual department is prepared to take responsibility, and it supervises field majors in the social sciences and the humanities.

Field Major in Humanities

At the present time new students are being accepted in the humanities field major: the program is being revised and a new program is being formulated. Interested students should inquire at the Division Office at the end of the fall quarter 1976.

Upper Division Courses. Required: A minimum of 45 approved upper division units in the areas listed below (approved lower division courses may occasionally be substituted for upper division courses in satisfaction of certain requirements but may not be counted as part of the minimum total of 45 upper division units): (1) the Junior Course and the Senior Course ( Humanities 103A-103B and 190; (2) (a) two courses in important areas of world literature or philosophy before 1800, relating to the origins and development of the major topic(s) concentration of the student; (b) one course on some aspect of the history of religion, similarly related; (3) a minimum of 18 units including either (a) the courses representing the high points of a national literary tradition (if selected from a foreign tradition, at least two of these must require reading of the texts in the original lan

Although the foregoing requirements will normally be satisfied by courses in the College of Letters and Science, the Board of Advisers will consider petitions to substitute courses offered by other colleges and schools.

Honors Program. Upper division students with an overall grade-point average of 3.0 and an average cumulative grade-point average of 3.3 in the major program may, upon approval from the adviser, enroll in the honors program in the major at any time up to the first term of their senior year. The subject requirements for graduation in the honors program are the same as those of the regular program with the following additions: the candidates for honors must (a) present at least one approved upper division course beyond the intermediate level in the original language in part

Teaching Credential. Students primarily interested in teaching in the humanities at the senior high school and junior college level are advised to seek information concerning the M.A.T. program in Comparative Literature. Students primarily interested in teaching at the junior high school or grade school level should inquire from the chairman of the Teacher Training Committee of the Division of Interdisciplinary and General Studies.
Field Major in Social Sciences

Upper Division Courses. Required: A minimum of 45 approved upper division units in the areas listed below (approved lower division courses may be substituted on a per division course in satisfaction of certain requirements but may not be counted as part of the minimum total of 45 upper division units): (1) the junior course and the senior course (Social Sciences 103A-103B and 190); (2) three areas listed below (approved lower division courses providing an historical foundation in Western history and culture. These must include at least one course from a time period before the Renaissance and at least one course before the 20th Century). (3) a minimum of 18 units including either (a) at least three courses representing the high points of a coherent historical tradition and one course in an immediately related area of a non-historical social science or (b) at least three courses in a coherent area of a non-historical social science (normally selected from the offerings of the departments of Anthropology, Geography, Linguistics, Political Science, Psychology, and Sociology) and one course in an immediately related area of a historical tradition; and (4) at least two related courses in the arts or humanities or sciences. Recommended: Prospective majors who have not completed Social Sciences 1A-1B-1C, 2A-2B-2C with a grade of C+ or higher are advised to take Social Sciences 100 before enrolling in Social Sciences 103A-103B.

Although the foregoing requirements will normally be satisfied by courses in the College of Letters and Science, the Board of Advisers will consider petitions to substitute courses offered by other colleges and schools.

Honors Program. Upper division students with an overall grade-point average of 3.0 and a grade-point average of 3.3 in the major program may, upon approval from the advisor, enroll in the honors program in the major at any time up to the first term of their senior year. The specific requirements for the honors program are under revision. Specific information may be obtained in the main office of the Division, 301 Campbell Hall.

Teaching Credential. Students interested in securing a teaching credential should inquire from the chairman of the Teaching Training Committee of the Division of Interdisciplinary and General Studies.

Interdisciplinary

LOWER DIVISION COURSES

10. Human Sociology. (5) Three hours of lecture and one hour of discussion per week. The interrelations of social and biological science will be explored, using a series of cases employing both kinds of information. The importance of experimental methods and history of science will be stressed.

Mr. Washburn (W)

44A–44B–44C. Topics in Western Civilization. (5–6–8) One hour of lecture and four hours of discussion per week. For completion of Subdivision A, two hours of discussion per week. Introduction to the history, literature, and other cultural aspects of selected periods of western civilization. Begins in the 19th Century and proceeds to the present time. The course will meet in small groups for discussion; lectures, discussions, and reading assignments will involve interdisciplinary approaches; the development of skill in writing will be a primary goal.

Mr. Rabkin in charge (F, W, Sp)

Humanities

UPPER DIVISION COURSES

100. The Study of the Humanities. (4) Four 1-hour lectures and discussions per week. Prerequisite: upper division standing or instructor's permission. Examination of humanistic materials, with special attention to literature, philosophy, and the motion picture. Particularly designed for the general student or prospective major who has satisfied the requirement in reading and composition but has not completed courses 1A-1B-1C and 2A-2B-2C at Berkeley. To be offered 1976-77 only.

Mr. Von Blum (F, W, Sp)

103A–103B. Arts and Materials of the Humanities. (4–4) Four 1-hour lectures and discussions per week. Prerequisite: completion of lower division sequence in the Division or an approved combination of courses covering similar materials. Examination of the provinces and the goals of the Humanities in comparison to those of other disciplines. Credit and grade will be awarded upon completion of the sequence. To be offered 1976-77 only.

Mr. Dillon (F, W, Sp)

109. Problems in the Humanities: Senior Thesis. (4) Prerequisite: 103A–103B and at least 12 upper division units in literature and philosophy, including at least one course in the pre-modern period. The preparation and presentation of a senior thesis pertaining to the student's individual area of concentration within the Humanities Field Major. Students work tutorially under the supervision of a member of the faculty.

Mr. Von Blum (F, W, Sp)

191. Social and Political Content in Art. (5) Four hours of lecture per week. Prerequisite: upper division standing or instructor's permission. Painting, graphics, and photography examined as sources for historical-social analysis. Discussion of social and political content in modern and contemporary art. Topics include war, revolution, poverty, bureaucracy, personal relationships.

Mr. Von Blum (W)

198. Directed Group Study for Upper Division Students. (1–5) Up to 5 units of upper division literature and philosophy, including at least one course in the pre-modern period. The preparation and presentation of a senior thesis pertaining to the student's individual area of concentration within the Humanities Field Major. Students work tutorially under the supervision of a member of the faculty.

Mr. Von Blum (F, W, Sp)

H106. Honors Course. (1–6) Meetings to be arranged. Prerequisite: honors standing, 20 units of upper division history and other social sciences including courses 103A–103B or the equivalent, and a knowledge of two foreign languages including either classical Greek or classical Latin. Preparation and writing of an honors thesis under the supervision of a member of the faculty. To be offered 1976-77 only.

Mr. Dillon (F, W, Sp)

H109. Supervised Independent Study and Research. (1–6) Meetings to be arranged. Enrollment is restricted by regulations on page 34. Must be taken on a passed/not passed basis.

Mr. Von Blum (W, Sp)

Social Sciences

UPPER DIVISION COURSES

100. The Study of the Social Sciences. (4) Four 1-hour lectures and discussions per week. Prerequisite: upper division standing or instructor's permission. Examination of humanistic materials, with special attention to literature, philosophy, and the motion picture. Particularly designed for the general student or prospective major who has satisfied the requirement in reading and composition but has not completed courses 1A-1B-1C and 2A-2B-2C at Berkeley. To be offered 1976-77 only.

Mr. Von Blum (F, W, Sp)

103A–103B. Arts and Materials of the Social Sciences. (4–4) Four 1-hour lectures and discussions per week. Prerequisite: completion of lower division sequence in the Division or an approved combination of courses covering similar materials. Examination of the provinces and the goals of the Social Sciences in comparison to those of other disciplines. Credit and grade will be awarded upon completion of the sequence. To be offered 1976-77 only.

Mr. Von Blum (F, W, Sp)

109. Supervised Independent Study and Research. (1–5) Meetings to be arranged. Enrollment is restricted by regulations on page 34. Must be taken on a passed/not passed basis. To be offered 1976-77 only.

Mr. Von Blum (F, W, Sp)

110. Human Social Behavior. (5) Three hours of lecture per week. Prerequisite: completion of lower division sequence in the Division or an approved combination of courses covering similar materials. Examination of the various genres of escape literature — science fiction, spy novels, mysteries, etc. — in different relationships to society and social attitudes.

French: Mr. Rex, Ms. Tyrer (F, W, Sp)

198. Directed Group Study for Upper Division Students. (1–6) Meetings to be arranged. Prerequisite: honors standing, 20 units of upper division literature and philosophy, including course 103A–103B or the equivalent, and a knowledge of two foreign languages including either classical Greek or classical Latin. Preparation and writing of an honors thesis under the supervision of a member of the faculty. To be offered 1976-77 only.

Mr. Von Blum (F, W, Sp)

H109. Honors Course. (1–6) Meetings to be arranged. Prerequisite: honors standing, 20 units of upper division literature and philosophy including course 103A–103B or the equivalent, and a knowledge of two foreign languages including either classical Greek or classical Latin. Preparation and writing of an honors thesis under the supervision of a member of the faculty. To be offered 1976-77 only.

Mr. Von Blum (F, W, Sp)

Graduate Adviser: Mr. Perella.

The Department offers courses designed to lead to proficiency in the Italian language as well as to a critical appreciation of the literature of Italy from its beginnings to the present. It also provides courses in Italian civilization at the lower division level, and upper division courses of Italian literature in English translation. At the graduate level, students will find the opportunity for advanced work in philology as well as in literature.

THE MAJOR

Lower Division. 1, 2, 3, 4, 5, or their equivalents.

Upper Division. 40 units of upper division courses (of which 20 units must be taken in residence) including: 101A–101B and 103A–103B or their equivalent.

Honors Program. With the approval of the major adviser, a student with an overall grade-point average of 3.0 or higher and a grade-point average of 3.3 or higher in the major may apply for admission to the honors program. The honors program will include, in addition to the requirements for the major, Italian 191S for two quarters and a comprehensive examination.

GRADUATE STUDY

Master of Arts in Italian. Requirements: 36 units of upper division and graduate courses in Italian of which at least 18 units must be in the 200 series. Italian 200 and Italian 203 are required. With the consent of the graduate adviser, a maximum of 4 units of course work outside the Department may be counted towards the over-all unit requirement. In the final quarter of residence candidates must pass the comprehensive written and oral examination. Further information may be obtained from the Department office.
Doctor of Philosophy in Italian. The program for the Ph.D. degree in Italian is open to students holding the B.A. in Italian or in a program in which Italian was the major field of study. The student admitted to the program undertakes study and course work in preparation for (1) a comprehensive qualifying examination in Italian literature and civilization from the origins to the present which is to be taken within four quarters after admission to the program, (2) an Italian philology requirement to be satisfied by examination or prescribed course work before (3) a comprehensive qualifying examination on a major period of Italian literature and a minor in a related humanistic discipline. Before the qualifying examination can be taken, the student must also prove to have a reading knowledge of Latin and of a modern foreign language other than Italian (e.g., French, German, Spanish, Russian). For further information please contact the Department.

Doctor of Philosophy in Romance Languages and Literature. (For this program, consult the publication issued by the Graduate Division on Languages and Literatures and the Fine Arts.)

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSES

The first year of work in a foreign language in secondary school is considered to be equivalent to one quarter in college; each successive year in the same foreign language in secondary school is equal to one additional course in a sequence of four quarter courses in college.

1. Elementary Italian. (5) Five 1-hour meetings and one to two laboratory sessions per week. Prerequisite: course 1 or 14A. Mr. Ferruoio in charge (F, W, Sp).

2. Elementary Italian. (5) Five 1-hour meetings and one to two laboratory sessions per week. Prerequisite: course 1 or 14A. 13C. In conversation- prerequisite: course 1 or 14A. 138. Intermediate Italian. (5) Five 1-hour meetings per week. Prerequisite: course 1 or the equivalent. Read/listen/analyze. 1-5; 1-5; 1-5; 1-5) Hours to be determined on individual basis. Course covers the same material Italian 1 through 4. It is divided into 20 units (14A-D, 1-5 units each). Enrollment for a specific number of units is required, whether the minimum 12-unit study list requirement for quarter course must be met. Mrs. Feucht in charge (F, W, Sp).

3. Intermediate Italian. (5) Five 1-hour meetings per week. Prerequisite: course 2 or the equivalent. Mr. Ferruoio in charge (F, W, Sp).

4. Intermediate Italian. (5) Five 1-hour meetings per week. Prerequisite: course 3 or the equivalent. Mr. Ferruoio in charge (F, W, Sp).

5. Advanced Italian. (5) Five 1-hour meetings per week. Prerequisite: course 4 or the equivalent. Reading, composition, and grammar review. (F, W, Sp).

13A-13B-13C. Conversation. (2-2-2) Two 1-hour meetings and one hour of laboratory per week. 13A. Beginning Italian to study each week are concurrently taking course 1 or 14A. 13B. Intermediate conversation- prerequisite: course 1 or 14A. 13C. Intermediate conversation- prerequisite: course 2 or 14B. Mrs. Ross (F, W).

14A-14B-14C-14D. Individualized Language Instruction. 1-5; 1-5; 1-5; 1-5) Hours to be determined on individual basis. Course covers the same material Italian 1 through 4. It is divided into 20 units (14A-D, 1-5 units each). Enrollment for a specific number of units is required, whether the minimum 12-unit study list requirement for quarter course must be met. Mrs. Feucht in charge (F, W, Sp).

UPPER DIVISION COURSES IN ENGLISH

200. Syntax, Lexicon and Stylistic Analysis. (4) Three hours of lecture per week. Introduction to the structural, morphological, and phonological aspects of written Italian. Prerequisite: course 3 or the equivalent. Examination or course 105. Mr. Stefanini (F).

201. Historical Grammar. (4) Four 1-hour meetings per week. Historical and comparative examination of the development of the most significant literary dialects of Italian. Mr. Stefanini (W, Sp).

202. Medieval Authors. (4) Three 1-hour meetings per week. Lyric, religious, didactic, and satirical poetry; chronicles, novelle, and treatises. Mr. Stefanini (W).

203. Bibliography and Methods of Research. (4) Three hours of lecture per week. Introduction to methods of bibliographical research and library techniques. Required of all candidates for the M.A. in Italian. Mr. Stefanini (F).

204. History of the Italian Language. One 3-hour meeting per week. Mr. Stefanini (Sp).

205. Seminar on Dante. (4) One 1-hour meeting per week. Mr. Ferruoio (Sp).

210A-210B-210C. Studies in Italian Composition. (1-1-1) One 1-hour meeting per week. Mr. Ferruoio (Sp).

211. Seminar on Petrarch. (4) One 1-hour meeting per week. Mr. Ferruoio (Sp).

213. Seminar on Boccaccio. (4) One 1-hour meeting per week. Mr. Ferruoio (Sp).

217. Studies in the Renaissance. (4) One 3-hour meeting per week. Mr. Stefanini (F).

217A. Humanism. Mr. Costa (F).

217B. The Theatre. Mrs. Clubb (F).

217C. Ariosto. Mrs. Clubb (Sp).

217D. Tasso. Mr. Ferruoio (Sp).

218. The Age of the Baroque. (4) One 3-hour meeting per week. Mr. Ferruoio (Sp).

191. Age of Enlightenment. (4) One 3-hour meeting per week. Mr. Ferruoio (Sp).

221. Studies in the Nineteenth Century. (4) One 3-hour meeting per week. Mr. Ferruoio (Sp).

221A. Romanticism. Mr. Stefanini (Sp).

221B. Leopardi. Mr. Stefanini (Sp).

221C. Manzoni. Mr. Stefanini (F).

222. Studies in the Twentieth Century. (4) One 3-hour meeting per week. Mr. Ferruoio (Sp).

223. Poetry and Theater. Mr. Ferruoio (Sp).

225. Prose. Mr. Ferruoio (Sp).

226. Studies in Literary Genres and Regional Literature. (4) Three hours of lecture per week. A synthesis of the development of the most significant literary genres and dialectal literature. Mr. Ferruoio (Sp).

227. The Lyric. Mr. Ferruoio (Sp).

228. Specific Topics. Mr. Ferruoio (Sp).

229. Special Study for Graduate Students. (2-6) Three 1-hour meetings per week. Mr. Ferruoio (Sp).

UPPER DIVISION COURSES IN ITALIAN

101A-101B. Advanced Studies in Italian Language. (4-4) Three hours of lecture per week. Prerequisite: course 3 or the equivalent. Advanced grammar, composition, and reading. Mr. Ross (F, W).

102. Advanced Conversation. (4) Three hours of lecture per week. Prerequisite: course 3 or the equivalent. Conversation and discussion on topics of current interest. Course material will be adapted to train students on various levels of verbal expression. Mr. Stefanini (W).

103A-103B. Introduction to Italian Literature. (4-4) One 3-hour meeting per week. Mr. Ferruoio (Sp).

110A-110B. Italian Literature of the Thirteenth and Fourteenth Centuries. (4-4) Two 1 1/2-hour meetings per week. Mr. Ferruoio (Sp).

110A. Emphasis on the "Stil Nuovo" and Dante's minor works.

110B. Emphasis on Boccaccio's Decameron and Petrarch's Rime. Mr. Ferruoio (Sp).

111. Italian Literature of the Fifteenth Century. (4) Three 1-hour meetings per week. Humanism and the Early Renaissance. Mr. Ferruoio (Sp).

112A-112B. Italian Literature of the Sixteenth Century. (4-4) Three 1-hour meetings per week. Mr. Ferruoio (Sp).

112A. The High Renaissance. Mr. Ferruoio (Sp).

112B. The Late Renaissance. Mr. Ferruoio (Sp).

113. Italian Literature of the Seventeenth Century. (4) Three hours of lecture per week. The main trends of Baroque Prose and Poetry will be on Marino, Tassoni, Campanella, Galileao, and Serpi. Mr. Stefanini (Sp).


115A-115B-115C. Italian Literature of the Nineteenth Century. (4-4-4) 150 formerly 116. Three hours of lecture per week.

115A. From Neoclassicism to Romanticism. Mr. Perelia (F).

115B. Romanticism. Mr. Perelia (W).

115C. Main trends in poetry and prose from 1850 to 1900. Mr. Perelia (Sp).

117A-117B-117C. Italian Literature of the Twentieth Century. (4-4-4) Three hours of lecture per week.

117A. Fiction. Mr. Costa (F).

117B. Poetry. Mr. Costa (W).

117C. Theatre. Mr. Costa (Sp).

120. Special Study for Honors Candidates. (2-2) Two 1-hour meetings per week. Emphasis on Italian literature. One 3-hour meeting per week. Study of literary language, the visual arts, music, and the cinema. Mr. Costa (W).

121. Studies in Literary Genres and Regional Literature. (4) Three hours of lecture per week. A synthesis of the development of the most significant literary genres and dialectal literature. Mr. Ferruoio (Sp).

122A. The Lyric. Mr. Ferruoio (Sp).

122B. The Drama. Mr. Ferruoio (Sp).

122C. The Theatre. Mrs. Clubb (Sp).

122D. Literary Criticism. Mr. Costa (F).

122E. Philosophy and Political Thought. Mr. Costa (Sp).

122F. Dialectal Prose and Poetry. Mr. Ferruoio (Sp).

122G. Specific Topics. Mr. Ferruoio (Sp).

226. Special Study for Graduate Students. (2-6) Three 1-hour meetings per week. Mr. Ferruoio (Sp).

The Staff (Mr. Perelia in charge) (F, W, Sp).
Three hours of lecture per week. Prerequisite: course 113A or consent of instructor: Sentential and quantificational logic. Formal grammar, semantical interpretation, formalization, and metatheory of formalized mathematical theories. Selected topics from model theory or proof theory.

Mr. Vaught (125A: F, W; 125B: Sp)

128A, 128B. Mathematical Logic. (4-4) Three hours of lecture per week. Prerequisite: course 104A. Classification of second order equations, boundary value problems for elliptic and parabolic equations, existence and uniqueness theorems in simple cases, maximum principles, and a priori bounds. Mr. Raat (Sp)

128A. Numerical Analysis. (5) Three hours of lecture per week and one 4-hour laboratory. Prerequisite: courses 51B and 51C. No credit following course 129B. Programming for numerical calculations, roundoff error, approximation and interpolation, quadrature, and solution of ordinary differential equations. Practice on the computer. Mr. Bremermann.

Mr. Lanford, Mr. Bowen, Mr. Do Vogel, Mr. Kahan, Mr. Grunbaum, Mr. Hald, Mr. Pardee (F, W, Sp)

128B. Numerical Analysis. (6) Three hours of lecture and four hours of laboratory per week. Prerequisite: courses 112, 128A, or permission of instructor. No credit following course 129B. Solution of nonlinear equations and systems of linear equations, evaluation of eigenvalues and eigenvectors of matrices, applications to simple partial differential equations. Practice on the computer. Mr. De Vogelere, Mr. Grunbaum (W, Sp)

130. The Classical Geometries. (4) Three hours of lecture per week. Prerequisite: course 113B. Topics chosen from the classical geometries: axioms for affine and projective planes, planes over a division ring, duality, the coordinatization theorem, n-dimensional projective geometry, affine and projective transformations and relations, classification of hyperbolicities, the projective group and its subgroup, non-Euclidean geometry, inverse geometry. Mr. Gale, Mr. Bajwa, Mr. McKenzie (F, W, Sp)

132. Topics in Geometry. (4) Three hours of lecture per week. Prerequisite: course 113A and consent of instructor. Topics selected from such areas as classical projective geometry, inversive geometry, symplectic geometry, geometric algebra, integral geometry, convexity, and elementary topology. Mr. Kobayashi (Sp)

134. Number Systems. (4) Three hours of lecture per week. Prerequisite: course 11C. Especially recommended for future teachers. Natural numbers, integers, rational numbers, and real numbers developed both axiomatically and through sets through the process of formation by inductive definitions by recursion. Mr. Wu, Mr. Stallings (W, Sp)

135. Introduction to the Theory of Sets. (4) Three hours of lecture per week. Prerequisite: courses 113A and 104A. Set-theoretical paradoxes and means of avoiding them. Sets, relations, functions, order and well-order. Proof by transfinite induction and definitions by transfinite recursion. Cardinal and ordinal numbers and their arithmetic. Construction of the real numbers. Axiom of choice and its consequences. Mr. Ratner, Mr. Farly, Mr. Wu, Mr. Rietfeld (F, Sp)

**135S. Introduction to the Theory of Sets. (4) Three hours of lecture per week. Prerequisite: courses 113A and 104A. Honors section corresponding to 135 for exceptional students with strong mathematical inclination and motivation. Emphasis is on rigor, depth, and hard problems. Mr. Chernoff (W)

180. Mathematical Models in Physics and Engineering. (4) Three hours of lecture per week. Prerequisite: courses 113A and 185. Designed primarily for mathematics majors with little or no background in physics. An introduction to the basic concepts and techniques which arise in the study of dynamical systems and wave propagation. Mr. Kato (Sp)

190A–190B–190C–190D. Survey of Algebra and Analysis. Every Other Week. Prerequisite: upper division or graduate standing with specialization outside mathematics and physical science. Students receive no credit for 190A following 1A or 16A, two units credit for 190B following 1B or 16B, no credit for 190C following 5A or 11A. Course 190D may replace courses 5B–5C as prerequisites for more advanced mathematics courses. Mr. Kato (Sp)

190A. Analytic geometry, differential and integral calculus. (F, W)

190B. Calculus of several variables (partial differentiation, extremum problems), complex numbers and trigonometry, vectors and vector spaces. (W, F)

190C. Linear algebra. (W, F, Sp)

190D. Infinite series, differential and difference equations, multiple integration, Kuhn-Tucker theorem. Mr. Deliberto, Mr. Lehman, Mr. Silver (W)

191B. Experimental Courses in Mathematics. The topics for this experimental method of instruction will be announced at the beginning of each quarter that such courses are offered. See departmental公告s.

195. Topics in Mathematics. (4) Three hours of lecture per week. Prerequisite: consent of instructor. Lectures on special topics, which will be announced at the beginning of each quarter that the course is offered. May be repeated for credit.

Mr. Lanford (F, W)

H196. Honors Thesis. (4) Meetings to be arranged. Prerequisite: admission to the Honors Program in Mathematics: a grade-point average of 3.00 overall and a grade of B or better in course 195A for a major Independent study of an advanced topic leading to an honors thesis.

The Stall (F, W, Sp)

199. Supervised Independent Study and Research. (4) Prerequisites: approval of the department and enrollment is required. See departmental announcements. See listing on page 34. Must be taken on a passed/not passed basis.

The Stall (F, W, Sp)

**RELATED COURSES IN OTHER DEPARTMENTS**


Computer Science 167. Graph Theory.

Computer Science 189. Introduction to Combinatorics.

Economics 191A. Introduction to Mathematical Economics.

Statistics 100A–100B–100C. Introduction to Probability and Statistics.


Statistics 141. Introduction to Continuous Parameter Stochastic Processes.

Statistics 142. Introduction to Discrete Parameter Stochastic Processes.

Statistics 168. Game Theory.

**GRADUATE COURSES**

202A–202B–202C. Introduction to Topology and Analysis. (4-4-4) Four hours of lecture per week. Prerequisite: course 104A; also algebra linear for 202B and 105 for 202B and 202C.

202A. General topology—theory of topological spaces. Spectral theory for Banach spaces. Mr. Feldman, Mr. McKenzie (F, W, Sp)

202B. Bounded linear maps on Banach spaces. Spectral theory in commutative Banach algebras. Mr. Feldman, Mr. McKenzie (F, W, Sp)

202C. Measure and Integration. The Fourier Transform. Mr. Feldman, Mr. Dubins (F, W, Sp)

204A–204B–204C. Ordinary and Partial Differential Equations. (4-4-4) Four hours of lecture per week. Prerequisites: courses 105 and 185 or permission of instructor. Fundamental existence theorem for ordinary differential equations for systems of linear equations with constant and periodic coefficients. Sturm-Liouville theory; Poincare-Bendixson Theorem. Mr. Chorin, Mr. Grunbaum (Sequence beginning F)

205. Theory of Functions of a Complex Variable. (4) Formerly 205A–205B. Three hours of lecture per week. Prerequisites: course 105A. Normal families, the Riemann mapping theorem, Picard’s and related theorems, and additional topics chosen by the instructor from classical theory. Mr. Sarason, Mr. Spanier (F, W)

206A. Linear Spaces. (4) Three hours of lecture per week. Prerequisite: courses 105A and 202A, or course 202B. Elementary theory of Banach and Hilbert spaces. Mr. Bade, Mr. Rieffel (F, Sp)

206B. Linear Operators. (4) Three hours of lecture per week. Prerequisite: course 206A. Spectrum and resolvent, functional calculus of compact operators, spectral theorem for bounded self-adjoint operators, commutative Banach algebras. Mr. Bade (W)

207. Differential Operators. (4) Three hours of lecture per week. Prerequisite: course 204B. Differential equations for bounded adjoint operators, perturbation theory, additional topics selected by the instructor.

208. Functional Analysis. (4) Three hours of lecture per week. Prerequisite: course 206A. Locally convex linear topological spaces, distributions, further topics selected by the instructor.

209A–209B. Operator Algebras, (4) Three hours of lecture per week: course 206B. C*-algebras, positive linear functionals and representations, spectrum, von Neumann algebras, K-theory and density theorems, traces, further topics selected by the instructor.

Mr. Rieffel (W, Sp)

211. Mathematical Theory of Fluid Mechanics. (4)
Three hours of lecture per week. 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.

212A–212B. Complex Variables. (4–4) Three hours of lecture per week. Prerequisite: courses 205A, 205B, or their equivalents. Complex functions, analytic functions, analytic continuation and envelopes of holomorphicity, analytic classification and applications of analytic problems and analytic continuation in two complex variables, analytic sets and ideals of holomorphic functions, analytic classification and envelopes of holomorphicity, analytic classification and applications of analytic problems and analytic continuation in two complex variables. Further topics such as pseudo-convexity and the E. Levi problem, embedding theorems for Stein manifolds, p-adic topology, normalization theorem, bounded domains in $\mathbb{C}^n$. Mr. Takeuchi (W, Sp).

214. Differentiable Manifolds. (4) Three hours of lecture per week. Prerequisite: courses 140, 202A, or their equivalents. Differentiable structures, tangent and normal bundles, Sard's theorem and transversality, Whitney's imbedding theorem. Morse functions, differential forms, and Stokes' theorem, the Frobenius theorem.

Mr. Waggoner (F, Sp).


Mr. Stallings (F, Sp); 215B: (W); 215C: (Sp).


220A. Functions and Abstract Machines. (4) Three hours of lecture per week. Prerequisite: courses 113B and 135 or consent of instructor. Functions computed by abstract machines, abstract machines and regular sets. Turing machines, recursive functions, decision problems. Mr. Spanier (F).

220B. Power Series and Languages. (4) Three hours of lecture per week. Prerequisite: course 220A. Power series in non-commuting variables, rational and algebraic power series, applications to context-free languages, grammars, special families of languages. Mr. Spanier (W).

*226C. Semigroups and Machines. (4) Three hours of lecture per week. Prerequisite: courses 226A and 250A. Formal structure of prime decomposition theory, application to finite state machines, algebraic theory of complexity.

227B. Theory of Abstract Functions. (4–4) Three hours of lecture per week. Prerequisite: course 225C. Recursive and recursively enumerable sets of natural numbers; characterizations, significance, set-theoretical equivalence of unsolvability. The recursion theorem. Constructive ordinals, the hyperarithmetical and analytical hierarchies. Recursive aspects of game theory (Sequence beginning W).

228A–228B. Numerical Solution of Differential Equations. (4–4) Three hours of lecture per week. Prerequisite: courses 128A, 128B. Ordinary differential equations, elementary methods of solution, predictor-corrector methods; stability theory, Richardson extrapolation, stiff equations, boundary value problems, variational methods, invariant partial perturbations. Partial differential equations; stability, accuracy, and convergence, Von Neumann's condition, finite difference solution of hyperbolic and parabolic equations, the Courant-Friedrichs-Lewy condition, numerical dissipation and dispersion, finite difference and finite element solution of elliptic equations. The solution of ordinary differential equations will be discussed in 228B.

Mr. Hald, Mr. Miller (W).


Mr. Vaught (Sequence beginning W).

231. Category Theory. (4) Three hours of lecture per week. Prerequisite: one graduate course in algebra, topology, or logic, or consent of instructor. Categories, functors, natural transformations, limits, colimits. Universal constructions, adjoints. Functor categories, representable functors, Yoneda Lemma. Monads, adjoint functors, etc. Applications to various branches of mathematics. Topics such as: Relations with the foundations of mathematics, (Go) algebra; differential geometry, ring theory, topology.


235C. Selected topics such as: arithmetic of relation types, generalized continuum hypothesis, inaccessible cardinals, infinite sets and their classification, axioms of replacement, foundation, and the consistency of the axioms.

236. Metamathematics of Set Theory. (4–4) Three hours of lecture per week. Prerequisite: courses 225C and 235C. Various set theories: common sets and relations, finite and infinite sets, limits, limits of limits, con- tinua. Universal constructions, adjoints. Functor categories, representable functors, Yoneda Lemma. Monads, adjoint functors, etc.

237. Applications to various branches of mathematics. Topics such as: Relations with the foundations of mathematics, (Go) algebra; differential geometry, ring theory, topology.


239. Selected topics such as: arithmetic of relation types, generalized continuum hypothesis, inaccessible cardinals, infinite sets and their classification, axioms of replacement, foundation, and the consistency of the axioms.

240A–240B. Riemannian Geometry. (4–4) Three hours of lecture per week. Prerequisite: course 214. Riemannian manifolds, parallelism, geodesics, structure equations, connection on a manifold, conformal changes of metric, manifolds. Riemannian geometry of Lie groups.
258. Classical Harmonic Analysis. (4) Three hours of lecture per week. Prerequisite: course 206A or a basic knowledge of Fourier series, complex variables, and analysis. Basic properties of Fourier series, convergence and summability, conjugate functions, Hardy spaces, boundedness and boundedness of analytic and harmonic functions, additional topics at the discretion of the instructor.

Mr. Sarason (W)

*259. Transformation Groups. (4) Three hours of lecture per week. Prerequisite: courses 214 and 216. Topological groups, Haar measure, general theory of topological transformation groups, the existence of slices and applications, the Smith theory of periodic transformations.

Mr. Wolf (W)

260. Topological Groups. (4) Three hours of lecture per week. Prerequisite: courses 206A and 214. General topological groups, Haar measure, compact groups and Lie algebras, general structure theory; representations. Mr. Wolf (W)

259A-259B-259C. Lie Groups. (4-4-4) Three hours of lecture per week. Prerequisite: courses 206A and 260A. Banach algebras, convolution algebras, group representations.

Mr. Wolf (W)

280A. Topological Groups. (4) Three hours of lecture per week. Prerequisite: courses 205A and 214. General topological groups, Haar measure, compact groups and Lie algebras, general structure theory; representations. Mr. Wolf (W)

280B. Abstract Harmonic Analysis. (3) Three hours of lecture per week. Prerequisite: courses 205A and 260A. Banach algebras, convolution algebras, group representations.

Mr. Wolf (W)

281A-281B-281C. Lie Groups. (4-4-4) Three hours of lecture per week. Prerequisite: course 214. Lie groups and Lie algebras, general structure theory; compact, solvable, complex, and semi-simple groups; classification of simple groups, representation theory; further topics such as the theory of symmetric spaces. Mr. Addisson (F)

285. Differential Topology. (4) Three hours of lecture per week. Prerequisite: course 214. Vector bundles, tubular neighborhoods, approximation theorems. Morse theory, handlebodies, surgery and cobordism. Mr. Thomas (Sp)

271. Topics in Foundations. (4) Three hours of lecture per week. Advanced topics chosen by the instructor. The content of this course changes, as in the case of seminars. Hence it may be repeated for credit.

Mr. Addison (F)

*272. Topics in Differential Topology. (4) Three hours of lecture per week. Advanced topics chosen by the instructor. The content of this course changes as in the case of seminars. Hence it may be repeated for credit.

Mr. Addisson (F)

273. Advanced Numerical Analysis. (4) Three hours of lecture per week. Prerequisite: permission of instructor. Topics of current interest in numerical analysis and its applications. Course may be repeated for credit.

273A. Ordinary Differential Equations.

273B. Initial Value Problems.

273C. Boundary Value Problems.

273D. Finite Element Methods.

273E. Topics in Numerical Linear Algebra.

273F. Topics in Computational Physics.

273G. Nonlinear Equations and the Minimization of Functions.

273H. Monte Carlo Methods.

273I. Approximation Theory.

273J. Ill-posed Problems.

273K. Inverse Problems.

273L. Hald (Sp)

273M. Parkett (W)

274. Topics in Algebra. (4) Three hours of lecture per week. Advanced topics chosen by the instructor. The content of this course changes, as in the case of seminars. Hence it may be repeated for credit.

Mr. Lam (Sp); Mr. Seidenberg (W)

275. Topics in Applied Mathematics. (4) Three hours of lecture per week. Advanced topics chosen by the instructor. Prerequisite: course 215. The content of this course changes, as in the case of seminars. Hence it may be repeated for credit.

Mr. Fary (F)

277. Topics in Differential Geometry. (4) Three hours of lecture per week. Advanced topics chosen by the instructor. The content of this course changes, as in the case of seminars. Hence it may be repeated for credit.

Mr. Chern (W)

278. Topics in Analysis. (4) Three hours of lecture per week. Advanced topics chosen by the instructor. The content of this course changes, as in the case of seminars. Hence it may be repeated for credit.

Mr. Helson (W)

*279. Topics in Partial Differential Equations. (4) Three hours of lecture per week. Advanced topics chosen by the instructor. The content of this course changes, as in the case of seminars. Hence it may be repeated for credit.

Mr. Sarason (W)

*280A-280B-280C. Mathematical Theory of Relativity. (4-4-4) Three hours of lecture per week. Prerequisite: course 259 or consent of instructor. Special theory of relativity, spinor representation of the Lorentz group, reformulation of classical physical theories in special theory of relativity, principle of equivalence. Einstein theory of gravitation, cosmological problems.

280. Seminars. (2-8) One 2-hour lecture per week. Credit and grade will be awarded at termination of seminar. Topics in foundations of mathematics, theory of computation, logic. Mr. Wolf (W)

281. Topics in Partial Differential Equations. (4) Three hours of lecture per week. Advanced topics chosen by the instructor. The content of this course changes, as in the case of seminars. Hence it may be repeated for credit.

Mr. Fary (F)

282. Transformation Groups. (4) Three hours of lecture per week. Prerequisite: courses 206A and 214. General topological groups, Haar measure, compact groups and Lie algebras, general structure theory; representations. Mr. Wolf (W)

283. Mathematical Theory of Relativity. (4-4-4) Three hours of lecture per week. Prerequisite: course 259 or consent of instructor. Special theory of relativity, spinor representation of the Lorentz group, reformulation of classical physical theories in special theory of relativity, principle of equivalence. Einstein theory of gravitation, cosmological problems.

290. Seminars. (2-8) One 2-hour lecture per week. Credit and grade will be awarded at termination of seminar. Topics in foundations of mathematics, theory of computation, logic. Mr. Wolf (W)

291. Individual Research. (2-8) By appointment. Independent research and scholarly work by members of the staff, visiting mathematicians, and graduate students.

Mr. Addisson (F)

292. Individual Research. (2-8) By appointment. Independent research and scholarly work by members of the staff, visiting mathematicians, and graduate students.

Mr. Fary (F)

294. Individual Research. (2-8) By appointment. Independent research and scholarly work by members of the staff, visiting mathematicians, and graduate students.

Mr. Thomas (Sp)

295. Individual Research. (2-8) By appointment. Independent research and scholarly work by members of the staff, visiting mathematicians, and graduate students.

Mr. Thomas (Sp)

296. Individual Research. (2-8) By appointment. Independent research and scholarly work by members of the staff, visiting mathematicians, and graduate students.

Mr. Addisson (F)

297. Individual Research. (2-8) By appointment. Independent research and scholarly work by members of the staff, visiting mathematicians, and graduate students.

Mr. Addisson (F)

298. Individual Research. (2-8) By appointment. Independent research and scholarly work by members of the staff, visiting mathematicians, and graduate students.

Mr. Addisson (F)

299. Individual Research. (2-8) By appointment. Independent research and scholarly work by members of the staff, visiting mathematicians, and graduate students.

Mr. Addisson (F)

300. Teaching Workshop. (3) Two hours of discussion per week. Designed for teaching assistants with little or no teaching experience. The course covers techniques and alternatives to standard classroom methods, guided group and self-analysis of videotapes, reciprocal classroom visitations, and an individual project. Must be taken on a satisfactory/unsatisfactory basis.

Mr. Wolf (W)

601. Individual Study for Master's Students. (1-8) Individual study for the comprehensive or language requirements with the grad advisor. Units may not be used to meet either unit or residency requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (F, W, Sp)

602. Individual Study for Doctoral Students. (1-8) Individual study in consultation with the major field advisor, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required for candidates for the Ph.D. May not be used as a residence requirement for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (F, W, Sp)

IDS 289A-289B. Turbulence and Its Mathematical Analysis. (3) Two Introductory Studies for the complete description of this course.

Logic Colloquium. (No credit) Reports on current research and scholarly work by members of the staff, visitors, and graduate students.

Mathematics Colloquium. (No credit) Meetings for the presentation of original work by members of the staff, visiting mathematicians, and graduate students.

Medical Physics

Division Office, 103 Donner Laboratory

Professors:
Edward L. Alpen, Ph.D.
Hans J. Bremermann, Ph.D.
Robert M. Glaser, Ph.D.
Herbert B. Jones, Ph.D.
Robert C. Metz, Ph.D.
Robert K. Mortimer, Ph.D.
John H. Lawrence, M.D.
Alexander Y. Nichols, Ph.D.
Cornelius A. Tobias, Ph.D.

Associate Professor:
Alan J. Bearden, Ph.D.

The courses of the Division are designed to meet several objectives: (1) to provide students for advanced work in biophysics, medical physics, and allied fields; (2) to offer for physical science and engineering students selected topics and concepts of biological sciences; and (3) to provide biomedically oriented students an introduction to some of the quantitative physical problems and approaches in biology and medicine. Courses 10, 11, 20, and 103 are designed to provide background and perspective in their specified fields.

Group Major in Biophysics

Major Advisers: Mr. Bearden, Mr. Glaser, Mr. Mortimer, Mr. Nichols.

The group major in biophysics is designed to serve as preparation for graduate study in biophysics, radiobiology, and related disciplines, and is also appropriate preparation for students interested in the health and medical sciences. The program consists of a comprehensive background in physics, mathematics, chemistry, and biology, coupled with core courses in biophysical subject areas, which include: molecular physics and biological structure, biological energetics and kinetics, radiation and track biophysics, and radiation biology. The group major in biophysics includes a medical physics option to provide biomedically oriented students with a background in physics, mathematics, and biology as well as an introduction to some of the quantitative physical problems and approaches in biology and medicine.

MAJOR REQUIREMENTS

Biophysics

Lower Division. Physics 5A-5B-5C-5D-5E, Chemistry 1A-1B, 8A-8B, Mathematics 1A-1B, 1C, 51A-51B-51G, Biology 1A-1B, 141, one course from the following: Botany 130, Zoology 104, three courses from the following: Medical Physics 101A-
101B, 120, 121, 122; recommended: one upper division course in genetics; additional upper division courses in physics, biology, chemistry, mathematics or other related courses as approved by the academic adviser, to complete a minimum of 36 units of upper division work in the major.

Medical Physics Option


Upper Division. Physics 132, Chemistry 109A–109B, Computer Science 67, Biology 130A–130B or related course, Biochemistry 102, Medical Physics 101A–101B; one course from the following: Genetics 100, Molecular Biology 110B–110C, Zoology 104, Physics 101; additional upper division courses in physical science, biological science, and biophysical science or related courses, as approved by the academic adviser, to complete a minimum of 45 units of upper division work in the major.

Honors Program. Admission to the honors program in the group major in biophysics, and in the medical physics option, is contingent upon a student attaining senior standing with a grade-point average of 3.5 or better on all UC Berkeley courses in work and a 3.3 grade-point average or better in courses in the major. In addition to completing the normal requirements of the major, the honor's student will write a thesis based on research performed in Medical Physics H195A–H195B. The thesis will be reviewed by a faculty committee.

Graduate Study

Graduate degrees available under the supervision of faculty of the division are the Ph.D. in biophysics, the Ph.D. in medical physics and master's degrees in biophysics and bioreadiology. These degrees are administered under the Graduate Group in Biophysics and Medical Physics. Further information is available from the Group Office, 101 Donner Laboratory.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSES

10. Atomic Radiation and Life. (3) Three hours of lecture and one hour of discussion per week. Basic aspects of atomic radiations with examples from bio-physical and medical fields. Provides liberal arts as well as science students with a framework for evaluating the complex changes associated with the atomic age.

11. Drug Use and Abuse. (4) Three hours of lecture and one and one-half hours of discussion per week. The nature of mood and sensation altering drugs. Abusive effects of drugs, psychological implications of drug use, and the social processes associated with drug use. Central issues will focus on a specific topic and will consist of lectures, readings and discussion. May be repeated for credit with consent of instructor.

UPPER DIVISION COURSES

101A. Radiation and Tracer Biology. (4) Three hours of lecture and one hour of demonstration per week. Prerequisites: 101B, or equivalent, with consent of instructor. An introductory course in radioactive and tracer techniques. Mr. Mortimer, Mr. Nichols (F).

101B, Radiation Biology. (3) Three hours of lectures and three hours of laboratory per week. Prerequisites: Physics 6C or Chemistry 1B, Biology 1B, or equivalent with consent of instructor. A presentation of scientific concepts explaining struc- tural and functional changes in the nature and origin of disease, aging, conditioning, demographic and dynamic aspects of human populations. Mr. Mortimer (W).

103. Human Biology. (4) Three hours of lecture and one hour of discussion per week. Prerequisites: Biology 1A–1B or Biology 11A–11B, or consent of instructor. An introduction to human biology. Mr. Breitenstein (Sp).

120. Biological Energies. (4) Formerly 102A. Three hours of lecture and one hour of discussion per week. Prerequisites: Biology 1B, Physics 5C, or equivalent, with consent of instructor. Thermodynamics of closed and open systems; physical and biological transport processes, gravitational and biomolecular physical forces. Mr. Mel (F).

121. Molecular Physics and Biological Structure. (5) Five hours of lecture per week. Prerequisites: Biology 1B, Physics 5C, or equivalent, with consent of instructor. Basic concepts of molecular physics as they are used in understanding biological structure and phenomena associated with structure. To include chemical bonds, intermolecular forces, the structure of water, diffusion methods and spectroscopic methods of structure determination. Mr. Glaeser (F).

122. Mechanisms of Energy Flow and Transduction. (4) Formerly 102B. Three hours of lecture and one hour of discussion per week. Prerequisites: Biology 1B, Physics 5C, or equivalent, with consent of instructor. Molecular mechanisms of biophysical phenomena; photosynthesis, oxidative phosphorylation, muscle contraction, active transport, the coupling of chemical energy in biological processes and the conversion of other forms of energy to biochemical energy in cells. Mr. Breitenstein (Sp).

H195A–H195B. Senior Honors Thesis Research. (2–3) Prerequisite: open only to students in the Honors Program. Independent research and preparation of a thesis under the supervision of a faculty member. To receive credit the student must, at the end of two quarters, submit a satisfactory thesis. Credit and grade will be awarded on completion of the full sequence. The Staff (F, W, Sp).

199. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations listed on page 34. Additional limitation: overall grade-point average of at least 2.5. Must be taken on a pass/no pass basis. The Staff (F, W, Sp).

GRADUATE COURSES

CELLULAR BIOPHYSICS

201. Membrane and Lipoprotein Structure. (3) Three hours of lecture per week. Prerequisites: upper division courses in atomic and molecular physics (e.g., course 121) and in physical chemistry, or consent of instructor. Characterization of cell membranes and lipoprotein macromolecules by physical techniques. Emphasis is placed on the theoretical foundations for each of the physical methods. Topics include nerve membranes and lipid microdomains, liquid crystalline phases, fusion, energy transducing membranes, and serum lipoproteins. Mr. Glaeser (F).


204A–204B. Advanced Laboratory in Biophysical Research. (4–4) Two hours of lecture and three one and one-half hours of laboratory per week. Prerequisites: courses in the biological sciences at the atomic, molecular, cellular and organismal level. Enrollment limited. 204A is not prerequisite for 204B. 204B is not prerequisite for 204C. The Staff (F, W, Sp).

RADIATION BIOPHYSICS

211. Molecular Radiation Biology. (3) Two 1 1/2-hour lectures per week. Analysis of the action of ionizing, ultraviolet and visible radiations on cells and viruses in relation to their effects on molecules of biological interest, radiomimetic chemicals, intracellular repair of radiation damage, and the application of artificial radiation to the study of metabolic systems. Mr. Mortimer, Mr. Wolff (Sp).

212. Mutagenesis and Radiation Genetics. (2) Two 1 1/2-hour lectures per week. Genetic effects of radiation and chemical mutagens. Mutagenic mechanisms, induced genetic recombination, mosaic development, and genetic changes associated with tumor treatment, and effects on human populations. Mr. Mortimer (W).

213. Mammalian Radiation Biology. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 211 or permission of instructor. Analysis of the actions of ionizing, ultraviolet and visible radiations on mammalian cells and mammalian organ systems. Cell life cycles; normal and abnormal cell kinetics; recovery phenomena; aging and rearrangement. Mr. Mortimer, Mr. Wolff (Sp).

214. Radiological Physics. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 101A and Physics 124. Interaction of electromagnetic and particle radiations with matter, dosimetry, health physics, shielding, measurement of environmental radiation. Mr. Tobias (Sp).

THEORETICAL BIOPHYSICS

221. Mathematical Models and Methods In Biology and Medicine. (4) Three hours of lecture and three one and one-half hours of discussion per week. Prerequisites: Mathematics 104A or 121A or equivalent; Biology 1A–1B or consent of instructor. The representation of complex biological systems by mathematical models. Systems dynamics. Chemical dynamics, Chemotaxis, Ecological models. Heart beat models; impulse models. Mr. Bremermann (F).

222. Biocybernetic Systems, Nerve Nets, Artificial Intelligence (5–5) Three hours of lecture and three one and one-half hours of discussion per week. Prerequisites: Mathematics 104A or 121A or equivalent; Biology 1A–1B or consent of instructor. Organization of biological systems. Bifurcation theory, control theory, automata models. Receptors and effectors. Neural nets. Pattern recognition. Effector control. Mathematical, biological and cybernetic complexity. Natural and machine intelligence. Application to medical diagnosis. Mr. Bremermann (W).

223. Bioenergetics and Non-Equilibrium Thermal Physics. (3) Three hours of lecture per week. Prerequisite: physical chemistry or consent of instructor. Thermophysical properties applied to bioenergetics, nonequilibrium thermodynamics, and complex processes. Mr. Bremermann (Sp).

MEDICAL PHYSICS

231A–231B. Nuclear Medicine. (5–5) Three hours of lecture and three one and one-half hours of laboratory per week. Prerequisite: course 101A, courses in differential and integral calculus. Advanced theory and techniques of nuclear medicine, applications of radioactive isotopes to the study of disease processes. Mr. Alpen (W).

232A–232B. Medical Physics of Pathologic Processes. (2–2) Two hours of lecture per week. Mr. Alpen (W).

232A. Carcinogenesis. Evaluation of current status of evidence concerning the process of carcinogenesis and an attempt to integrate such evidence into a consistent picture. Leading concepts concerning development of malignancy will be considered. Mr. Alpen (F).

232B. Atherogenesis. Examination of factors and processes associated with increased atherogenesis in arterial systems of man; characterization of abnormal metabolic states at molecular, cellular and tissue levels; review of risk factors in human atherosclerosis, with emphasis on blood lipopro- teins. Mr. Nichols (Sp).

SPECIAL STUDIES


286L. Biophysics Group Proseminar Laboratory. (2) Eight hours of laboratory per week. Introduction to research programs that are actively in progress in laboratories of the Graduate Group in Biophysics and Medical Physics. May be repeated for credit. Must
290. Seminar. (1–3) One and one-half hours of seminari per week. Graduate student seminars in biophysical areas including cellular, radiation, medical and theoreti cal physics. Seminars will offer several sessions covering different topics; topics will be announced each quarter. Enrollment in more than one section is permitted. The Staff (F, W, Sp)

299. Individual Research: Medical Physics and Biophysics (1–12) Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

601. Individual Study for Master's Students. (1–8) Individual study for the comprehensive or language requirement in consultation with the field adviser. Units may not be used to meet either unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

602. Individual Study for Doctoral Students. (1–8) Individual study in consultation with the major field adviser. Intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. degree. Must not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

Molecular Biology

Department Office, 229 Stanley Hall

Professors: Richard Calendar, Ph.D.
Malvin Calvin, Ph.D., Sc.D.
A. L. Clark, Ph.D.
Peter H. Duesberg, Ph.D.
Harrison Echols, Ph.D.
Harry Elson, Ph.D.
Howard K. Schachman, Ph.D.
Harry Rubin, O. V. M.
C. Arthur Knight, Ph.D.

Assistant Professors: Ellen Daniel, Ph.D.
Steven K. Beckendorf, Ph.D.

The Department of Molecular Biology offers a program of instruction and research at the graduate level, with emphasis on the description of biological phenomena at the molecular level.

PREPARATION FOR GRADUATE STUDY

Students interested in pursuing graduate work in molecular biology are advised to obtain a strong background in chemistry, physics, and mathematics, and to be familiar with the basic concepts of biology. Biochemistry and genetics form the specific foundation for much of the instructional work in the Department. Common preparation required of all students, as exemplified by course offerings at Berkeley (courses are followed by quarter units):

Chemistry: 4A–4B–4C (15); 12A–12B–112 (8); 110A–110B (6)

Biochemistry: 102, 102L or 110A–110B–110C (9)

Physics: 5A–5B–5C–5D (15)

Mathematics: 1A–1B–1C (12)

Biology: 1A–1B (12)

Additional: Undergraduate work including genetics (9)

Those students who are deficient in their preparation when they enter the graduate program in molecular biology will be expected to remedy their deficiencies as soon as possible.

The Graduate Major for the Ph.D. Degree.

Training and performance in laboratory research are emphasized in the graduate program of this department. Current areas of research activity include determination of the biochemical mechanisms of nucleic acids and proteins; chemical events in mutation and recombination; control mechanisms in the growth of viruses, bacteria, and animal cells; and biological ultrastructure.

In addition to the basic preparatory courses (listed above), the student is expected to take Molecular Biology 200A and 200B. Other prerequisites for consultation with a graduate adviser during the first two quarters of residence and thereafter with the student's research adviser.

Each student serves as a teaching assistant for the required courses or requirement for the Ph.D. degree. Demonstration of a reading knowledge of one foreign language chosen from French, German, Japanese, and Russian is required before the qualifying examination can be taken. In the qualifying examination the student must demonstrate proficiency in research as well as general knowledge of different areas of molecular biology. Incoming students with adequate undergraduate preparation should plan on finishing their Ph.D. requirements, including the dissertation, within four years. Those with deficiencies may require a longer time; such deficiencies, however, should be made up during the first year of graduate work.

Lettas and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSES

1. Molecules of Life. (4) Three lecture hours plus one discussion period per week. Prerequisite: Biology 1A and 1B. Recommended: Biology 1A and 1B, and Chemistry 8 or 12. For students intending to major in the biological sciences, consultation with the field adviser is required of all students and designed for those not specializing in molecular biology. Emphasis on the molecular basis of metabolism and inheritance. Cell chemistry and division; biochemical pathways; enzyme function; gene structure, replication, mutation, recombination, and expression; protein synthesis. Mr. Stent, Mr. Gerhart (Sp)

10. Introduction to Molecular Biology. (3) Three 1-hour lectures per week. Open without prerequisite for all students and designed for those not specializing in science. The molecular basis of life. Contemporary description of genetics: evolution, growth, and reproduction, with emphasis on viruses and simple organisms. Extension to higher organisms and medical and social implications. Mr. Rubin (F)

UPPER DIVISION COURSES

110A. Molecular Basis of Heredity. (6) Three 1-hour lectures and two discussion sections per week. Prerequisite: Chemistry 1A or 1B; Molecular Biology 1A or consent of instructor. An introduction to the molecular basis of the structure and function of the hereditary substance of living forms. Emphasis on prokaryotic organisms and their viruses. Mr. Calender (W)

110B. Molecular Basis of Heredity. (6) Three 1-hour lectures and two discussion sections per week. Prerequisite: Chemistry 1A or 1B; Molecular Biology 1A or consent of instructor. An introduction to the molecular basis of the structure and function of the hereditary substance of living forms. Emphasis on eukaryotic organisms and their viruses. Mr. Calender (W)

112. General Virology Laboratory. (6) Three hours of lecture and nine hours of laboratory per week. Prerequisite: course 200A or 200A or consent of instructor. Techniques used in research on viruses. Mr. Schachman and Mr. Clark (W)

118. Molecular Basis of Heredity. (6) Three 1-hour lectures per week. Open without prerequisite for all students and designed for those not specializing in science. The molecular basis of life. Contemporary description of genetics: evolution, growth, and reproduction, with emphasis on viruses and simple organisms. Extension to higher organisms and medical and social implications. Mr. Rubin (F)

120. Introduction to Molecular Virology. (4) Four 1-hour lectures and two discussion sections per week. Prerequisite: Chemistry 1A or 1B, and Biology 1A or 1B. Course 110B may be taken without course 110A with the consent of instructor. An introduction to the molecular basis of the structure and function of the hereditary substance of living forms. Emphasis on eukaryotic organisms and their viruses. Mr. Knight (W)

121. Molecular Genetics Laboratory. (6) Three 1-hour lectures and two discussion sections per week. Prerequisite: course 200A or 220A, or consent of instructor. Techniques used in research on bacteria and viruses. Mr. Schachman and Mr. Clark (W)

129. Microbial Genetics. (3) Three hours of lecture per week. Prerequisite: course 200A or 220A, or consent of instructor. Techniques used in research on bacteria and viruses. Mr. Schachman and Mr. Clark (W)

130. Microbiological Genetics Laboratory. (6) Two hours of lecture and seven hours of laboratory per week. Prerequisite: course 220A or 220A or consent of instructor. Techniques used in research on bacteria and viruses. Mr. Schachman and Mr. Clark (W)

131. Techniques in Animal Cell Culture. (4) Three hours of lecture and seven hours of laboratory per week. Prerequisite: course 220A or consent of instructor. Techniques used in research on the growth and function of animal cells in culture. Mr. Clark (W)

270. Research Seminar. (1) Prerequisite: 211 or 280 taken concurrently or consent of instructor. Seminar on research: preparation, analysis, and evaluation of results in area of student's individual research interests. The Staff (F, W, Sp)

290. Research. (1–12) Individual research under the supervision of a staff member. The Staff (F, W, Sp)

299. Special Study for Graduate Students. (1–5) May be repeated for credit. The Staff (F, W, Sp)

602. Individual Study for Doctoral Students. (1–8) May be repeated for credit. The Staff (F, W, Sp)

Music

Department Office, 104 Morrison Hall
THE MAJOR

First Year. Courses A-B-C; 1A-1B-1C.


Third and Fourth Years. (a) Performance — Three courses from the group 141-149, preferably in sequence. (b) Additional courses to complete the minimum of 36 units in the series for majors 100-160 (including courses in the 130 series and performance courses 141-149 but not courses in the 127 and 128 series); interdepartmental Studies courses 104, 115, and 117 are acceptable for the major.

Honors Program. Adviser: Mr. Heathz. Satisfily qualified students majoring in music are invited to consult the adviser concerning studies which they may propose to undertake. Appropriate general fields include music history, analysis, musical composition, and performance. The Honors Seminar (H198) is required of seniors who wish to obtain departmental honors at graduation.

Teacher Training. Consult major advisers.

HIGHER DEGREES

The M.A. and Ph.D. degrees are offered in musical composition or in research. Graduate students should consult the Graduate Division section of this catalog and send for the special announcements issued by this Department concerning these degrees.

Medieval Studies. Students who are interested in specializing in medieval studies should consult the Graduate Division section of this catalog.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSES

THEORY

10A–10B. Basic Musicianship. (2–3) Three 1-hour meetings per week, including 1 hour of notation, sight singing, ear training, and beginning lin-ear analysis. For general students.

27. Introduction to Music. (4) Two 1-hour lectures, one 1-hour listening section, and one 1-hour discussion section per week. Devoted to the development of listening skills. Mr. Newcomb (F); Mr. Moe (W)

UPPER DIVISION COURSES

HISTORY AND LITERATURE

127A. History of Western Music. (4) Two 1-hour lectures, one 1-hour listening section, and one 1-hour discussion section per week. Prerequisite: course 27 or consent of instructor. The evolution of Western music from the Middle Ages up to Beethoven.

Mr. Newcomb (W)

127B. History of Western Music. (4) Two 1-hour lectures, one 1-hour listening section, and one 1-hour discussion section per week. Prerequisite: course 27 or consent of instructor. The evolution of Western music from Beethoven to the present.

Mr. Newcomb (Sp)

128A. Opera. (4) Two hours of lecture plus one 2-hour listening and discussion section per week. Prerequisite: course 27 or consent of instructor. Study of operas selected from the repertory of the San Francisco Opera Association.

Mr. Kerman (F)

128B. The Symphonies of Beethoven. (4) Three 1-hour lectures per week. Prerequisite: course 27.

Performance Admission to all performance courses is determined by audition during the period of advanced enrollment. All courses in this group may be repeated for credit.

141. University Symphony Orchestra. (2) Two 2-hour rehearsals per week. This course should be taken in a three-quarter sequence. Mr. Senturia (W, Sp)

142. University Chamber Band. (1) One 2-hour rehearsal per week. Mr. Berdahl (F)

143. University Concert Band. (2) Two 1 1/2-hour rehearsals and one section hour per week. This course should be taken in a two-quarter sequence. Mr. Berdahl (W, Sp)

144. University Chorus. (2) Two 1/2-hour rehearsals and one section hour per week. Primarily concerned with major works for chorus and orchestra. This course should be taken in a three-quarter sequence. Miss Davidson (F, W, Sp)

145. Repertory Chorus. (2) Two 2-hour rehearsals per week. A smaller mixed chorus that aims at a high standard of ensemble singing and explores the lesser-known choral repertory. This course should be taken in a three-quarter sequence. Mr. Brett (F, W, Sp)

146. Chamber Music Ensemble. (2) Four hours per week. Chamber Music for strings, winds, piano, percussion, and voice.

The Staff (W, Sp)

147. Contemporary Chamber Music Ensemble. (2) Four hours per week. Mr. Wilson (F, W, Sp)

148. African Music Ensemble. (2) Two 2-hour rehearsals per week. Performance of West African music with particular emphasis on the music of Ghana. Practical instruction in traditional instrumental and vocal techniques. This course should be taken in a three-quarter sequence. Mr. Ladzekpo (F, W, Sp)

149. Collegium Musicum. (2) Two 2-hour rehearsals per week. Performance of Renaissance and Baroque music for voices and instruments. The course should be taken in a three-quarter sequence. Mr. Curtis (F, W)

GROUP II

Courses primarily for students whose major subject is music.

LOWER DIVISION COURSES

Note: Musicianship (A-B-C-D-E-F), Harmony (1A-
A-B-C. Musicianship. (2-2-2) Three 1-hour classes per week for ear training, sight singing, and dictation.

Musicianship. (2-2-2) Three hours of lecture and one discussion section per week. Prerequisite: course 1C or consent of instructor. The Staff (Mr. Clark in charge)

D-E-F. Musicianship. (2-2-2) A continuation of course A-B-C, which is prerequisite.

Sequence beginning (F)

The Staff (Mrs. Clark in charge)

1A-1B-1C. Harmony. (4-4-4) Three 1-hour classes per week. Diatonic harmony, chorale harmonization, and analytical studies. Emphasis will be on written work.

Sequence beginning (F)

The Staff (Mr. Imbrie in charge)

2A-2B-2C. Harmony. (4-4-4) Three 1-hour classes per week. A continuation of course 1A-1B-1C, which is prerequisite.

The Staff (Mr. Dugger in charge)

UPPER DIVISION COURSES

THEORY

100A. Advanced Musicianship. (2) Three class hours per week. Prerequisite: courses 2C, 2D, and consent of instructor. Mr. Swackhamer

100B. Keyboard Harmony. (2) Three class hours per week. Prerequisite: course 2C and consent of instructor. Mr. Swackhamer (W)

100C. Score Reading. (2) Three class hours per week. Prerequisite: course 2C and consent of instructor. Mr. Swackhamer (Sp)

101A-101B-101C. Tonal Counterpoint. (4-4-4) Three 1-hour classes per week. Prerequisite: course 2C. Mr. Tentour (W)

105A-105B-105C. Composition. (4-4-4) Three class hours per week. Prerequisite: course 2C and consent of instructor. Sequence beginning (F) Mr. Denny

106A-106B. Canon and Fugue. (4-4) Two 2-hour classes per week. Prerequisite: course 101B. Sequence beginning (W) Mr. Denny

107A-107B. Studies in Musical Analysis. (4-4) Two 2-hour classes per week. Prerequisite: course 2C. Sequence beginning (W) Mr. Dugger

110A-100A. Orchestration. (4-4) Two 2-hour classes per week. Prerequisite: courses 2C and 101A.

1112. Choral Conducting. (4) Two 2-hour classes per week. Prerequisite: courses 2C, 100B or 100C, and consent of instructor. Mr. Denny

112B. Instrumental Conducting. (4) Two 2-hour classes per week. Prerequisite: course 2C, 100B or 100C, and consent of instructor. Mr. Senturia (W)

112C. Advanced Conducting. (4) Two 2-hour classes per week. A continuation of course 112B, which is prerequisite. Mr. Senturia (Sp)

HISTORY AND LITERATURE

1114. Music in the Fourteenth Century. (4) Three hours of lecture per week. Prerequisite: course 2C and 21C, or consent of instructor. A study of sacred and secular polyphony from the motets of Philippe de Vitry through the song forms of Guillaume de Machaut, his contemporaries and successors, up to 1400.

Mr. Crocker

1115. The Performance of Medieval and Renaissance Music. (4) Three class hours per week. Prerequisite: Experience in playing an instrument or in singing.

Mr. Crocker

116E. The Performance of Baroque Music. (4) Three class hours per week. Prerequisite: experience in playing an instrument or in singing. Mr. Curtis (W)

116F. The Organ Music of J. S. Bach. (4) Three class hours per week. Prerequisite: courses 2C and 21C, or consent of instructor. Mr. Moe (F)

1116G. J. S. Bach. (4) Three hours of lecture per week. Prerequisite: course 2C and 21C or consent of instructor. Mr. Curtis

1116H. Purcell. (4) Three hours of lecture per week. Prerequisite: course 2C and 21C or consent of instructor. Emphasis will be upon the dramatic music, principally The Fairy Queen.

Mr. Brett

116J. Music of Handel. (4) Three class hours per week. Prerequisite: courses 2C and 21C, or consent of instructor. Mr. Duxelles (W)

117A. The Symphonies of Mozart. (4) Three class hours per week. Prerequisite: courses 2C and 21C or consent of instructor. Mr. Moe

117B. The Operas of Mozart. (4) Mr. Heartz

117C. The String Quartets of Beethoven. (4) Three class hours per week. Mr. Kerman

117D. The Symphonies of Beethoven. (4) Three hours of lecture per week. Prerequisite: course 2C and 21C or consent of instructor. Mr. Denny (F)

117E. Music on the Grand Tour. (4) Three hours of lecture per week. Prerequisite: course 2C and 21C or consent of instructor. Mr. Denny (W)

117F. Haydn. (4) Formerly 117D. Three hours of lecture per week. Prerequisite: course 2C and 21C or consent of instructor. Mr. Denny (F)

118A. The Symposium: 1825-1910. (4) Three class hours per week. Mr. Newcomb

118B. Plano Music of the Romantic Period. (4) Three class hours per week. Mr. Newcomb

118C. Art Song of the Nineteenth Century. (4) Three 1-hour classes per week. Prerequisite: courses 2C and 21C, or consent of instructor. Mr. Newcomb

118D. Wagner's Ring of the Nibelung. (4) Three hours of lecture per week. Mr. Newcomb

118E. Verdi. (4) Three class hours per week. Prerequisite: course 2C and 21C or consent of instructor. Mr. Newcomb

118F. Chamber Music of the Twentieth Century. (4) Three class hours per week. Mr. Moe

119A. Musical Analysis. (4-4-4) Three hours of lecture per week. Bibliography, research methods, and individual projects typically based on manuscripts and early prints in the University's collection. Consent of the instructor must be obtained before enrollment in any graduate course.

Mr. Moe

205. Studies In the History of the Theory. (4) Three class hours per week. Prerequisite: consent of instructor. The topic for 1976 is the analytical techniques of Heinrich Schenker. Mr. Curtin (F)

206. Proseminar in Music History. (4) Two 1 1/2-hour meetings per week. Studies in the history and literature of Western music, dealing with representative composers, music, and topics. The following courses will be given in rotation.

208A-208B. Medieval Polyphony and its Notation. Mr. Moe

208C. The Sixteenth Century. Mr. Newcomb

208D. The Seventeenth Century. Mr. Moe (W)

208E. The Eighteenth Century. Mr. Heartz (Sp)

208F. The Nineteenth Century. Mr. Moe (Sp)

208G. The Twentieth Century. Mr. Heartz (W)

208K. Chant and Related Forms. Mr. Crocker (F)

209. Field Methods in Ethnomusicology. (4) Three class hours per week. Prerequisite: courses 235 A-B. Techniques, equipment, research and data-collection, analysis, documentation, notation, transcription.

Ms. Wade (Sp)

1212A-212B. Seminar: Medieval Studies. (4-4) One 3-hour meeting per week. A final grade will be assigned upon completion of both quarters.

Mr. Crocker

1212A-212B. Seminar: Studies In the Sixteenth Century. (4-4) One 3-hour meeting per week.

Mr. Moe

1215A-215B. Seminar: Research In Music History. (4-4) Three hours of lecture per week. Prerequisite: consent of instructor. A final grade will be assigned upon completion of both quarters. Mr. Heartz (W, Sp)

1216. Seminar: Studies In Baroque Music. (4) One 3-hour meeting per week. The topic will be late seventeenth-century keyboard music. A final grade will be assigned upon completion of both quarters. Mr. Moe

1217A-217B. The Classic Symphony. (4-4) One 3-hour meeting per week. A final grade will be assigned upon completion of both quarters. Mr. Heartz (W, Sp)

1220A-212A. Seminar: Studies In Classic and Romantic Music. (4-4) One 3-hour meeting per week. A final grade will be assigned upon completion of both quarters. Mr. Moe

1230. Topics In Asian Music. (4) One 3-hour meeting per week. Prerequisite: consent of instructor.

Ms. Wade

235A. Theory and Methodology of Ethnomusicology I. (4) Three class hours per week. Prerequisite: instructor. An introduction to the field, its methods, and problems drawn on from the field of ethnomusicology. May be taken by undergraduates with permission of instructor.

Ms. Wade (F)
235B. Theory and Methodology of Ethnologists, sociologists, tolkierists, linguists, and other social scientists in the field of the social sciences. (May be taken by undergraduates with permission of instructor.)

Ms. Wade (W)

250. Seminar: Performance. (4) Three hours of lecture per week. Prerequisite: by petition to the Graduate Committee. Limited to performance activity that can be directly supervised by faculty expertise.

The Staff (Mr. Moe in charge) (F, W, Sp)

260. Group Special Studies. (2-8) Meetings as arranged.

The Staff (Mr. Brett in charge) (F, W, Sp)

270. Special Study. (2-8) Open to properly qualified graduate students for research or creative work. Such work shall not serve in lieu of regular courses of instruction.

The Staff (Mr. Crocker in charge) (F, W, Sp)

601. Individual Study for Master's Students. (1-8) Preparation for the comprehensive or language requirements in consultation with the field adviser. May not be used for units or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (Mr. Newcomb in charge) (F, W, Sp)

602. Individual Study for Doctoral Students. (1-8) Study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (Mr. Dunkle in charge) (F, W, Sp)

Professional Courses

405A-405B-405C. Elementary Piano. (1/2-1/2-1/2) One hour of laboratory per week. Open only to majors in music. Must be taken on a satisfactory/unsatisfactory basis. Mr. Clark in charge. Sequence beginning (F).

405D-405E-405F. Elementary Piano. (1/2-1/2-1/2) One hour of laboratory per week. Open only to majors in music. Required of music majors who do not pass the entrance examination in piano. Graded on a passed/not passed basis only.

Mrs. Clark in charge. Sequence beginning (F).

4128A-4128B-4128C. Vocal Technique. (2-2-2) Two 1 1/2 2-hour meetings per week. Prerequisite: satisfactory ability on the piano. Auditions required. 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.

425A. Stringed Instruments. (2) One 2-hour meeting per week. Open only to majors and teaching minors in music. May be repeated twice without duplication of credit.

Mr. Sellin (F, W, Sp)

425B. Wind Instruments. (2) One 2-hour meeting per week. Open only to majors and teaching minors in music. May be repeated twice without duplication of credit.

Interdepartmental Studies

*IDS 115. Music and Poetry of the English Renaissance.* (4) See Interdepartmental Studies for the complete description of this course.

IDS 117. Music and the Philosophers. (4) See Interdepartmental Studies for the complete description of this course.

*IDS 222. Studies in Music of the Ancient World.* (4) See Interdepartmental Studies for the complete description of this course.

Near Eastern Studies

Department Office, 122 Dwinnelle Hall

Professors:

Robert B. Alter, Ph.D.
Adel A. Bloch, Ph.D.
William M. Brinner, Ph.D.
George F. Davis, Jr., Ph.D.
Hassan A. Kazimi, Ph.D.
Anne D. Komis, Ph.D.

Jacob Mijoff, D.B.L., D.D. (Hon.)
James T. Monroe, Ph.D.
Ruggiero Stefanini, Dottore in Lettere

Associate Professors:

Hamid Algar, Ph.D.
David Azair, Ph.D.
Wolfgang J. Heimpel, Ph.D.

Leonard H. Lesko, Ph.D.
Suzi Azarman, Ph.D.
Martin Schwartz, Ph.D.

Baruch M. Bakser, Ph.D.

William C. Hickman, Ph.D.

Victor R. Gold, Ph.D. (Visiting)

Michael D. Guinan, Ph.D. (Visiting)

Adjunct Professor:

Richard I. Ceplise, Ph.D.

Lecturers:

Daniel A. Foxvoy, Ph.D.
Charlotte Gorman
Abbas-Hadi Hariri, Ph.D.

Lev Hakata, Ph.D.
Grace M. Smith, Ph.D.

Departmental Major Adviser: Mr. James T. Monroe.

Graduate Adviser: Mr. Wolfgang J. Heimpel.

Instruction in the Department of Near Eastern Studies is concerned with the languages and civilizations of the ancient, medieval, and modern Near East. The Department offers specialized training in archaeology, art history, Assyriology, Hittitology, Iranian studies, Judaic and Islamic studies and Turkish. For students from other disciplines, the Department provides a wide variety of courses to supplement such related fields as linguistics, history, political science, comparative literature, and anthropology. The Department strongly recommends that graduate students take advantage of courses offered in these fields, provided that they are relevant to the student's field of study. Credit for such courses will be recognized by the Department, subject to approval of the graduate adviser. Many of the Department's courses are restricted to a small number of students, thus affording an opportunity for close contact with the instructing staff. To those not studying the languages, the lecture courses offer a comprehensive body of information on past and present Near Eastern civilizations. The Department is one of several participating in the recently formed Graduate Program in Ancient History and Mediterranean Archaeology (see Index for a full description of the program). The Department is also participating with the Graduate Theological Union in a joint doctoral degree program in Near Eastern Religions, and with the School of Education in an MAT program in Near Eastern Studies. In addition, the Department is coordinating with the School of Library and Information Studies a concurrent degree program in Near Eastern Studies and Librarianship, leading to the M.A. degree in Near Eastern Studies, and the M.L.S. with two possible specializations: 1) Islamic Bibliography, 2) Jewish Bibliography. Further information can be obtained from the Department office.

Cooperative arrangements between the University and the nearby Graduate Theological Union enable students in the Department to use the extensive library holdings of the Union and to supplement their programs with selected courses in Palestinian archaeology, Biblical studies, Semitic epigraphy and philology.

THE MAJORS

A. The Major in Near Eastern Studies

In Arabic, Hebrew, Persian and Turkish: Prerequisite: the elementary courses in the language, or their equivalents. It is recommended that these be taken in the freshman year.

The major requires 37 upper division language units plus 8 upper division lecture units, for a total of 45 units. Major guidelines for each discipline are available in the departmental office. With the consent of the Department, portions of the requirement may be fulfilled by related courses in other departments.

B. Assyriology, Hittitology, Old Iranian Studies, and Egyptology: A basic reading knowledge of German is recommended. The major requires 36 upper division language units plus 8 upper division lecture units.

C. Biblical Studies: A basic reading knowledge of Hebrew or Aramaic is recommended. The major requires 30 upper division units (15 in Hebrew, 15 in Aramaic).

D. Semitic Studies: A basic reading knowledge of Arabic or Hebrew is recommended. The major requires 18 upper division units (9 in Arabic, 9 in Hebrew).

E. Jewish Studies: A basic reading knowledge of Hebrew is recommended. The major requires 18 upper division units (12 in Hebrew, 6 in another language within the field of Jewish studies).

F. Islamic Studies: A basic reading knowledge of Arabic is recommended. The major requires 18 upper division units (9 in Arabic, 9 in another language within the field of Islamic studies).

G. Near Eastern Languages and Literatures: A basic reading knowledge of one of the above is recommended. The major requires 18 upper division units (9 in that language, 9 in another language within the field of Near Eastern Languages and Literatures). (This major may not be taken by students who are majoring in another field.)

H. Classical Studies: A basic reading knowledge of Greek or Latin is recommended. The major requires 18 upper division units (9 in Greek, 9 in Latin).

I. Interdisciplinary Studies: A basic reading knowledge of one of the above is recommended. The major requires 18 upper division units (9 in that language, 9 in another language within the field of Near Eastern Languages and Literatures). (This major may not be taken by students who are majoring in another field.)

J. South Asian Studies: A basic reading knowledge of Sanskrit or Pali is recommended. The major requires 18 upper division units (9 in Sanskrit, 9 in Pali).

K. Near Eastern Studies: A basic reading knowledge of one of the above is recommended. The major requires 18 upper division units (9 in that language, 9 in another language within the field of Near Eastern Languages and Literatures). (This major may not be taken by students who are majoring in another field.)

L. Near Eastern Studies: A basic reading knowledge of one of the above is recommended. The major requires 18 upper division units (9 in that language, 9 in another language within the field of Near Eastern Languages and Literatures). (This major may not be taken by students who are majoring in another field.)
the dissertation according to Plan A (see Graduate Division).

The Concurent Degree Program in Near Eastern Studies and Librarianship is open to qualified candidates with a B.A. degree in Near Eastern Studies who are majoring in either Arabic, Persian, Turkish, or Hebrew. A new program leading to a Master of Arts in Teaching degree in Near Eastern Studies with Arabic or Hebrew emphasis, designed to train teachers for the public schools, is being sponsored in conjunction with the School of Education. Course work will consist of twenty-four units in Education and twenty-four units in Near Eastern Studies and includes a written project involving field work, to be completed during the second year. For a complete description please refer to the Announcement of the School of Education.

The Joint Doctoral Program in Near Eastern Religions is open only to students who intend to work toward the Ph.D. degree, but all students must first possess an M.A. (or equivalent) in the field of Near Eastern Studies or in a related field provided they have at least two ancient languages suitable to the proposed program. Applicants must be admitted into both the Graduate Theological Union and the University, and the degree is conferred jointly by both institutions.

For further details, consult the regulations of the Graduate Division and the Graduate Advisor in 1229 Dwinelle Hall.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

Near Eastern Studies

LOWER DIVISION COURSES

10. Languages and Cultures of the Near East. (4) Three 1-hour lectures per week. The growth, structure, and differentiation of ethnic, religious and language groups in the Arab States, Israel, Turkey, and Iran.

Mr. Birner (F)

*115A. Introduction to Near Eastern Art and Archaeology. (Formerly course 154A. Three hours of lecture per week. The ancient art of western and central Asia from the Neolithic through Achemenid times.

Ms. Azarpay (F)

*116. Introduction to Islamic Art. (4) Formerly course 152. Three hours of lecture per week. The art and architecture of Islamic lands from the seventh to the seventeenth century.

Mr. Sami (W), Ms. Arzoumanian (F), Mr. Azarpay (F, W, Sp)

20A-20B-20C. History and Culture of Ancient Western Asia and Egypt. (5-5-5) Four hours of lecture and one hour of discussion per week. A survey of the civilizations of the Near East with special emphasis on ancient Egypt, Mesopotamia, Iran, Anatolia, and Asia Minor from their origins until Hellenistic times.

Mr. Algar, Mr. Khouri, Mr. Hickman (W)

*125A-25B-25C. Introduction to Egyptian Art and Architecture. (4-4-4) Three hours of lecture per week. A survey of the art and architecture of ancient Egypt, and their relation to the social and political institutions of the times.

(Sp)

*130. Hebrew Literature in Israel Since 1948. (4) Four 1-hour lecture periods per week. Prerequisite: no knowledge of Hebrew is required. A sampling of some of the important Hebrew writing, both fiction and poetry, of the last three decades. Attention will be devoted both to the formal aspects of this writing and to the ways in which it reflects Israel's historical predicaments.

35. Introduction to Judaism. (3) Three hours of lecture per week. The nature of classical Judaism, its major cultural and intellectual expressions in the Middle Ages, and transformations in the modern era.

Mr. Bokser (F)

*140. Epic Themes in the Literature of the Islamic Near East. (4) Three hours of lecture per week. Prerequisite: no knowledge of the languages of the area is required. All readings are in English. The course will concentrate on three representative works, one each in the four language areas: Arabic, Persian, and Turkish.

Mr. Azarpay, Mr. Khouri, Mr. Hickman (W)

UPPER DIVISION COURSES

150A-150B-150C. The History of Ancient Israel. (4-4-4) Three hours of lecture per week. 150A: The Patriarchal age through the age of Solomon. 150B: The Divided Kingdom through the Persian period. 150C: The Hellenistic and Graeco-Roman period. Sequence beginning in the fall, but 150A is not prerequisite for 150B, nor 150B for 150C.

Mr. Milgrom, Mr. Gold (F, W, Sp)

*151A-151B. Medieval Jewish Civilization. (4-4) Three hours of lecture per week. The social and intellectual history of the Jews in Europe and the Near East from the rise of Islam to the eighteenth century.

Mr. Bokser (W, Sp)

*152A-152B-152C. Aspects of Biblical Religion. (5-5-5) Four hours of lecture per week for 152A-152B, and two hours of lecture per week for 152C. The teachings of ancient Israel's intellectual leaders (rabbis, prophets, and sages) on: individual versus collective responsibility, sin versus self-redemption, national versus universal aspirations, etc. Sequence beginning fall, but 152A is not prerequisite for 152B, nor 152B for 152C.

Mr. Milgrom, Mr. Knapp (F, W, Sp)

153A-153B. Hebrew Literature in Translation. (4-4) Three hours of lecture per week. A chronological survey of major works of Hebrew literature from the early post-biblical period to the present day.

Mr. Ayalon, Ms. Kligman, Mr. Winston (F, W, Sp)

154A. Apocrypha and Pseudepigrapha. (4-4) Three hours of lecture per week. A survey of the Apocrypha, Pseudepigrapha, and Dead Sea Scrolls.

Mr. Milgrom, Mr. Gold (F, W, Sp)

154C. The Bible in Translation. (4) Three 1-hour lectures per week. Intended for students not majoring in Near Eastern Languages as an introduction to the Books of the Bible, their historical development, and their place within the broader context of ancient Near Eastern society.

Mr. Hakak (F)

155A. Comparative Religion and Thought. (4-4) Three 1-hour lectures per week. The impact of ancient Near Eastern religion on the development of religious thought.

Mr. Bokser (W, Sp)

155B. Judaism in Late Antiquity. (4-4) Three hours of lecture per week. The emergence and development of classical Judaism.

Mr. Bokser (W, Sp)

156A-156B. Culture of Islam in Islamic Times. (4-4) Three hours of lecture per week. A general survey of Islamic cultural history from the beginning of the Islamic era, with special emphasis on religious and philosophical currents.

156A: Religious Sciences and Sufism. 156B: Philosophy, Rational Sciences, and Shi'ism.

Mr. Algar (W, Sp), Mr. Bokser (W, Sp)

1561B. The Religions of Ancient Iran. (4-4) Three hours of lecture per week. Principally devoted to Zoroastrianism and Manichaeism, but with some attention to Indo-Iranian origins, and the relevance of Iranian religion for the history of Hellenistic Gnosticism, Judaism, and Islam.

Mr. Schwartz (F, W)

1562A-1562B. Introduction to the Comparative Study of the Iranian Languages. (3-3) Two 1-hour lectures per week. Prerequisite: consent of instructor and familiarity with at least one classical Indo-European language or with the processes of comparative philology. Survey of the languages of the Iranian branch of the Indo-European family of languages.

Mr. Schwartz (F, W), Mr. Wachtel (W)

1563A-1563B. History of Persian Literature. (4-4) Three 1-hour lectures per week. The history of the Persian language from the fifteenth century to the contemporary period.

Mr. Hariri (F, W)

1564A-1564B. Civilization of Ancient Iran. (4-4) Three hours of lecture per week. The civilization of the Iranian nations from the beginning to the rise of Islam.

Mr. Schwartz (F, W), Mr. Wachtel (W)

1565A-1565B. Turkish Literature in Translation. (4-4) Three hours of lecture per week. Prerequisite: no knowledge of Turkish is required. A study of Turkish literature in translation from the 8th century to contemporary writing.

Mr. Cengiz (W, Sp), Mr. Wachtel (W)

1566A-1566B. Ottoman Civilization. (4-4) Three hours of lecture per week. Religious, social, economic, and political institutions of the Ottoman period will be treated.

Mr. Hickman (W, F)

170A-170B. Ancient Mesopotamian Religious Texts. (4-4) Three hours of lecture per week. Discussion of original sources bearing on the society and beliefs and practices of the ancient Mesopotamians.

Mr. Caplice (F, W)

1712A-1712B. Ancient Mesopotamian Documents and Literature. (4-4) Three hours of lecture per week. A study of a selection of legal, economic, epistolary, educational, scientific, and historiographic texts in translation.

Mr. Caplice (W, Sp)

1713A-1713B. Problems in Egyptian History. (4-4) Three hours of lecture per week. Prerequisite: 1712.

Mr. Schwartz (F, W)

NOTE: For key to symbols, see page 34.
Art and Archaeology of the Near East

190A—190B—190C. Near Eastern Art. (4–4–4) Three hours of lecture per week. The artistic traditions of Western Asia from Neolithic Age through the Sasanian period, and the Western Mediterranean from the Neolithic period through the Bronze Age. Prerequisite: at least two years of Arabic or equivalent. May be repeated for credit when applied to a different dialect. May be repeated for credit when topics change and with consent of instructor. Prerequisite: at least two years of Arabic or equivalent, some knowledge of Hebrew recommended, or consent of instructor. A survey of the literary, historical, and religious material in Judeo-Arabic. Intro- duction to paleography, grammar and varieties of Judeo-Arabic style from 9th to 13th centuries. Readings will vary. May be repeated for additional credit when subject matter changes.

Mr. Algar (F, W, Sp)

Mr. Brinner (F, W, Sp)

Mr. Bloch (W)

Mr. Monroe (F, W, Sp)

288. Seminar. (3) Students may receive credit for more than one seminar in the same quarter. May be repeated for additional credit with consent of instructor. Units may not be used to meet either unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis. (F, W, Sp)
shown on page 34. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

GRADUATE COURSES
*200A–200B–200C. Readings in Coptic. (4–4–4) Three 1-hour meetings per week. Prerequisite: course 100A–100B–100C or consent of instructor. May be repeated for additional credit. The Staff (F, W, Sp)

*201A–201B–201C. Later Egyptian. (4–4–4) Three 1-hour meetings per week. Prerequisite: course 101A–101B–101C or 102A–102B–102C or 103A–103B–103C or equivalent. Introduction to late Egyptian and Demotic. Sequence beginning (F). Mr. Larkin (F, W, Sp)

202A–202B–202C. Egyptian Texts. (4–4–4) Three 1-hour meetings per week. Prerequisite: consent of instructor. May be repeated for additional credit. Philological analysis of texts of a single single genre and period. Mr. Bokser (W, Sp)

203A. Hieratic Hieroglyphic Texts. (4) Three hours of class per week. Prerequisite: Knowledge of Middle and Late Egyptian or consent of instructor. A seminar on the hieroglyphic inscriptions from the Kingdom of Ptolemy (c. 650–300 B.C.). The course will cover the stelae of Excommunication, Natasen, and Amanitore-a. Historical analysis of these texts will also be presented.

298. Seminar. (2) Students may receive credit for more than one seminar in the same quarter. May be repeated for additional credit with consent of instructor. The Staff (F, W, Sp)

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GRADUATE COURSES
204A–204B–204C. Advanced Biblical Hebrew Texts. (4–4–4) Three 1-hour meetings per week. Prerequisite: course 103A–103B–103C and 105A–105B–105C or equivalent. May be repeated for credit with consent of instructor and when reading material differs. Enrolment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

206. Ancient and Modern Jewish Texts. (4–4–4) Three 1-hour recitation sessions per week. Prerequisite: course 106A–106B–106C or consent of instructor. May be repeated for additional credit when subject matter varies.

*205. Studies in Hebrew Linguistics. (4) Three 1-hour meetings per week. Prerequisite: consent of instructor. The Staff (F, W, Sp)

206. Ancient and Modern Jewish Texts. (4–4–4) Three 1-hour recitation sessions per week. Prerequisite: course 106A–106B–106C or consent of instructor. May be repeated for additional credit with consent of instructor and when reading material differs. Enrolment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

**NOTE:** For key to symbols, see page 34.

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**PERSIAN**

LOWER DIVISION COURSES

*1A–1B–1C. Elementary Persian. (5–4–4) Five 1-hour recitation sessions and one 1-hour laboratory per week. The Staff (F, W, Sp)

12. Intensive Elementary Persian. (20) Twenty hours of class work plus three hours of study centering upon the equivalent of four quarters of Persian: Hebrew 1A–1B–1C and Hebrew 20A. Mr. Halkin (F, W, Sp)

15A–15B–15C. Hebrew Conversation. (1–1–1) Two hours of conversation work plus three hours of study. Prerequisite: two quarters of Hebrew or equivalent. Sequence beginning (F). Mr. Bokser (W, Sp)

20A–20B–20C. Intermediate Hebrew. (5–4–4) Five 1-hour recitation sessions per week. Prerequisite: course 1A–1B–1C, or equivalent. Sequence beginning Fall. Ms. Grosman. (F, W, Sp)


UPPER DIVISION COURSES

*100A–100B–100C. Advanced Hebrew. (4–4–4) Three 1-hour meetings per week. Prerequisite: course 100A–100B–100C or consent of instructor. May be repeated for additional credit. Advanced Hebrew, especially designed for those going on to the study of modern Hebrew literature, vocabulary building, grammatical review, and literary analysis of a sampling of modern texts. The Staff (F, W, Sp)

101A–101B–101C. Biblical Hebrew Texts. (4–4–4) Three 1-hour recitation sessions per week. Prerequisite: course 20A–20B–20C or equivalent. May be repeated for additional credit with consent of instructor. The Staff (F, W, Sp)

102A–102B–102C. Postbiblical Hebrew Texts. (4–4–4) Three hours of lecture per week. Prerequisite: 20A–20B–20C or equivalent. Texts from the postbiblical period (Mishnah, Tosefta, Talmud, and Midrash) and an introduction to the language of rabbinic texts. May be repeated for additional credit with consent of instructor. Mr. Bokser (W, Sp)

103B–103C. Late Rabbinic and Medieval Hebrew Texts. (4–4–4) Three hours of lecture per week. Prerequisite: course 20A–20B–20C or equivalent. Studies of texts or themes based on texts, e.g., the Logratic, magical, messianic, poetic, apocalyptic, sectarian, historical, exegetical, or legal texts. May be repeated for additional credit with consent of instructor. Mr. Hakak, Mr. Bokser (W, Sp)

UPPER DIVISION COURSES

*100A–100B–100C. Intermediate Modern Persian. (4–4–4) Three 1-hour meetings per week. Prerequisite: course 101A–101B–101C or equivalent. Sequence beginning (F). The Staff (F, W, Sp)

101A–101B–101C. Selected Readings in Persian Literature. (4–4–4) Three 1-hour meetings per week. Prerequisite: course 100A–100B–100C or equivalent. May be repeated for additional credit with consent of instructor. The Staff (F, W, Sp)

102A–102B–102C. Readings in Classical Persian Prose. (4–4–4) Three 1-hour meetings per week. Prerequisite: course 101A–101B–101C or equivalent. The Staff (F, W, Sp)

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**Persian and Iranian**

**PERSIAN**

LOWER DIVISION COURSES

*1A–1B–1C. Elementary Modern Persian. (5–4–4) Five 1-hour recitation sessions per week. Sequence beginning (F). The Staff (F, W, Sp)

UPPER DIVISION COURSES

*100A–100B–100C. Intermediate Modern Persian. (4–4–4) Three 1-hour meetings per week. Prerequisite: course 101A–101B–101C or equivalent. Sequence beginning (F). The Staff (F, W, Sp)

101A–101B–101C. Selected Readings in Persian Literature. (4–4–4) Three 1-hour meetings per week. Prerequisite: course 100A–100B–100C or equivalent. May be repeated for additional credit with consent of instructor. The Staff (F, W, Sp)

102A–102B–102C. Readings in Classical Persian Prose. (4–4–4) Three 1-hour meetings per week. Prerequisite: course 101A–101B–101C or equivalent. The Staff (F, W, Sp)

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**Summary:**

- **Cuneiform**
  - Upper Division Courses
  - Graduates Courses
- **Egyptian**
  - Upper Division Courses
- **Persian and Iranian**
  - Lower Division Courses
  - Upper Division Courses
Semiotics

**UPPER DIVISION COURSES**

*150A-150B-150C. Arameic. (4-4-4) Three 1-hour meetings per week. Prerequisite: Hebrew 100A-100B-100C or consent of instructor. Biblical and Aramaic linguistics. Mr. Schwartz (F, W, Sp)

101A-101B-101C. Syrian. (4-4-4) Three 1-hour meetings per week. Prerequisite: Biblical Aramaic or consent of instructor. Morphology and syntax of the Syriac language. Readings in the Syriac translation of the Bible and in Syriac literary literature. Mr. Gold, Mr. Guinan (F, W, Sp)

198. Directed Group Study for Upper Division Students. (1-4) The Staff (F, W, Sp)

Semiotics

**GRADUATE COURSES**

*200A-200B-200C. Studies in Comparative Semitics. (4-4-4) Three 1-hour recitation sessions per week. Prerequisite: 15 units of upper division semitics and consent of instructor. Comparative Semitic phonatics, morphology, and lexicon. Mr. Schwartz (F, W, Sp)

201A-201B-201C. Old Turkic. (4-4-4) Three 1-hour meetings per week. Prerequisite: course 151A-151B-151C or equivalent. Sequence beginning Fall. Mr. Guinan (F, W, Sp)

202A-202B-202C. comparative Turkic. (4-4-4) Three 1-hour meetings per week. Prerequisite: consent of instructor. Comparative morphology and lexicography. Sequence beginning Fall. Mr. Guinan (F, W, Sp)

**Turkish**

**LOWER DIVISION COURSES**

1A-1B-1C. Elementary Modern Turkish. (5-5-5) Five 1-hour recitation sessions per week. Sequence beginning Fall. Mr. Schwartz (F, W, Sp)

15A-15B-15C. Conversational Turkish. (1-1-1) Two hours of lecture per week. Prerequisite: concurrent enrollment in course 101A or equivalent. Mr. Schwartz (F, W, Sp)

**UPPER DIVISION COURSES**

100A-100B-100C. Intermediate Modern Turkish. (6-4-4) Five 1-hour recitation sessions per week. Sequence beginning Fall. Mr. Schwartz (F, W, Sp)

101A-101B-101C. Readings in Modern Turkish. (4-4-4) Three 1-hour meetings per week. Prerequisite: course 100A-100B-100C or equivalent. Sequence beginning Fall. Mr. Schwartz (F, W, Sp)

**Neurobiology**

**GROUP MAJOR IN NEUROBIOLOGY**

The neurobiology group major is intended for students seriously committed to the study of the nervous system. In order to understand what is known about the function of the nervous system and to prepare for future advances in this area, a sound background is required in basic sciences (physics, chemistry, mathematics) together with more selective knowledge in anatomy, biochemistry, physiology, psychology, neurology, and linguistics. Since problems related to or analogous to those encountered in studying the nervous system are handled in electrical engineering, computer sciences, and linguistics, courses in these subjects may also be desirable.

The group major requires a basic background in physics, chemistry, and mathematics, and gives guidance on course work in the very large field of relevant subject areas. It may lead to graduate study in neurobiology, and might also be appropriate for those entering the health professions. It is strongly biased towards later specialization in neurology, neurophysiology, psychiatry, psychology, or mental health. It must be understood that the departmental majors in physiology, zoology, electrical engineering, and psychology also provide a starting point for graduate work in neurobiology and lead to a greater range of career choices.

Graduate courses in neurobiology are listed under Interdepartmental Studies in this catalog.

**Lower Division Courses.** Students are strongly advised to pursue physics, chemistry, and mathematics to the most advanced level they can achieve in their freshman and sophomore years.

**Upper Division Courses.** A minimum of 45 units, including two laboratory courses in different areas, must be completed. Students must complete at least one course in each of the following categories:

- Behavior: Psychology 115 (4), 117 (4); Zoology 135 (4), 135L (3)
- Biochemistry: Biochemistry 100A-100B-100C (4-4-4) or 102 (4) and 102L (5)
- Cell Biology: Physiology 101 (5) or Zoology 104 (5)
- Neuroanatomy: Anatomy 203 (4); Physiology 102B (5), 103B (3)
- Neurophysiology: Physiology 102B (5), 103B (3), 110 (3) or Psychology 110 (5) or Zoology 138 (3); Psychology 111A-111B (6-5)
- Additional recommended courses: Anthropology 115 (4); Psychology 106 (4-4) or 109 (4), 109L (4); Medical Sciences 122 (4), 125 (4), 128 (4), 129 (4); Molecular Biology 110A-110B-110C (4-4-4); Optometry 151 (5), 160 (5); Psychology 123 (4), 125L (3), 152 (4), 153 (4); Psychology 125 (5), 124 (4); Statistics 130A-130B (4-4) or Public Health 160A-160B-160C (4-4-4); Zoology 106 (5); 120A-120B (4-4), 124 (4), 124M (5). Graduate courses may be included in this list with consent of the advisor and the instructor concerned.
Oriental Languages
Department Office, 104 Durant Hall

Professors:
Honora Aoki, Ph.D. (Japanese)
Curt Borch, Ph.D. (Chinese)
Kun Chang, Ph.D. (Chinese)
Helen McCullogh, Ph.D. (Altaic)
William H. McCullogh, Ph.D. (Japanese)
Michael C. Rogers, Ph.D. (Oriental Languages)

Associate Professors:
Jacqueline G. Bosson, Ph.D. (Chinese)
Linda D. Liao, Ph.D. (Oriental Languages)
P. M. C. Schafer, Ph.D. (Chinese)

Assistant Professors:
H. Samuel Cheung, Ph.D. (Chinese)
John C. Jamieson, Ph.D. (Oriental Languages)

Senior Lecturers:
Suzumu W. Nakamura, M.A. (Emeritus)

Lecturers:
Yoshiko E. Dyakstra, Ph.D. (Japanese)
Celeste F. Tolle, M.A.

Deparmental Major Advisers: Mr. Cheung (Chinese); Mrs. McCullogh (Japanese); Mr. Bosson (Altai).

Graduate Advisers: Mr. Rogers (Chinese); Mrs. McCullogh (Japanese); Mr. Bosson (Altai).

The Department of Oriental Languages at Berkeley offers a thorough training in the classical and modern languages and literatures of Eastern Asia. The East Asian Library, which houses one of the largest American collections of materials related to China, Korea, Japan, and Tibet, is located on the Berkeley campus. A student selects one area of emphasis under the guidance of the Departmental Major Adviser. Individual upper division courses stress the philological, linguistic, or literary study of Oriental cultures, and students are encouraged to select courses that will provide an insight into each of these disciplines. The Department also emphasizes the study of a particular Oriental culture in its broader geographical context.

THE MAJOR

Emphasis on Chinese

Lower Division: Oriental Languages—Chinese 1A-1B-1C (5-5-5); Chinese 10A-10B-10C (5-5-5); Chinese 2A-2B-2C (4-4-4); Linguistics 20 (5). Linguistics 20 may be taken on a passed/not passed basis.

Upper Division: A total of 36 upper division units, with at least 4 units from each of the following areas: Modern Chinese (100A, 100B, 100C, 102A, 102B, 156A, 156B, 156C, 156D, 156E, 156F, 156G); Chinese Linguistics (125, 134, 135, 145, 175, 176), and Classical Chinese (103, 123, 104A, 104B, 110A, 110B, 110C, 118, 153, 163A, 163B, 163C). The remaining 24 units should be met primarily through upper division Oriental Languages language courses, but, with permission of the major adviser, some courses from other departments will be acceptable. Also, with permission of the major adviser, up to 6 upper division units may be drawn from the following Oriental Languages lecture offerings: 112A, 112B, 132, 141, 142, 143, 151, 152, 171A, 171B.

Emphasis on Japanese

Lower Division: Oriental Languages—Japanese 1A-1B-1C (5-5-5); Japanese 10A-10B-10C (5-5-5); Japanese 12 (4); Linguistics 20 (5) (may be taken on a passed/not passed basis).

Upper Division: Oriental Languages—Japanese 100A-100B-100C (5-5-5); Japanese 129A-129B (4) or Japanese 125C (4) or Japanese 126C (4) or Japanese 160 (4); Japanese 139A (4); Oriental Languages 132 (4).

Lower and Upper Division: in consultation with the adviser, a program of courses in addition to those prescribed to make a total of 49 lower division units and 38 upper division units.

Emphasis on Altaic Languages

Lower Division: Oriental Languages—Korean 1A-1B-1C (5-5-5) or Near Eastern Studies—Turkish 1A-1B-1C (4-4-4); Linguistics 20 (5).

Upper Division: Oriental Languages—Altaic 144A-144B-144C (5-5-5); Altaic 154A-154B-154C (4-4-4) and other relevant courses as designated by the adviser (e.g., Oriental Languages 143 (4), Altaic 177A-177B (4-4); Near Eastern Studies—Turkish 100A-100B-100C (5-5-4) and 168A-168B (4-4)) to make a total of 36 upper division units.

Honors Program:
An undergraduate student who has completed upper division language courses in the Department, and who has a grade-point average of 3.5 in those courses and an overall average of 3.0, may apply to the Departmental Chairman for admission to the honors program. If accepted, the student will enroll in H195 for three consecutive quarters leading to the completion of an honors thesis, which must be submitted at least two weeks before the end of the quarter in which the student expects to graduate. While enrolled in H195, the student will undertake independent advanced study under the guidance of appropriate members of the staff. Upon satisfactory completion of the program, a faculty committee will determine the degree of honors to be awarded (Honors, High Honors, Highest Honors), taking into consideration both the quality of the thesis and overall performance in the Department. Honors will not be granted to a student who does not achieve a minimum cumulative grade-point average of 3.3 in all undergraduate work in the University.

Graduate Programs:
M.A. and Ph.D. programs are offered in Chinese Language and Literature and in Japanese Language and Literature. The M.A. degree is offered in Altaic Language and Literature, with emphasis on Mongolian. Information concerning graduate degree requirements may be obtained from the Department Office.

Prospective graduate students are urged to acquire an active command of their language of emphasis as early as possible. Toward this end, a period of study at the Inter-University Program for Chinese Language Studies in Taipei, Taiwan, or the Inter-University Center for Japanese Language Studies in Tokyo, Japan, both institutions co-sponsored by the University of California at Berkeley, is strongly recommended.

Oriental Languages—General

(Courses in which knowledge of an Oriental language is not required.)

LOWER DIVISION COURSE

38. Great Books of Eastern Asia. (4) Three hours of lecture per week. Prerequisite: junior standing; sophomores admitted with consent of instructor. Lectures on principal genres, authors, and individual works of Chinese literature from the beginning to the present day, with section discussions (to follow each lecture). Designed to help students with emphasis on Chinese literature. M. Lancaster (Sp)

UPPER DIVISION COURSES

112A–112B. Chinese Literature in Translation. (4-4) Three hours of lecture per week. Prerequisite: junior standing. suitable reading materials included. Lectures on major literary works from different eras, with emphasis on Chinese, Buddhist, and Western influences. M. Motoluij (Sp)


142. Korea. The development of Korean civilization, with emphasis on Chinese influence. M. Rogers (F)

143. Mongolia. A survey of the historical, cultural, and linguistic development of the Mongol peoples. M. Bosson (F)


152. Modern Japanese Literature in Translation. (4) Three 1-hour meetings per week. Reading in English translation of representative works of Japanese writers from the end of the nineteenth century to the present. M. Motoluij (Sp)

171A–171B. Development of Buddhism in the Far East. (4–4) Three 1-hour meetings per week. The introduction of Buddhism from India into Central Asia, China, and its subsequent spread to Korea and Japan. The separate tradition of Tibetan Buddhism is included. A two quarter sequence beginning (F). M. Lancaster (F, W)

Chinese

LOWER DIVISION COURSES

1A–1B–1C. Elementary Chinese. (5–5–5) Five 1-hour meetings plus two additional hours in the language laboratory required per week. Prerequisite: satisfactory performance in the language administered by the departmental instructor. First examinations for 1A–1B–1C will be given during the last two class meetings of each quarter. Sequence beginning (F). The Staff (F, W, Sp)

2A–2B–2C. Introduction to Classical Chinese. (5–4–4) Formerly 11A–11B–11C. 5–4–4 1-hour meetings per week. 2A–2B–2C three 1-hour meetings per week. Prerequisite: 2A is prerequisite to 2B; 2B or equivalent is prerequisite to 2C. 2A: Characters, radicals, grammar; 2B: easy readings in pre-T’ang literature; 2C: dictionaries, easy readings in Han and Six-dynasties literature; easy readings in T’ang, Hsi, and Sung literature. M. Cikoski (F); Mr. Jamieson (W); M. Schafer (Sp)

10A–10B–10C. Intermediate Chinese. (5–5–5) Five 1-hour meetings and one additional hour in the language laboratory per week. Prerequisite: no knowledge: course 1C. Students who have attended a Chinese school admitted only by consent of instructor. Sequence beginning (F). The Staff (F, W, Sp)

*13. Introduction to the Study of Chinese Characters

NOTE: For key to symbols, see page 34.
**Korean**

**LOWER DIVISION COURSE**

*1A*-**1B*-**1C*. Elementary Korean. (5-5-5) Four 1-hour meetings per week. An introduction to the official language of the Mongolian People’s Republic (Khuicha). Graded readings in literary and expository texts. Mr. Bosson (F, W, S).

**100A*-**100B*-**100C*. Intermediate Korean. (4-4) Three 1-hour meetings per week. Continued reading and exercises in Khuicha, together with an introduction to the orthography and grammar of Mongolian in vertical script. Selected prose texts from the 17th century to the present in both Cyrillic script and vertical script. Mr. Bosson (F, W, S).

**177A*-**177B*. Manchu. (4-4) Three 1 1/2-hour meetings per week. Prerequisite: senior standing; consent of instructor. An introduction to literary Manchu; reading of selected prose texts. Mr. Bosson (W, S).

**1178A*-**1178B*. Survey of Mongolian Languages. (4-4) Three 1-hour meetings per week. Prerequisite: courses 144A, 144B, 144C. The linguistic classification of Mongolian languages will be discussed in connection with a detailed study and comparison of their phonological and morphological peculiarities. Mr. Bosson (W, S).

**175. Burul.** (4) Three 1-hour meetings per week. Prerequisite: courses 178A, 178B. An introduction to the standard modern Burul literary language; reading of selected prose texts. Mr. Bosson (Sp).

**Tibetan**

*184A*-**184B*-**184C*. Elementary Tibetan. (4-4) Three 1-hour meetings per week. Prerequisite: consent of instructor. Introduction to the grammar of standard literary Tibetan; graded readings in Tibetan prose from literary and historical sources. 164C. One 2-hour meeting per week. Prerequisite: courses 164A-164B. Mr. Bosson (F, W, S).

**174A*-**174B*-**174C*. Intermediate Tibetan. (3-3) Three 1-hour meetings per week. Prerequisite: course 164C. Emphasis on doctrinal Buddhist texts. Mr. Lancaster (F, W, S).

**184. Advanced Tibetan.** (2) Two 1-hour meetings per week. Prerequisite: courses 174A, 174B, 174C. Extensive reading in historical and literary texts. May be repeated for credit. Mr. Bosson (W, S).

**SPECIAL UPPER DIVISION COURSES**

**198. Honors Course.** (3-5) Hours to be arranged. Directed independent study and preparation of Senior Honors Thesis. Limited to senior honors candidates in Oriental Languages. (For description of Honors Program, see Index.) The Staff (F, W, S).

**199. Preceptorial and Reading Course.** (1-4) Hours to be arranged. Prerequisite: junior standing. The Staff (F, W, S).

**199. Supervised Independent Study and Research.** (1-5) Enrollment is restricted by regulations listed on page 34. Additional limitations: restricted to senior honor students in Oriental Languages. Must be taken on a pass/fail basis. The Staff (F, W, S).

**GRADUATE COURSES**

*201. Japanese Bibliography.** (3) Three 1-hour meetings per week. Prerequisite: Japanese 100A-100B-100C. Japanese reference works for literature and history. Mr. McCulloch (F).
Paleontology

Department Office, 3 Earth Sciences Building

Professors:
Zach M. Arnold, Ph.D.
Donal E. Savage, Ph.D.
Joseph T. Gardiner, Ph.D.

Associate Professor:
Wayne L. Fry, Ph.D.

Departmental Major Adviser: Mr. Fry

Graduate Adviser: Mr. Berry

The Department offers instruction in invertebrate and vertebrate paleontology, micropaleontology, paleobotany, and stratigraphic paleontology. Professional opportunities are few in the field without an advanced degree; hence the undergraduate program is designed to prepare students for graduate study. Either the biology of fossils or the geological aspects of their occurrence may be stressed at the undergraduate level, but advanced study requires competence in both geology and zoology or botany as well as paleontology.

THE MAJOR

All students must take Biology 1A–1B (12), Chemistry 1A–1B–1C (12), Geology 5 (5), Mathematics 1A–1B or 16A–16B (8), Paleontology 1 or 15 (5), and Physics 6A-6B, or other courses in mathematics (1C, 5A), statistics (20), computer science, organic chemistry, and Anthropology 1 are recommended. Study of a modern foreign language is strongly encouraged.

Geology 150 and 116A–116B and three courses from Paleontology 111, 112, 120, and 125 form a core. Students wishing to emphasize geology and stratigraphic paleontology must take Geology 118 and 6 hours of biological science from the list of recommended courses below. Paleontological emphasis requires Genetics 100 and 9 additional units of upper division biology or paleontology from the list of recommended courses.

Recommended Courses: Geology 102, 105, 107, 112A–112B, 116A–116B, 117, 124; Zoology 105–107, 108A, 109, 110, 144, 145, 155, 157, 159, 169; Botany 154, 155, 170; Evolution and comparative anatomy. These are from every continent, principally from the western United States. Paleontology, the research institute and archive for the staff and students and for qualified visiting scholars, has large collections of fossil vertebrates, invertebrates, plants, and recent mollusk shells and vertebrate skeletal elements. These are from every continent, principally from the western United States. Requests for utilization of the collections or facilities should be addressed to the Director, Room 3, Earth Sciences Building.

PREPARATION FOR GRADUATE STUDY

Graduate study, with programs leading to both the M.A. and Ph.D. degrees, is a principal activity of the Department. Students may emphasize either the biological or the geological aspects of paleontology. Facilities are extensive and education in most paleontological fields is expected to acquire a broad familiarity with several fields in paleontology as well as with related subjects outside the Department, such as geology, anthropology, zoology, and botany. Ph.D. candidates will be required to pass reading examinations in two foreign languages (usually French and German) before taking the oral qualifying examination.

For further details on the requirements for the M.A. and Ph.D. degrees, please consult the graduate adviser for the Department.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSES

1. Introduction to Paleontology. (5) Three 1-hour lectures, two 2-hour laboratories per week; field trips. First 2 years, emphasis on evolution, their meaning to earth history. Ancient floras and faunas of the world. Genealogy of groups of plants and animals, including the ancestry of man. The Staff (Mr. Fry in charge) (F, Sp)

2. Directed Studies in Paleontology. (2) Six hours of laboratory per week. Prerequisite: course 1 or 15 or Biology 1A-1B, or Geology 1 or 15. Mrs. McCullough (F, W; Mr. Jamieson (Sp)

UPPER DIVISION COURSES

101. Phylogeny and Evolution. (4) Two 1-hour lectures and one 3-hour laboratory per week. Prerequisite: a course in paleontology or in a related science. Paleontology 101 is for students pursuing a science major not majoring in paleontology. Examination and discussion of selected examples from the fossil record of plant and animal groups.

111. Invertebrate Paleontology. (4) Two 1-hour lectures and two 3-hour laboratories per week. Prerequisite: course 1 or 15, or Biology 1A-1B, or 11A-11B, or Geology 1, 5, Paleontology, or Philosophy and systems of the invertebrates. Mr. Clemens (Sp)

112. Stratigraphic Paleontology. (4) Two 1-hour lectures and two 3-hour laboratories per week. Prerequisite: Zoology 1 or 15 or Geology 1 or 15 or Paleontology. Morphology, anatomy, and the stratigraphic sequence of fossils. Mr. Berry (W)

115. Paleobiology of Microorganisms. (4) Two 1-hour lectures and two 3-hour laboratory sections per week. Prerequisite: Zoology, Morphology 1 or Paleontology 1 or 15. Examination of the fossil record of microorganisms and the deeper realm of cellular biology. Mr. Fry (W)

120. Paleobotany. (4) Two 1-hour lectures and two 3-hour laboratories per week. Prerequisite: consent of instructor. Advanced study of plants represented in the fossil record. Requires students to build on their comprehensive knowledge of earth sciences. Mr. Fry (F)

121. Floras of the Past. (4) Two 1-hour lectures, one 3-hour laboratory per week and term report. Prerequisite: course 120, 226, or consent of instructor. Mr. Fry (W)

NOTE: For key to symbols, see page 34.
125. Vertebrate Paleontology. (4) Three hours of lecture and two 3-hour laboratories per week. Prerequisite: course 1 or Anthropology 1, and Biology 1A–1B or 1A–1B or equivalent. Geologic history and evolution of backboned animals. Mr. Gregory (W).

126. Morphology of the Vertebrate Skeleton. (2) One hour of lecture and one 3-hour laboratory per week. Prerequisite: course 1 or Anthropology 1, and Biology 1A–1B or 1A–1B or equivalent. Morphology of skeleton and dentition. Mr. Gregory (W).

170. History of Paleontology. (4) Three 1-hour lectures per week, assigned reading and written report. Prerequisite: senior or graduate standing. To be offered alternate years with courses 224, 225. Discovery of fossils, interpretation of rocks, and correlation of vertebrate-bearing deposits. Topics vary from year to year.

226. Human Evolution, Prehistory and Palaeoenvironments. (2) See Interdepartmental Studies for the complete description of this course.

Biology 160A–160B. Marine Geobiology. (3–3) See Biology for the complete description of this course.

**Philosophy**

Department Office, 314 Moses Hall


*Associate Professors: Thompson Clarke, Ph.D.; Hans Sluga, B.Phil. Mr. Myro, Ph.D.*

Acting Assistant Professor: Linda G. Foy

Visiting Mills Professors: Carl G. Hempel (W); Gregory Vlastos (F, W)

The Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis.

The Staff (F, W, Sp)

GRADUATE COURSES

**130. Principles of Phylogeny and Systematics.** (4) Four hours of lecture per week. Mr. Berry (Sp).

**131. Morphology of the Vertebrate Skeleton.** (2) Three 1-hour lectures per week, assigned reading and written report. Prerequisite: senior or graduate standing. To be offered alternate years with courses 224, 225. Discovery of fossils, interpretation of rocks, and correlation of vertebrate-bearing deposits. Topics vary from year to year.

224. Paleontology and Evolution of Fish. (4) Two hours of lecture and two 3-hour laboratory sessions per week. Prerequisite: courses 125 and 126 or Zoology 105 or equivalent. To be offered in alternate years. Mr. Gregory (F, W).

225. Paleontology and Evolution of Amphibians and Reptiles. (4) Two hours of lecture and two 3-hour laboratories per week. Prerequisite: courses 125 and 126 or Zoology 105 or equivalent. Mr. Gregory (W).

**126A–126B. Evolution and Systematics of Mammals.** (4–4) See Interdepartmental Studies for the complete description of this course.

Mr. Matson (F).

250. Field Studies in Vertebrate Paleontology. (1–4) Prerequisite: course 224, 225, or 227. Demonstration in the field and written reports based on observations of occurrence, taphonomy, stratigraphic relationships, and correlation of vertebrate-bearing deposits. Mr. Savage, Mr. Clemens, Mr. Gregory (Sp).

250A. Field Studies in Vertebrate Paleontology. (1–4) Prerequisite: course 224, 225, or 227. Demonstration in the field and written reports based on observations of occurrence, taphonomy, stratigraphic relationships, and correlation of vertebrate-bearing deposits. Mr. Savage, Mr. Clemens, Mr. Gregory (Sp).

250C. Seminars in Paleontology. (1–0) The Staff (F, W, Sp)

260. Individual Study for Master’s Students. (1–0) Individual study for the comprehensive or language requirements in consultation with the field adviser. Units must be used to meet either the unit or requirement requirements for a master’s degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp).

262. Individual Study for Doctoral Students. (1–0) Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare themselves for the various examina- tions required of candidates for the Ph.D. May not be used for unit or residence requirements for the doctor’s degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp).

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

**LOWER DIVISION COURSES**

1. General Introduction to Philosophy. (4) Three hours of lecture and one hour of section meeting for discussion and written work. The nature and range of philosophical enquiry. The role of philosophy in relation to problems of everyday life and to the major problems of other intellectual disciplines. Students interested in a more detailed examination of specific problems in ethical and political philosophy and the theory of knowledge are advised to take course 2 and 4 as introductory courses.

2. Introduction to Philosophy: Ethical and Political Philosophy. (4) Three 1-hour lectures per week and one weekly section meeting for discussion and written work. Mr. Tussman (W).

3. Practical Reasoning. (4) Two 1-1/2 hour lectures per week. Intensive training in the analysis and evaluation of everyday arguments and functional prose (advertis- ing, propaganda, instructions), without use of formal logical analysis. Emphasis on current and controversial issues, and on clarity of commentary; other topics include definition, precision explanation and decision-strategies.

Mr. Myro (W).

12A–12B. Introduction to Logic. (4) Three hours of lecture and two hours of discussion per week. Course 12A in itself should not be regarded as a terminal course in logic. Mr. Chihara (F, W); Mr. Mates (F, W); Mr. Adams (W, Sp).

12C. Introduction to Logic. (4) Three 1-hour lectures per week. Prerequisite: 12A and 12B. Introduction to mathematical logic. Syntax, sentence structure, and formal derivations. Mr. Myro (W).

14A. Rudiments of Logic and the Philosophy of Logic. (8) Formerly 91A. Three hours of lecture and two hours of discussion per week. The first part of a sequence in which approximate equal time will be given to an elementary treatment of propositional and predicate logic, and to an examination of philosophical questions directly raised thereby.

Mr. Myro (W).

14B. Rudiments of Logic and the Philosophy of Logic. (8) Formerly 91B. Three hours of lecture and two hours of discussion per week. Study of topics in philosophy of logic, especially those arising out of course 91A such as: nature of logical languages, logical structures, implications for the philosophy of language, logical studies, truth, meaning, the relationship between formal systems and natural languages, between logical studies and empirical investigations of lan- guages.

Mr. Myro (W).

25A. Ancient Philosophy. (5) Three 1-hour lectures per week and one weekly section meeting.

25B. Medieval and Early Modern Philosophy. (5) Three 1-hour lectures per week and one weekly section meeting.

25C–25D. Modern Philosophy to Kant. (5–5) Three hours of lecture and section meeting per week. Mr. Myro (W), 250 Mr. Stroud (Sp).

**UPPER DIVISION COURSES**

General prerequisites.—Students enrolling in any restricted upper division course must have completed 8 units in courses 1, 2, 25A, 25B, 25C, or 25D, or have taken courses 25F, 25G, 25H, 25I, under conditions specified below, course 101. Additional prerequisites are indicated in certain courses.

**Unrestricted Course**

101. Philosophical Theories. (5) Three 1-hour lectures and one section meeting per week. 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 course 4 or its equivalent. It will be accepted as prerequisite for other upper division courses in the department in lieu of course 4. Mr. Sluga (Sp); Mr. Searle (F)

Restricted Courses

100. Philosophical Methods. (5) Two hours of lecture and two hours of section meeting per week. Prerequisite: two courses from course 1, 2, 4, 25A–25B, 25C, 25D. This course is designed for major students with the techniques of philosophical reasoning through detailed study of selected philosophical texts and through extensive training in philosophical writing, based on those texts. Restricted to majors and to be taken as early as possible after declaring the major. Mr. Sluga (F); Mr. Stroud (W)

102. Practical Ethics. (4) Three hours of lecture per week. A course in the nature of moral arguments, using a variety of contemporary examples of personal and social problems.

104. Ethical Theories. (4) Three hours of lecture per week. The fundamental concepts and problems of morality examined through the study of classical and contemporary philosophical ethics of Mr. Vernazen (W); Mr. Searle (Sp)

*106. Philosophy in Literature. (4) Three hours of lecture per week. Philosophical issues as expressed in poetry, drama, and the novel. At the discretion of the instructor, the general prerequisite may be waived for majors in literature in or the fine arts.

107A. Existentialism in the Novel and Drama. (4) Formerly 107. Three hours of lecture and one hour of discussion per week. Prerequisite: at the discretion of the instructor, the general prerequisite may be waived for students in Literature. Dostoyevsky's The Brothers Karamazov; Kafka's The Castle; Camus' The Stranger and Miller's After the Fall studied as expressions of Christian, agnostic and atheist existential attitudes.

107B. Existentialism in Drama and Film. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: at the discretion of the instructor, the general prerequisite may be waived for students in Literature. Dostoyevsky's The Brothers Karamazov; Kafka's The Castle; Camus' The Stranger and Miller's After the Fall studied as expressions of Christian, agnostic and atheist existential attitudes.

*M108. Philosophy in Literature. (4) Three hours of lecture per week. 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.

*M110A–110B. Marxism. (4–4) Formerly 182A–182B. Three hours of lecture per week. A critical appraisal of the philosophical foundations and implications of Marx's ideas on man and society. During the first quarter, particular attention will be devoted to Hegel and Feuerbach and their influence on the development of Marxism.

112. Philosophy of Religion. (4) Three hours of lecture per week. The nature and the validity of religious ideas.

118. Philosophy of Law. (4) Three hours of lecture per week. Philosophical problems arising in the legal context.

125A–125B. Aesthetics. (4) Three hours of lecture per week. Course 125A is not prerequisite to 125B. At the discretion of the instructor, the general prerequisite may be waived for majors in literature in or the fine arts.

128. Political Philosophy. (4) Three hours of lecture per week. Analysis of political obligation and related problems.

129. Aesthetics Theories. (4) Three hours of lecture per week. A study of aesthetic theories based on historical and recent materials.

*M130. Philosophy of Action. (4) Three hours of lecture per week. A consideration, inter alia, of some of the following questions: What is an action? What is the structure of practical actions? What is the structure of explanations of actions?

131. Metaphysics. (4) Three hours of lecture per week.

132. Philosophy of Mind. (4) Three hours of lecture per week. Mind and matter; other minds; the concept "perception." Mr. Foy (F)

133A–133B. Philosophy of Language. (4–4) Three hours of lecture per week.

134A–134B. Theory of Knowledge. (4–4) Three hours of lecture per week.

*M135. Philosophy and Linguistics. (4) Three hours of lecture per week. Prerequisite: consent of instructor. This course approaches philosophy of language within the perspective of modern linguistics. It introduces what is philosophically relevant in generative transformational grammar.

*M136. Perception. (4) Three hours of lecture per week. The course will be devoted to studying major conflicting accounts of the nature of the simplest kind of perception, and their roles in the acquisition of knowledge with special emphasis on underlying divergent philosophical principles and orientations.

138. Special Topics in the Philosophy of Science. (4) Three hours of lecture per week. A discussion in some detail of one or a few special issues in, or approaches to, the philosophy of science. Details of current topics are available in the departmental guide for each quarter in which the course is given.

140. Philosophy of the Natural Sciences. (4) Three hours of lecture per week. Philosophical topics arising from physics, biology, etc.

141. Philosophy of the Social Sciences. (4) Three hours of lecture per week. Philosophical topics arising from psychology, economics, sociology, etc.

142. Probability and Induction. (4) Three hours of lecture per week. Different approaches to the foundations of probability; inductive confirmation of scientific theories.

143A–143B. Logic. (4–4) Three hours of lecture per week. Prerequisite: course 12A–12B or equivalent.


*M145. Modal Logic. (4) Three hours of lecture per week.

146. Philosophical Logic. (4) Three hours of lecture per week. Main subject of study will be logical aspects of natural language, and their relations to formal logic. Special attention will be given to unsettled questions of logical theory, including the nature of generalizations, time and tense, etc.

*M147. History of Logic. (4) Three hours of lecture per week. Aristotelian and Stoic logic; problems in medieval logic; Leibniz; and the eighteenth century to Frege.

150. Aestheticism on Philosophy. 1900–1945. (4) Three hours of lecture per week.

151. Anglo-American Philosophy Since 1845. (4) Three hours of lecture per week.

152A–152B. Phenomenology and Existentialism. (3–3) Three hours of lecture and one hour of discussion per week. Course 152A is prerequisite to 152B. Credit and grade will be awarded upon completion of the four sets of readings which cover the history of phenomenology and existentialism: Kierkegaard, Nietzsche and Husserl. 152B. Contemporary existentialism and phenomenology. Mr. Searle (Sp); Mr. Mates (W); Mr. Vergiazen (W)

*M153. The Later Heidegger. (5) Formerly course 191G. Three hours of lecture per week. Prerequisites: Philosophy of Art and Mind: Being and Time, and related works such as The Origin of the Work of Art and On Time and Being.

160A–160B. Plato. (4–4) Three hours of lecture per week.

161. Aristotle. (4) Three hours of lecture per week. Mr. Matson (Sp)

166. Medieval Philosophy. (4) Three hours of lecture per week.

170. Descartes. (4) Three hours of lecture per week.

171. Hobbes. (4) Three hours of lecture per week. Mr. Matson (F)

*172. Spinoza. (4) Three hours of lecture per week.

173. Leibniz. (4) Three hours of lecture per week. Mr. Mates (W)

174. Locke. (4) Three hours of lecture per week.

175. Berkeley. (4) Three hours of lecture per week.

176. Hume. (4) Three hours of lecture per week, Mr. Stroud (F).

178A–178B. Kant. (4–4) Three hours of lecture per week. Mr. Aschenbrenner (F); Mr. Aschenbrenner (W)

180. Philosophy of the 19th Century. (4) Three hours of lecture per week.

*M194. Nietzsche. (4) Three hours of lecture per week.

*M195. The Later Wittgenstein. (4) Three hours of lecture per week.

191. Kierkegaard. (3) Three hours and one hour of discussion per week. Prerequisite: one philosophy course. Kierkegaard as theologian, psychologist and philosopher, with emphasis on those aspects of his thought which have provided the basis of existential phenomenology. Death. Mr. Dreyfus (F)

*M191T. Gottlob Frege. (4) Three hours of lecture per week. Prerequisite: Logic 12A–12B or equivalent. A systematic study of the philosophical work of Gottlob Frege and its bearing on contemporary investigations in logic, the philosophy of mathematics and the philosophy of language.

191U. Husserl. (5) Three hours of lecture and one hour of discussion per week. Prerequisite: one philosophy course. Exploration and exposition of the fundamental principles of Husserl's transcendental phenomenology. Readings in Ideas, Cartesian Meditations, Crisis of European Philosophy. Mr. Dreyfus (F)

*M191V. Moroia-Ponty's Phenomenology of Perception. (4) Three hours of lecture per week. A detailed course in Moroia-Ponty's Phenomenology of Perception. Moroia-Ponty's treatment of such issues as sense data, skepticism concerning the external world, and skepticism concerning the mind will be compared to similar work in analytic philosophy.

199. Philosophy Tutorial. (5) Meetings once a week. Prerequisite: restriction to students in the Honors Program. The Staff

H195. Philosophy Seminar. (5) Meetings once a week. Prerequisite: restriction to students in the Honors Program. The Staff

H196. Senior Colloquium. (Formerly H197). A seminar course for honor students in philosophy on a topic to be announced. Emphasis on the writing of papers and discussion of them in the seminar.

199B. Group Study. (1–5) Directed study on special topics. Prerequisite: consent of instructor. The Staff

199C. Supervised Independent Study and Research. (1–8) Enrollment is restricted to students in the Honors Program. The Staff,

Graduate Courses

200. First Year Graduate Seminar, (5) Two hours of lecture and two hours of tutorial per week. A combination course designed to acquaint and limit to first year graduate students in philosophy. Mr. Sluga, Mr. Vernazen (F); Mr. Stroud (Sp)

204. Recent Work in Ethics. (5) Prerequisite: course 104 or equivalent. Open to advanced undergraduates.

Mr. Vernazen (W)

231. Metaphysics. (5) Three hours of lecture per week. An examination of the concept "metaphysics."

NOTE: For key to symbols, see page 34.
(as exemplified in the writings of selected authors) with the aim of ascertaining whether there is such a discipline and if so what might be its philosophic interest of value.

233. Recent Work in Philosophy of Language. (5) Two to four hours per week.

234. Recent Work in Theory of Knowledge. (5) Two to four hours per week. Mandatory for graduate students with extensive philosophical background and substantial special knowledge in philosophy of science; intensive discussion of the major logical problems in philosophy of science including induction, reduction, production, valuation, and explanation.

250. Special Studies. (1–9) Enrollment is ordinarily restricted to students who have not yet passed the Qualifying Examination.

250. Philosophical Problems. (6) Two to four hours per week. Special knowledge in philosophy of science; intensive valuation, and explanation.

250. Special Studies. (1–9) Enrollment is ordinarily restricted to students who have not yet passed the Qualifying Examination.

250. Seminar. (5) Advanced study in various fields of philosophy. Topics will vary from year to year.

601. Individual Study for Master's Students. (1–8) Individual study for the comprehensive or language requirements in consultation with the field adviser. Units may not be used to meet minor unit or residence requirements for master's degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff.

602. Individual Study for Doctoral Students. (1–8) Prerequisite: one full year of graduate work at Berkeley or consent of adviser. Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare for themselves the rather involved examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff.

The Staff

### Physical Education

**Department Office, 103 Harvard Gymnasium**

**Professors:**
- Helen M. Eckert, Ph.D.
- Lawrence Rarick, Ph.D.
- Acting Chairman, F, W
- Anne S. Sempschez, Ph.D.
- (Emerita)

**Associate Professors:**
- George A. Brooks, Ph.D.
- Mary Lou Norrie, Ph.D.
- (Emerita)

**Assistant Professors:**
- Francis L. Blandan, F.S.
- Lawrence Rarick, Ph.D.
- (Emeritus)
- Pauline Ha Staff, F, W.
- (Emerita)
- C. Richard Crawford, M.A.
- William Manring, M.S.
- William Martell, M.S.
- Kathryn Scott, M.A.
- (Emeritus)

**Supervisors:**
- Frances C. Blandan, F.S.
- Catherine Price, M.S.
- (Emerita)
- Ernest P. Price, M.S.
- (Emerita)
- P. J. Price, M.S.
- (Emerita)
- C. Richard Crawford, M.A.
- William Manring, M.S.
- William Martell, M.S.
- Kathryn Scott, M.A.
- (Emeritus)

**Department Major Advisers:**
- Miss Brooks, Miss Eckert, and Mr. Royce.

**Graduate Advisers:**
- Miss Brooks, Miss Norrie (Sp), Mr. Rarick.

**Teacher Education Advisers:**
- for women, Miss Park; for men, Mr. Flanagan.

The undergraduate major in physical education is designed to develop the scientific bases for understanding the physiological status of individuals and their ability to engage in motor activity. This includes the motor performance of daily life as well as that of a recreational, competitive, or aesthetic nature. The role of athletics, dance, and other physical activities, both historical and contemporary, in the United States and certain other cultures is examined.

### THE MAJOR

**Lower Division.**

High school chemistry or equivalent, elementary statistics; Anatomy 104 (formerly Anatomy 25) and Physiology 1 (or equivalent) of Physiology 108–108B and 109; Physics 10; Psychology 1. Recommended: History 4 or 4B or 4C or 4D or 17A or 17B or 17C or 17D; a lower division sociology course.

**Upper Division.**


### Honors Program.

A student with an overall grade point average of 3.3 or higher and a grade-point average of 3.3 or higher in courses in the major may, with the approval of the major adviser, apply for admission to the honors program. Requirements in the honors program are completion of Physical Education H195, H195 and H200—6 units; Physical Education H196—3 units. One course in the major will be waived with the approval of the adviser.

### Teaching Credential. Candidates for a teaching credential with a major in physical education see the Announcement of the School of Education.

### PREPARATION FOR GRADUATE STUDY

Students must complete the equivalent of the undergraduate major.

### THE GRADUATE MAJOR

For the M.A. degree, either Plan I requiring 30 units and a thesis or Plan II requiring 36 units and a comprehensive final examination may be followed. Programs of study with sponsorship in Education and Physical Education lead to the Ed.D. or Ph.D. degree.

### ACTIVITIES INSTRUCTIONS

The Department of Physical Education offers to all students an opportunity in instructional classes to learn and to improve skills in a wide variety of sports, dance, and gymnastic activities and to maintain or develop physical fitness. All classes are open to both men and women.

### FEES

The incidental fee payable by all students at the time of registration entitles students to use of gymnasiums, swimming pools, towells, showers, lockers, tennis courts, and the athletic fields; also to the use of clothing for certain physical education activities, including swimming.

A few special activity classes such as bowling and sailing require payment of extra fees.

### LOWER DIVISION COURSES

1. Physical Education Activities at Harvard Gymnasium. (1/2) Sections meet two hours per week. Student selects section by activity, level, and time preference. A wide variety of sports, exercise, and conditioning activities are offered. Students should consult the Schedule of Classes each quarter to determine the particular activities and levels of instruction available.

2. Physical Education Activities at Harvard Gymnasium. (1/2) Sections meet two hours per week. Student selects activity by level, and time preference. A wide variety of sports, dance, and conditioning activities are offered. Students should consult the Schedule of Classes each quarter to determine the particular activities and levels of instruction available.

### UPPER DIVISION COURSES

101. Kinesiology and Body Mechanics. (4) Three 1-hour lectures and one 3-hour laboratory per week. Prerequisites: Physiology 1 and Anatomy 104 (formerly Anatomy 25) or equivalent and Physics 10. Physical structure and muscular movements in various physical activities. Analysis of factors related to joint and muscle action.

102. Adapted Physical Education. (3) Two 1/2-hour lectures per week. Prerequisite: course 101. Adaptation of exercise for individuals with postural deviations from the normal or with physical disabilities requiring modification of activity.

105A–105B. Physiological Hygiene. (4–4) Three 1-hour lectures and one 3-hour laboratory per week. Prerequisites: Physiology 1 and Anatomy 104 (formerly Anatomy 25) or equivalent. The physiology of exercise: diet, ventilation, training, fatigue, and heart and respiration. Study of differences in cardio-vascular and respiratory function. Limitations of work in relation to altitude and climate.

105A: Mr. Brooks; 105B: Mr. Brooks (W); 105A: Miss Klimovitch (F, W); 105B: Miss Klimovitch (Sp)

106. Energy Sources for Human Movement. (3) Two hours of lecture and one 1-hour discussion section per week. Prerequisite: course 101. Discussion of the motor mechanisms of the human body and the effects of physical activity under normal and abnormal conditions in the human body.

110. Psychologic Bases of Physical Activity. (4) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: Psychology 1, elementary statistics (Psychology 5 recommended). Perception, motivation, learning, and emotion as factors in physical activity; reaction time and coordination; the psychology of competition.

111. Motor Development. (4) Three 1-hour lectures and one 1-hour section per week. Prerequisite: Psychology 1, elementary statistics (Psychology 5 recommended). Motor development from birth to maturity, age changes, sex and individual differences, maturation, and motor learning in childhood and adolescence, relation of motor performance to other aspects of development.

112. Motor Development of the Handicapped. (3) Three hours of lecture per week. Prerequisite: course 111 or equivalent. Motor development of the handicapped as a function of age, sex, and type of disability. Influence of maturational and environmental factors on motor development according to the type of handicap condition.

120. Sports in American Society. (3) Three 1-hour lectures per week. Prerequisite: Sociology 1 or equivalent. The roles of sports in the development of social relations with other aspects of American culture. Emphasis on the twentieth century.

121. Social-Cultural Bases of Human Movement. (4) Three hours of lecture per week. Prerequisite: one lower division sociology course, or consent of instructor. The social and cultural importance and structure, and extent of sports in modern societies. Social factors such as institutions,
processes, and systems are examined in relation to sport and sport groups as subcultures. (F, W)

130. History and Theories of Physical Education. (4) Three 1-hour lectures per week and one section meeting. Prerequisite: History 44 or B, or History 17A or B, Sports, dance, and gymnastics in selected historical and contemporary cultures. Political and social influences on theories and practices. (W)

131. Curriculum Development and Administration. (4) Four 1-hour lectures per week. Prerequisite: course 130. Curriculum development and evaluation in school programs of physical education including the instructional program, intramural sports and interscholastic athletic program, administrative policies and procedures pertaining to staff, facilities, equipment, budget and program. Miss Park (W)

135A–135B. Measurement and Evaluation In Physical Education, (4–4) 135A. Three hours of lecture and 2 hours of laboratory per week. Prerequisite: a course in elementary statistics. Miss Klimovich (F)

135B. Three hours of lecture and three hours of laboratory per week. Prerequisite: course 135A. Historical development of evaluation in physical education; measurement of physical abilities and specialized motor skills; analysis of selected research studies in the field. Inferences from hypothesis testing, correlation and variance analysis and regression. The statistical nature of research error. Mrs. Ecker (F)

140. Community Recreation, (3) Three 1-hour lectures per week. Prerequisite: Sociology 1 or equivalent. Nature, scope and significance of recreation in the social and economic life of the American people. History, purpose, organizational patterns and interrelationships of agencies and institutions which serve the recreational needs of the community and the nation. (F)

160. Theory of Dance. (4) Formerly 160A-B. Two 1-hour lectures and two hours of laboratory per week. Prerequisite: course 12 (sections in dance); Psychology 1. Ethnic, social, and contemporary dance forms; development of folk forms in Europe and the Americas; current trends in the United States; nature and function of rhythm in dance; theories and principles of technique, style, and composition. Miss Bloland (Sp)

165A. Theory of Sports Activities, (3) Two hours of lecture and four hours of laboratory per week. Prerequisite: course 1, 12, and 25 (sections in individual, team sports, track and field). The mechanics of movement in sports. Analysis of complex skills. Game structure and strategy. Competition in sport. Miss Park (F)

165B. Theory of Sports Activities, (3) Two hours of lecture and four hours of laboratory per week. Prerequisite: course 165A, 1, 12, and 25 (sections in gymnastics, swimming, and track). The mechanics of movement in gymnastic activities. Analysis of complex skills in a wide range of gymnastic activities and the analysis of exercise as it is related to physical activities. Miss Park (Sp)

171. Conditioning of Athletes and Care of Injuries, (2) One hour of lecture and two hours of laboratory per week. Prerequisite: course 50; Physiology 1 or anatomy 104 (formerly 25) or equivalent. Conditioning and care of athletes; sleep, diet, health, and activity habits. Care of injuries, with special emphasis on taping, therapy, and protective equipment. Mr. Royce (W)

H195. Honors Course. (3–6) Individual conferences to be arranged. Special study and/or research in the field of the major. The Staff (Miss Norrie in charge Sp), (Mr. Rarick F, W)

H196. Honors Thesis, (3) Individual conferences to be arranged. The Staff (Miss Norrie in charge Sp), (Mr. Rarick F, W)

197. Field Study In Physical Education, (1–5) Supervised experience relevant to specific aspects of Physical Education in off-campus organizations. Regular individual meetings with faculty sponsor and written reports required. Must be taken on a passed/not passed basis. The Staff (Miss Norrie in charge Sp), (Mr. Rarick F, W)

198. Supervised Independent Study and Research for Undergraduates, (1–5) Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis. The Staff (Miss Norrie in charge Sp), (Mr. Rarick F, W)

PROFESSIONAL COURSE

300. Problems and Methods In Teaching Physical Education, (3) Three hours of lecture per week. Prerequisite: satisfactory score in qualifying examinations in physical education activities; course 101 or 105; 110 or 135A. Analysis of modern, practical and theoretical problems in teaching physical activities in secondary school. Study of methods and outcomes and the desirable progression and sequences of skills, especially as applied to developmental activities and individual, dual, and team sports. Mr. Flanagan (Sp)

GRADUATE COURSES

200. Seminar In Physical Education, (3) One 3-hour meeting per week. Critical review of literature and research methods. Mr. Van Dallen, Mr. Rarick (F)

201. Seminar in Movement and Body Mechanics, (3) One 3-hour meeting per week. Prerequisite: course 101. Neurophysiological concepts, physical laws, and kinesiology. Mr. Royce (F)

205. Seminar in Physiological Hygiene, (3) One 3-hour meeting per week. Prerequisite: course 105. 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. Brooks (F, Sp)

210. Seminar in Psychological Bases of Physical Activity, (3) One 3-hour meeting per week. Prerequisite: course 112. Kinesthetic perception, motor coordination and learning, motivation, tension, subjective psychological factors, and related topics. Miss Norrie (Sp)

211. Seminar in Motor Development, (3) One 3-hour meeting per week. Prerequisite: course 112. Contemporary theories of development. Changing motor abilities and behavior from childhood through youth and age. Mr. Rarick (Sp)

212. Seminar in Motor Development of the Handicapped, (3) One 3-hour meeting per week. Prerequisite: course 112. Special problems in the motor development of the handicapped with reference to type of disability, maturational level, sex, and environmental factors. Mr. Rarick (Sp)

211. Seminar in Sociocultural Bases of Human Movement, (3) One 3-hour meeting per week. Prerequisite: course 121. Sociocultural analyses of sports, games, and dances in primitive and modern societies. Mr. Van Dallen (W, Sp)

230. Seminar in the Historical Foundations of Physical Education, (3) One 3-hour meeting per week. Prerequisite: course 130. Historical analyses of sport, games, exercises, and dance in primitive and modern societies. Mr. Van Dallen (W, Sp)

231. Seminar in Contemporary Administrative and Curricular Theories and Problems In Physical Education, (3) One 3-hour meeting per week. Prerequisite: course 131 or instructor's consent. Theories, policies, and practices relative to the administrative process and curriculum planning in physical education. Mr. Van Dallen (Sp)

290. Research, (2–6) Hours to be arranged. The Staff (Miss Norrie in charge Sp), (Mr. Rarick F, W)

298. Special Study for Graduate Students, (2–4) Hours to be arranged. Advanced study of special topics under the direction of a faculty member. The Staff (Miss Norrie in charge Sp), (Mr. Rarick F, W)

601. Individual Study for Master's Students, (1–6) Hours to be arranged. Individual study to prepare for master's comprehensive. Units may not be used to meet either unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (Miss Norrie in charge Sp), (Mr. Rarick F, W)

602. Individual Study for Doctoral Students, (1–6) Hours to be arranged. Individual study in consultation with major field adviser to prepare for doctoral examinations. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (Miss Norrie in charge Sp), (Mr. Rarick F, W)

PHYSICAL SCIENCE

FIELD MAJOR IN PHYSICAL SCIENCES

Adviser: Mr. Walter D. Knight, 341 Birge Hall

This program has been developed for students who wish to concentrate in the physical sciences on a broader basis than is possible in a departmental major. Two plans are offered within the major. Plan A is based on Physics 6, which is required of biology students and Mathematics 16, which is required in part by biology departments. Through this plan a student preparing for a career in environmental or health science may major in physical science and at the same time acquire the necessary pre-professional preparation. For example, Plan A, together with organic chemistry and a year of biology, will meet the entrance requirements of most medical schools. Plan B is based on Physics 5 and Mathematics 1, which are required by physical science and engineering departments. Within this plan it is possible to complete much of the departmental major in, for example, physics or chemistry, while also studying astronomy and geology as well as computer science.

NOTE: For key to symbols, see page 34.
PLANE A
(Broad introduction to physical science)

Lower Division Courses. Mathematics 16A, 16B, 5A or 41; Physics 6A, 6B, 6C; Chemistry 1A, 1B, 1C.

Additional Required Course. Computer Science 3 or 103.

Upper Division Courses. Physics 106B, 132; Chemistry 109A, 109B; Mathematics 103A, 130B; Statistics 103C, 130A, 130B. Electives in computer science, mathematics, statistics, and physical science with the approval of the adviser to complete a total of 45 upper division units major. Upper division units in engineering science will be accepted with the approval of the adviser.

PLANE B
(Optional of departmental concentration)

Lower Division Courses. Mathematics 1A, 1B, 1C, 5A, 5B, 5C, 5D, 5E, Chemistry 1A, 1B, 1C or 4A, 4B, 4C; 14. Strongly Recommended: Mathematics 5B 1.

Additional Required Course. Geology 5 or 101 or Astronomy 101 or 127A.

Upper Division Courses. Physics 105A; Chemistry 110A and Physics 110A, or Physics 137A and Chemistry 110A. Electives in computer science, mathematics, statistics, and physics with approval of the adviser to complete a total of 36 upper division units. Up to 12 upper division units in engineering science will be accepted with the approval of the adviser.

Honors Program. Students with a grade-point average of both overall and in the major of 3.30 may wish to participate in an honors program leading to graduation with honors. The honors program will include two quarters of work in a departmental honors program with a senior thesis.

Single Subject Teaching Credential. All credential candidates must be certified under the provisions of the California Teacher Preparation and Licensure Act of 1970. Prospective single subject teachers in physical science are encouraged to complete the field major in physical sciences. For students who began their post-secondary studies before July 1, 1975, and who complete the field major, the state examination in physics is waived. Students beginning college work after this date may be required to complete a state examination in physics, and others have gone on to jobs in industrial and government laboratories. Students who are considering high school teaching as a career are especially urged to consult with their adviser early.

Preparation for the major ordinarily requires the following courses: Physics 5A–5B–5C–5D–5E, Mathematics 1A–1B–1C–3A–3B–3C–3D, 124, 129A, 129B, 137C, 139, 141A, 141B, 142A, 142B, 145, 150, and 146. Those who have not taken a substantial chemistry course in high school are urged to take Chemistry 1A–1B, or preferably Chemistry 4A–4B.

The physics major includes the following courses: Physics 105A, 105B; Physics 110A, 110B, 110C; Mathematics 112; Physics 117A, 137B; eight units of Physics 111; two additional courses from the following list chosen with the approval of the major adviser; Physics 124, 128A, 129B, 137C, 139, 141A, 141B, 142A, 142B, 150, and 146. The student an introduction to some areas of current research.

Special programs may be worked out in consultation with the adviser. Completion of the physics major is usually required for admission to graduate work. Additional mathematics from among the courses Mathematics 104A–104B, 120A–120B–120C, 121A–121B, 185 is recommended.

Honors Program. Students with an overall grade-point average of 3.3 or better in courses in the major may consult the major adviser concerning the honors program. This program requires completion of the major, at least one quarter of Physics H190 and a senior thesis, Physics H195A–H195B.

Biophysics. Students who wish to obtain a broad introduction to the physical sciences and their application to biology are referred to the group major in biophysics, which appears under Medical Physics, Division of Advisers: Mr. Bearden, Mr. Glaser, Mr. Nicholls.

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. Chinosky.

Field Major in Physical Sciences. Students interested in this major may wish to visit the Department of Physics, with emphasis placed on the Ph.D. in addition to applications and transcripts of undergraduate work, applicants for admission must submit scores on the graduate record examination.

Requirements for the Ph.D. include the contents of the following courses: Physics 210A–210B–210C and 221A–221B–221C plus 21 units (7 quarter-courses) of material elected from upper division or graduate courses (not including any upper division material required for the undergraduate major), of which at least 21 units must be in 200 courses. Some of these 21 units could include courses in mathematics, biophysics or astrophysics. Mathematics 224 is recommended. Courses 230, 235, and 299, and 21 units considered above. Research is a major part of the Ph.D. program, and the Department offers opportunities in a wide variety of experimental and theoretical fields. The facilities of the Lawrence Berkeley Laboratory are available for experimental and theoretical research in high energy and nuclear physics.

Work in Le Conte and Birge Halls includes, among other fields, solid state physics (both experimental and theoretical fields. The facilities of the Lawrence Berkeley Laboratory are available for experimental and theoretical research in high energy and nuclear physics.)

Letters and Science List: For regulations governing the list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSES

Courses 5A–5B–5C–5D–5E; or HSA–H5B–H5C–H5D–HSE are fundamental and are designed to meet the needs of students majoring in any of the physical sciences, or who are enrolled in the colleges of Chemistry or Engineering. Those proceeding with the second year mathematics sequence should take courses in the order 510–51A–51B concurrently with Physics 5C–5D–5E respectively. Mathematics 21A–21B is designed for remedial preparation. Students in architecture, and students in the biological sciences. Physics 10 is recommended for the non-science major student who desires to gain some understanding of the basic physics concepts. These courses fulfill, in part, the natural science requirements of the College of Letters and Science.

All students planning to take lower division courses, except Physics 10, should have completed trigonometry.

5A. Physics for Scientists and Engineers. (3) Section 1: three hours of lecture and one hour of discussion per week and/or section 2: three 2-hour tutorial meetings per week. Prerequisite: high school physics, Mathematics 1A; Mathematics 1B or corresponding units of 15 must be taken concurrently or have been completed. Vectors, particle motion, Galilean invariance, Newton's laws, conservation of energy, momentum, and angular momentum, center of mass, motion of rigid bodies, computer printouts. The Staff (F, W, Sp)

5B. Physics for Scientists and Engineers. (4) Section 1: three hours of lecture, one hour of discussion, three hours of laboratory per week and/or section 2: three 2-hour tutorial meetings and three hours of laboratory per week. Prerequisite: course 5A. Mathematics 1A or 1B; Mathematics 15 must be taken concurrently or have been completed. Harmonic oscillator, mechanical waves, fluids, kinetic and thermodynamics, first and second laws of thermodynamics, statistical considerations. The Staff (F, W, Sp)

5C. Physics for Scientists and Engineers. (4) Section 1: three hours of lecture, one hour of discussion, three hours of laboratory per week and/or section 2: three 2-hour tutorial meetings and three hours of laboratory per week. Prerequisite: course 5A. Mathematics 1C and 15 must be taken concurrently or have been completed. Electrodynamics, electric fields and potentials, conductors and currents, magnetic force fields, and fields, induction of electric and magnetic materials. The Staff (F, W, Sp)

5D. Physics for Scientists and Engineers. (4) Section 1: three hours of lecture, one hour of discussion, and three hours of laboratory per week and/or section
2. Three 2-hour tutorial meetings and three hours of laboratory per week. Prerequisite: course 6A-6B-6C. Designed for optometry students.

106B. Physical Optics. (4) Three hours of lecture and three hours of discussion per week. Prerequisite: course 6A-6B-6C. Designed for optometry students.

106C. Introductory Physics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: senior standing.

110A-110B-110C. Electromagnetism and Optics. (4-4-3) Three hours of lecture and one hour of discussion per week. Prerequisite: course 105A-105B, 110A-110B, or 110B. Not open for credit to students who have completed 137A. A general descriptive course in modern physics; electromagnetic, elastic, and particle waves in periodic lattices; thermal, magnetic, and dielectric properties; magnetic color; magnetic resonance; theory of metals and semiconductors, superconductivity.

141A—141B. Solid-State Physics. (4-4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 137A and 137B, or taken concurrently. A thorough introductory course in modern solids: physical symmetry, band theory, electromagnetic, elastic, and particle waves in periodic lattices; thermal, magnetic, and dielectric properties; magnetic color; magnetic resonance; theory of metals and semiconductors, superconductivity.

150. Introduction to Atmospheric and Space Sciences. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 105A-105B, 110A-110B, or consent of instructor. 142A is a prerequisite to 142B. Motion of charged particles in electric and magnetic fields, dynamics of fully ionized plasma from both microscopic and macroscopic point of view, magneto-hydrodynamics, dynamos, and instabilities; examples from space sciences and controlled-fusion research. Mr. Kunkel Sequence beginning (W)

191A. Physics of Ecological and Meteorological Phenomena. (4) Three hours of lecture plus one hour of discussion per week. Prerequisite: course 5A-5B and Math 5IC or equivalent. Environmental Studies 102 is recommended as background. Stability properties of ecosystems. Topics include models for energy and nutrient flow, Liapunov methods for ecological stability analysis, global climatic catastrophes, and the significance of diversity indices.

191A—1915B. Senior Honors Thesis Research. (3-3) Open only to students in the Honors Program. The research under the direction of a faculty member. To get credit the student must, at the end of two quarters, submit a satisfactory thesis. Credit and grade will be awarded upon completion of thesis and final sequence.

198. Directed Group Study. (1-4) The Staff

199. Supervised Independent Study and Research. (1-3) Enrollment is restricted by regulations.

NOTE: For key to symbols, see page 34.

L&S: Physics / 167...
301. Undergraduate Physics Instruction. (1-2)
Tutorial hours to be individually arranged. Supervisor's enrollment will be by permission of the instructor. Open to a limited number of qualified undergraduate students interested in physics teaching at the college level. Students will be exposed to the educational methods and engage in tutorial or laboratory teaching under the supervision of a faculty mentor. May be repeated twice for a maximum total of four units of credit. Given on a passed/not passed basis only.
Mr. Reil (F, W, Sp)

GRADUATE COURSES

205A-205B. Advanced Dynamics. (2-3) 205A: two hours of lecture and one hour of discussion per week. Prerequisite: course 204A-204B. 205B: three hours of lecture and one hour of discussion per week. Prerequisite: course 204A-204B, or the equivalent. Methods of Lagrange, Hamilton, and Jacobi. General treatment of kinematics, including collisions of relativistic particles. Inverses, symmetry, and conservation laws. Small oscillations. Approximate methods in mechanics. (Sp)

221A-221B. Quantum Mechanics. (3-3) Formerly numbered 242A-242B. Three hours of lecture and one hour of discussion per week. Prerequisite: course 221A-221B or the equivalent. 221A. Physical principles of quantum mechanics: wave mechanics, matrix mechanics, and the Hartree-Fock method. 221B. Advanced topics in quantum mechanics, including applications to atomic physics and electron scattering. Group theory of SU(3) and SU(3) representations; brief survey of quantum mechanics of atoms, molecules, and solids, emphasizing applications of group theoretical methods. (Sp)

222A-222B. Properties and Interactions of Particles. (3-3) Formerly numbered 246A-246B. Three hours of lecture and one hour of discussion per week. Prerequisite: course 222A-222B or the equivalent. 222A. Experimental physics of strong interactions. Stabilities of the hadrons, strangeness, quantum numbers, and properties of the most familiar particles, techniques for relating experiment to theory, electromagnetic interaction, and weak interactions. 222B. Weak interactions. Fermi theory, the universal weak current, beta decay, muon decay, nonleptonic decay of strange particles, lepton number. (Sp)

227A-227B. Dynamics of Strong Interactions. (3-3) Formerly numbered 244A-244B. Three hours of lecture and one hour of discussion per week. Prerequisite: course 221A-221B-221C and course 225A-225B or the equivalent. The theory of strong interactions. The quark model of the nucleon. Quantum chromodynamics. 227B will usually emphasize current algebra techniques. (Sp)

228A-228B. Translations and Rotations. (3-3) Three hours of lecture and one hour of discussion per week. Prerequisite: course 228A or the equivalent. 228A: Space translations, rotational symmetry, Lorentz transformations, and the Poincaré group. Local Lorentz invariance, the Dirac equation, and relativistic quantum mechanics. 228B: Wave mechanics in flat space-time and curved space-time. The equivalence principle, the GRW model, and macroscopic quantum phenomena, spinodal demixing and decay. Application to astrophysical and astronomical investigations, high-speed transports and electric discharges. (Sp)

230A-230B. Quantum Theory of Fields and Particles. (3-3) Three hours of lecture and one hour of discussion per week. Prerequisite: course 221A-221B-221C or the equivalent. An introduction to the relativistic quantum mechanics of fields and particles. Symmetry principles, S-matrix theory, Quantum electrodynamics. Phenomenological theories of weak and strong interactions. (Sp)

231A-231B. General Relativity. (3-3) Three hours of lecture and one hour of discussion per week. Prerequisite: course 210A-210B-210C or the equivalent. 231A: Introduction to Einstein's theory of gravitation with applications to astrophysics and cosmology. Tensor analysis, general relativistic models for matter and the electromagnetic field. 231B: Applications to the solar system, dense stars, black hole theory and cosmology. (Sp)

238A-238B. Quantum Theory Of Solids. (3-3) Three hours of lecture and one hour of discussion per week. Prerequisite: course 221A-221B and course 141A-141B or the equivalents, or consent of instructor. Phonon, magnon, plasmon, polaron, and electron fields in solids and their interactions; superconductivity, many-body techniques; Green's functionals; Brillouin zones and symmetry; excitations; impurity states; transport processes; Fermi surfaces; neutron scattering; recoilless emission; theoretical methods of magnetic resonance. (Sp)

240A-240B-240C. Theoretical Plasma Physics. (3-3) Three hours of lecture and one hour of discussion per week. Prerequisite: 210A-210B-210C, 211, 212, 142A-142B, or consent of instructor. Analytical and computational techniques in applications to the solar system, stars, and interstellar interactions with radiation. Rigorous kinetic theory. (Sp)

242A-242B-242C. Theoretical Plasma Physics. (3-3) Three hours of lecture and one hour of discussion per week. Prerequisite: 210A-210B-210C, 211, 212, 142A-142B, or consent of instructor. Analytical and computational techniques in applications to the solar system, stars, and interstellar interactions with radiation. Rigorous kinetic theory. (Sp)

242A-242B-242C. Theoretical Plasma Physics. (3-3) Three hours of lecture and one hour of discussion per week. Prerequisite: 210A-210B-210C, 211, 212, 142A-142B, or consent of instructor. Analytical and computational techniques in applications to the solar system, stars, and interstellar interactions with radiation. Rigorous kinetic theory. (Sp)

250. Special Topics in Physics. (2-4) Prerequisite: consent of instructor, may be repeated for credit. Topics vary from quarter to quarter. See Department of Physics announcements.

251A-251B. Graduate Seminar. (1-2) One hour lecture and one hour of discussion per week. Prerequisite: Graduate standing in Physics, or consent of instructor. Must be taken on a satisfactory/unsatisfactory basis. (Sp)

250. Special Topics in Physics. (2-4) Prerequisite: consent of instructor, may be repeated for credit. Topics vary from quarter to quarter. See Department of Physics announcements.

251A-251B. Graduate Seminar. (1-2) One hour lecture and one hour of discussion per week. Prerequisite: Graduate standing in Physics, or consent of instructor. Must be taken on a satisfactory/unsatisfactory basis. (Sp)

252. Seminar. (1-2) Must be taken on a satisfactory/unsatisfactory basis.

255. Research. (1-8) May be repeated for credit.

259. Individual Study for Graduate Students. (1-8) Prerequisite: graduate standing. This course is arranged to allow qualified graduate students to investigate research fields of current interest through reading or laboratory study under the direction of faculty members who agree to give such supervision. Must be taken on a satisfactory/unsatisfactory basis.

260. Individual Study for Doctoral Students. (1-8) Individual study in consultation with the major field advisor intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used to fulfill residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

256. Special Topics in Physics. (2-4) Prerequisite: consent of instructor. May be repeated for credit. Topics vary from quarter to quarter. See Department of Physics announcements.

See Interdepartmental Studies for complete description of the following courses.

IDS 145. Physiological Problems about the Earth. (4)

IDS 252A. Stellar Structure and Evolution. (3)

IDS 252B. Stellar Structure and Evolution. (3)

IDS 253. Astrophysical Spectroscopy. (3)

IDS 254. High Energy Astrophysics. (4)

IDS 285. Theoretical Astrophysics Seminar. (2)

Medical Physics (See Index)

Physiology-Anatomy

Department Office, 2549 Life Sciences Building

Professors:

John O. Hayden, Ph.D. (Chairman)
Nelo Pace, Ph.D.
Lester Packer, Ph.D.
Lawson L. Rosenberg, Ph.D.
Walter F. Freeman, M.D.
Herbert J. Freeman, Ph.D.
Harden B. Jones, Ph.D.
Robert I. Macey, Ph.D.
Charles S. Nicoll, Ph.D.

Assistant Professors:

Robert S. Zucker, Ph.D.
Terry E. Machen, Ph.D.

Graduate Alumni: Mrs. Diamond, Mr. Nicoll, Mr. Zucker.

Graduate Alumni: Mrs. Forte, Mr. Freeman, Mrs. Timiras (Physiology), Mr. Srinivasan, (Anatomy)

MAJOR IN PHYSIOLOGY

The curriculum outlined below leads to the A.B. degree in physiology. It is intended to provide a broad understanding of the cellular mechanisms underlying the life process, of the functions of the various parts of living organisms, and of the integrated physical response of whole organisms to the environments in which they live, together with the functional changes that occur in living organisms with the passage of time during their life span.

Lower Division. Chemistry 1A-1B (4-4); Chemistry
8A-8B (4.5-5.5); Mathematics 16A-16B (4-4) or 1A-1B-1C (4-4-4); Physics 8A-8B-6C (4-4-4). Biology 1A-1B-1C

Upper Division. Physiology 101 (5); Physiology 102A-102B (5); Physiology 103A-103B (3-3); a course in human anatomy, either Anatomy 105-108L, Anatomy 105 (4.5) or Anatomy 104 (5); a course in biochemistry e.g., Biochemistry 102 (5), 109A-109B (4-4) and four upper division courses in biological sciences, two of which must be in physiology. Recommended: three additional quarters of course work in chemistry (e.g., Chemistry 5 or 109), physics or mathematics.

Honors Program. To be enrolled in the honors program a student must maintain a grade-point average of at least 3.3 overall and 3.3 in the courses required for the undergraduate major in physiology. To receive honors with the bachelor's degree the student must: (1) maintain a grade-point average of at least 3.3 in the major and in the honors in program, (2) complete the undergraduate major in physiology as stipulated above, (3) complete at least 8 units of course work or equivalent, and (4) submit a satisfactory thesis based upon the research work performed.

GRADUATE MAJOR IN PHYSIOLOGY

Students qualified for admission may elect a course of work leading either to the M.A. degree or directly to the Ph.D. degree. The M.A. degree is not prerequisite for the Ph.D. degree. On the other hand, candidates for either degree must have completed the equivalent of the requirements for the undergraduate major shown above, in addition to the minimum requirements for the particular graduate degree, as follows:

1. The M.A. degree in physiology is to be earned according to Plan I of the Graduate Division, which includes the satisfactory completion of 30 units of course work and a thesis. Required: course 151 (4); course 209 (5), courses 203 (4) and 205A-205B (5-5); at least 12 units of course work in chemistry (e.g., Chemistry 5 or 109), physics or mathematics.

2. The Ph.D. degree in anatomy. Required: course 151 (4); courses 209 (5), 203 (4), 205A-205B (5-5); at least 28 units of course work in physiology 101 (5); 102A-B (5-5); 103A-B (3-3); Biochemistry 102 (4). An adequate reading knowledge in two of the languages approved by the Department (e.g., French, German, Russian, or Computer Language) must be demonstrated before proceeding to the oral qualifying examination, which covers the major subdivisions of anatomy and related fields. A dissertation based upon original research work is prepared according to Plan A of the Graduate Division.

For further details concerning the graduate degrees, please consult the graduate advisor in anatomy.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

Physiology

LOWER DIVISION COURSES

1. Introductory Human Physiology. (6) Four hours of lecture, one hour and one three-hour laboratory per week. Prerequisite: one year of college physics or chemistry or biology. Introduction to the mechanisms underlying the life processes in man. Lectures and laboratory experiences will include studies on blood and cardiovascular system, respiration, digestion, nervous system, endocrine and metabolic functions, and their hormones. Mr. Zucker, Mr. Machen, Ms. Russell, Mr. Macey (Sp).

2. The Biology of Man. (4) Three hours of lecture and one hour of demonstration per week. Prerequisite: Introduction to biology in the biological sciences. An introduction to the workings and evolutionary origins of the human body and brain. Emphasis is placed on man's biological mechanisms and behavior in the context of the changed environment he has created. Must be taken on a passed/not passed basis. Dr. Freeman, Mr. Rosenberg (F).

99. Supervised Independent Study and Research. (1-3) Prerequisite: consent of instructor. Limited to freshmen and sophomores. Must be taken on a passed/not passed basis. The Staff (F, W, Sp).

UPPER DIVISION COURSES

101. Introductory Cell Physiology. (6) Three 1 1/2-hour lectures and one hour of discussion per week. Prerequisite: one year of college physics or chemistry or biology; accepted on a space available basis. Recommended: Physics 102 (4). A course in the biological sciences. Functional and original research projects. Some of these may be conducted at the Botoga Marine Laboratory. Mr. Macey (Sp).

102A-102B. Mammalian Physiology. (5-6) Three 1 1/2-hour lectures and one hour of discussion per week. Prerequisite: Biology 1A, 1B and a course in vertebrate anatomy. Recommended: Physics 102 (4). The physiological function among the various animal phyla. The student will include studies on the nervous system, respiratory, cardiovascular, gastrointestinal, reproductive, excretory and endocrine systems. Mr. Nicoll, Ms. Timiras, Mr. Spisak, Mr. Westheimer (Sp).

102A-102B. Mammalian Physiology. (5-6) Three 1 1/2-hour lectures and one hour of discussion per week. Prerequisite: Biology 1A, 1B and a course in vertebrate anatomy. Recommended: Physics 102 (4). The physiological function among the various animal phyla. The student will include studies on the nervous system, respiratory, cardiovascular, gastrointestinal, reproductive, excretory and endocrine systems. Mr. Nicoll, Ms. Timiras, Mr. Spisak, Mr. Westheimer (Sp).

103A-103B. Comparative Physiology. (4) Four and one-half hours of lecture per week. Prerequisite: Biochemistry 102 (4) or consent of instructor. Comparative survey of physiology among the various animal phyla. The student will include studies on the nervous system, respiratory, cardiovascular, gastrointestinal, reproductive, excretory and endocrine systems. Mr. Nicoll, Ms. Timiras, Mr. Spisak, Mr. Westheimer (Sp).

110. Introduction to Neurobiology. (3) Three 1-hour lectures and one hour of discussion per week. Prerequisite: a course in the biological sciences. Functional and original research projects. Some of these may be conducted at the Botoga Marine Laboratory. Mr. Macey (Sp).

121. Comparative Physiology. (4) Four and one-half hours of lecture per week. Prerequisite: an introductory course in the biological sciences; accepted on a space available basis. Mr. Freeman, Mr. Rosenberg (F).

132. Environmental Physiology. (4) Three 1 1/2-hour lectures per week. Prerequisite: an advanced course in the biological sciences. An introduction to the chemical and biotic influences of the environment on man, and the adaptive changes in response to environment. Mr. Rosenzweig (F).

141. Physiology of the Endocrine. (4) Three 1 1/2-hour lectures per week. Prerequisite: an advanced course in the biological sciences. Recommended: Organic Chemistry 130 or equivalent; consent of instructor. Mr. Freeman, Mr. Macey (Sp).

150. Biomembranes. (3) Two 1 1/2-hours of lecture per week. Prerequisite: a course in Cell Physiology (course 101 or equivalent), or graduate standing and/or consent of instructor. Structure and function of membranes. Special emphasis upon molecular organization, membrane bioenergetics and current developments in the field including techniques for the isolation and study of natural and artificially reconstructed membranes, high resolution microscopy and spectroscopy. Mr. Packer, Mr. Mohr (Th).

152. Physiology of Human Development. (4) Three 1 1/2-hour lectures per week. Prerequisite: an introduction to the biological sciences. Functional changes in man from prenatal life to maturity. Mrs. Timiras (W).

153. Physiology of the Aging Process. (4) Three 1 1/2-hour lectures per week. Prerequisite: an advanced course in the biological sciences. Functional changes in man from maturity to old age. Mr. Freeman, Mr. Macey, Mr. Spisak, Mr. Westheimer (Sp).

160. Biology of Human Reproduction. (8) Four and one-half hours of lecture per week. Prerequisite: Biology 1A-1B or equivalent. Anatomy and physiology of reproductive organs, puberty, endocrinology of the menstrual cycle; psychophysiology of copulation and orgasm; infertility and sexual dysfunction; conception and control of pregnancy; menstrual cycle; fertility and contraception; sexual differentiation of brain and reproductive organs; homosexuality. Mr. Nicoll (F).

161A. Human Anatomy. (9) Three 1-hour lectures and one 1-hour laboratory per week. Prerequisite: Biology 1A-1B or consent of instructor. Special laboratory projects in human anatomy and physiology. Topics will be individually selected and pursued to an experimental conclusion. The Staff (Th).

169. Field Study in Physiology. (1-5) Prerequisite: Students must declare an undergraduate major. Supervised experience relevant to specific aspects of physiology and anatomy in off-campus organizations. Regular individual meetings with faculty sponsor and written reports required. Must be taken on a passed/not passed basis. The Staff (W, Sp).


NOTE: For key to symbols, see page 34.
GRADUATE COURSES

231. Seminar in Cell Physiology. (1) One 1-hour lecture per week. Current research on cellular organization and function. Mr. Packer, Mr. Macey, Mr. Forte (F, W, Sp)

215. Neuroendocrinology. (4) Four and one-half hours of lecture per week. Prerequisite: consent of instructor. Neurosecretory phenomena, control of endocrine glands and effects of hormones on behavior. Mr. Nicoll, Mrs. Timiras (F, W, Sp)

216. Seminar in Neuroendocrinology. (2) One and a half hours of lecture per week. Prerequisite: course 101 to 103, course 215 or consent of instructor. Current research in the field will be considered. Mr. Nicoll (Sp)

231. Seminar in Environmental Physiology. (2) One 1 1/2-hour lecture per week. Prerequisite: courses 102, 123, and 231. Physiological effects experienced by man and other mammals during extraterrestrial flight. Mr. Pace (F)

233. Space Physiology. (2) Two 1-hour lectures per week. Prerequisite: consent of instructor. Concepts of human physiology. The endocrine glands of mammals and the metabolic reactions mediated by their hormones. Mr. Rosenberg (W)

242. Seminar in Endocrine Physiology. (3) Three hours of class per week. Prerequisite: consent of instructor. Selected topics on current research in endocrine physiology. Mr. Rosenberg (W)

281. Seminar in History of Neurophysiology. (2) Two hours of class per week. Prerequisite: consent of instructor. Selected readings in classical texts of physiological history with emphasis on the historical development of ideas about the nervous system. Mr. Freeman (F)

272. Physiological Transport Processes. (3) Two hours of lecture and two hours of laboratory per week. Prerequisite: Differential and integral calculus, elementary physiology. Recommended: Physical Chemistry 1A or equivalent. The transport processes in mammalian systems with special applications to passive and excitable membranes, cellular, cardiovascular, renal, and respiratory systems. Mr. Macey (W, Sp)

281. Seminar in Physiological Action of Drugs. (2) One and one-half hours of lecture per week. Prerequisite: courses 101, 102, 102A. A course in organic chemistry and in biochemistry. The endocrine glands of mammals and the metabolic reactions mediated by their hormones. Mr. Rosenberg (Sp)

231. Seminar in Neurology. (2) Three hours of class per week. Prerequisite: consent of instructor. Selected topics on current research in neuroendocrinology. Mr. Freeman (W, Sp)

215. Seminar in Advanced Neuroanatomy Topics. (2) One 1 1/2-hour lecture per week. Prerequisite: consent of instructor. Topics to be varied each quarter. May be taken more than once for credit. Mr. Freeman, Mr. Westheimer, Mr. Zuckerk (F, W, Sp)

291A. Seminar in Neurochemistry. (3) Two 1 1/2-hour lecture-discussion classes per week. Prerequisite: courses 101, 120, and 231. Physiology and Chemistry 121. The chemistry and molecular biology of nervous systems will be discussed in this course. Cellular (synaptic and axonal) and integrative neurochemistry in vertebrate nervous systems will be emphasized. Topics to be covered include neurotransmitter synthesis and regulation, drug receptors, transport processes, neurotoxins, ion channels, neurochemistry of learning and psychiatric disorders, and neurotoxicology. The course will be offered 1976-77 only. Mr. Zuckerk (F)

292. Seminar. (1) One hour of lecture per week. Departmental seminar dealing with various topics in functional neuroanatomy. Mr. Macey (W, Sp)

298. Special Study in Physiology. (1-12) Prerequisite: consent of instructor. Individual arrange-ments to be made. The Staff (Mr. Forte in charge) (F, W, Sp)

108L. General Human Anatomy Laboratory. (3) One 1 1/2-hour lecture per week. Prerequisite: a college course in Biology or Chemistry. The functional anatomy of the human body as revealed by gross and microscopic examination. Mrs. Diamond (F)

109L. General Human Anatomy Laboratory. (3) One 1 1/2-hour lecture per week. Prerequisite: course 108 or equivalent. Prepared human dissections, models, and microscopic slides. Mrs. Diamond (F)

151. Developmental Anatomy. (4) Three 1-hour lectures and one 3-hour laboratory per week. Prerequisite: Biology 1A-1B; or 11A-11B. Recommended: an introductory course in human anatomy or concurrent enrollment in course 108-108L. Conception, fertilization, and development of the human embryo and fetus. Determinants of abnormal development and introduction to experimental embryology. Enrollment limited to 100 students. Mr. Srebnik (F, W, Sp)

201. Directed Group Study. (2-3) Mr. Srebnik (F, W, Sp)

209. Supervised Independent Study and Research. (1-5) Enrollment is restricted by regulations listed on page 34. Individual conferences to be arranged. Prerequisite: course 104. Special library and laboratory projects may be assigned. Must be taken on a satis-
factory/unsatisfactory basis. Mr. Srebnik (Sp)

GRADUATE COURSES

203. Functional Neuroanatomy. (4) Two 1-hour lectures and two 3-hour laboratories per week. Prerequisite: consent of instructor. Development, structure (gross and microscopic) and functional relationships of the human nervous system. Mr. Salit (Sp)

204. Cellular and Sub-cellular Design Principles. (3) Two 1 1/2-hour lectures per week. Prerequisite: consent of instructor. Molecular, physiological and evolutionary determinants of cell and tissue structure. Mr. Salit (Sp)

205A-205B. Systematic and Regional Human Anatomy. (5-5) Two 1-hour lectures and two 4 1/2-hour laboratories per week. Prerequisite: either course 151 or Zoology 105 or other advanced work in mammalian biology. Consent of instructor. Dissection, x-ray, and surface anatomy of the body. The special reference to the functional capacities of the structures examined. Mr. Srebnik (W, Sp)

206. Seminar in Advanced Neuroanatomy Topics. (2) Two hours of lecture per week. Prerequisite: course 203 or equivalent consent of instructor. Current research topics in functional neuroanatomy. Mr. Diamond (Sp)

209. Advanced Topics in Histology. (3) Three one-half hour lectures and two one-hour discussions per week. Prerequisite: Physiology 105 or equivalent. Histology from the viewpoint of cellular specialization: a consideration of specific cellular bases for general understanding. May be taken for a survey of current research and clinical problems. Mrs. Burnsie (S)

210. Physiological Anatomy of Reproduction. (2) One 1 1/2-hour meeting per week. Prerequisite: graduate standing in a biological science. Informal conferences and demonstrations. Oral report required. Mr. Srebnik (Sp)

209. Special Study in Anatomy. (1-12) Individual arrangement to be made. Prerequisite: consent of instructor. The Staff (Mr. Srebnik in charge) (F, W, Sp)

209. Individual Research in Anatomy. (1-12) Individual arrangement to be made. Prerequisite: consent of instructor. Original research in anatomy. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

295. Freeze-Etch Electron Microscopy. (2) One 1-hour lecture per week and one 3-hour laboratory. Prerequisite: graduate standing in a biological science. Preparation, equipment, and operation of Freeze-etch specimen preparation, electron micrograph analysis, and biological interpretation of Freeze-etch replicas. To be taken on a pass/prompt, pass/fail basis. Mr. Srebnik (Sp)

602. Individual Study for Doctoral Students. (1-8) Independent study in consultation with the major professor, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of the candidate for the Ph.D. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)
Political Economy of Industrial Societies

A group major in the political economy of industrial societies has received approval by the College for offering in 1976-77. However, the California Post-Secondary Education Commission reviews all new major programs, and their final determination regarding the group major in the political economy of industrial societies was not available at press time for the General Catalog. Students interested in the major are referred to the Division of Interdisciplinary and General Studies, 301 Campbell Hall, for a description of the program and the status of the approval process.

Political Science

Department Office, 210 Barrows Hall

Professors:
Reinhard Bendix, Ph.D.
A. James Reichmuth, Ph.D.
Ernst B. Hass, Ph.D. (Robson Professor)
Norman Jacobson, Ph.D.
Chalmers A. Johnson, Ph.D.
Martin Lenski, Ph.D.
B. C. Tilly, Ph.D.
George Lenczowski, LL.M. (Emeritus)
James W. Bebout, Ph.D.
Leslie Lipson, Ph.D.
Herbert McClosky, Ph.D.
William M. Mur, J.D., Ph.D.
John A. Perkins, Ph.D.
Hans Pitz, Ph.D.
Nelson W. Polacy, Ph.D.
Michael P. Rogin, Ph.D.

Associate Professors:
Jacobo Chinos, Ph.D.
Jordiñana Das Gupta, Ph.D.
Gustavo Gutierrez Lacy, J.D.
Andrew C. Johns, Ph.D.
Kenneth T. Jottl, Ph.D.

Assistant Professors:
Christopher H. Achen, Ph.D.
Robert L. Arves, Ph.D.
George W. Breslaur, Ph.D.
Karl D. Jackson, Ph.D.
Robert A. Kagan, J.P.D.
Galil W. Lapidus, Ph.D.

Assistant Professor:
Bill L. Cavala, M.A. (Acting)

Visiting Professor:
Giorio Friedi, Ph.D.

Lecturers:
M. A. S. Bechtel
Martin Sanchez-Jankowski, M.A.

The Major

The major in political science at Berkeley consists of twelve courses. The required lower division courses are two quarters of Political Science 1 and one quarter of Political Science 2. The required upper division courses are Political Science 101A–101B, 102A, 112A–112B, 113A–113B, 114A–114B, 116A, 117A–117B, 118A–118B. These courses are available on a pass/fail basis.

Policy Theory

106. The Politician. (5) Three hours of lecture and one hour of discussion per week. Analysis of the role of the executive in government. (W)

107. The American Executive. (5) Two 1 1/2-hour lectures and one 1-hour conference per week. Analysis of the role of the executive in government. (W)

Further Information

For information on the major, honors program offerings, undergraduate courses, and faculty scheduling, contact the Undergraduate Office, 210A Barrows Hall. Booklets describing the undergraduate program for the year 1976-77 are available.

The American Institutions Requirement

This requirement may be satisfied by completing an approved course, or by passing an examination.

Higher Degrees

Inquiries should be addressed to the departmental Graduate Office, 210 B Barrows Hall.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

Lower Division Courses

1. Introduction to Politics. (5) Two hours of lecture and one hour of discussion per week. Introduction to the study of politics and to political science. 1A. American Government. 1B. Comparative Analysis. 1C. International Relations. 1D. Political Theory. Enrollment limited to 40 students per class; number of classes per section will vary. Detailed descriptions available in Undergraduate Office. No more than two sections may be taken for credit and no section may be repeated.

The Staff (F, W, Sp)

4. Tutorial in Political Science. (5) Two 2-hour seminars among 1 1/2 hour tutorial per week. Prerequisite: two courses in lower division political science, or consent of instructor. Major themes in the study of politics.

The Staff (W, Sp)

393A–393B–393C. American Studies. (6–6–6) One 1-hour lecture and one 2-hour seminar per week. Prerequisite: open to sophomores: limited to fifteen students. Admission by interview with the three instructors during the winter quarter 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 of the two equivalent courses (English 33A–33B–33C and History 33A–33B–33C).

14-1. Experimental Courses. (1–5) Prerequisite: consent of instructor. The staff and students of the two equal courses will vary. Detailed descriptions available in Undergraduate Office.

52. National Security Policy. (3) Two hours of lecture per week. Analysis of the evolution, development and formulation, and execution of current U.S. National Security Policy. Will include consideration of the fundamental concepts of national interest; the translation of these concepts into specific policy objectives and supporting programs; the relationship to foreign policy; and current national security policy problems.

Mr. Boyd (Sp)

Upper Division Courses

100. American Institutions. (5) Formerly 5. Three hours of lecture and one hour of discussion per week. Prerequisite: not open to students who have received credit for 1A. A survey of the powers, structure, and operations of government, primarily at the national level.

The Staff (W, Sp)

Core Course

101A–101B–101C. Political Inquiry. (5–5–5) Three hours of lecture and one hour of discussion per week. Prerequisite: 101A is prerequisite to 101B. 101A and 101B are prerequisite to 101C. 101A–101B: Introduction to the major analytical and methodological problems of political inquiry. Themes include epistemology, methodology, research design, data analysis, ethical issues in social research and the social implications of social science research. 101C: Opportunity for students to undertake a major research project using methods and techniques studied in 101A and 101B. Multiple sections offered quarterly. Detailed information available in Undergraduate Office.

The Staff (W, Sp)

American Government and Politics

105. The Politician. (5) Three hours of lecture and one hour of discussion per week. The nature of politics, the education of politicians, the structure of ambition, and the ethics of the political world. Sessions with elected officials and party workers on their vocation. Directed field research.

107. The American Executive. (5) Two 1 1/2-hour lectures and one 1-hour conference per week. Analysis of principal institutions, functions and problems of the Presidency and the federal executive branch. Special attention will be given to topics of presidential leadership, staffing, executive legislative relations, and policy formation. Comparative reference to executive processes in other political systems. Mr. Politsky (F)

108. Congress. (5) Three hours of lecture and one hour of discussion per week or another course in American politics. Nomination and election; constituent relations, the formal and informal structures of both houses, rivalries in the executive branch, policy formation, and lobbying.

Mr. Wollinger (F)

109. The American Legal System. (5) Three hours of lecture and one hour of conference per week. The nature of the American legal system; the interrelationships of judges, lawyers, police, political officials, bureaucrats on the one hand, and political and social aspects of the legal process.

110. State Governments. (5) Two 1 1/2-hour lectures and one 1-hour conference per week. Comparative study of political systems, federal-state relations, elections; policies; administrative problems.

111A–111B. Urban Government and Politics. (5–5) Three hours of lecture and one hour of discussion per week. Urbanization and the growth of cities; the metropolitan community; historical development of local government; general policies, central-local relations, local politics and decision-making; administrative organization and process. 111A: A comparative study with emphasis on local government outside the United States. Mr. Phillips (W, Sp)

1112. Basic Problems in American Government. (5) Two 1 1/2-hour lectures and one 1-hour conference per week. Detailed examination, with emphasis on causes and consequences, of the most important problems of American political life in contemporary America. The subject matter of the course will vary depending upon the instructors. Course may be repeated once subject to approval by the department.

160. Social Groups and Political Power. (5) Three hours of lecture and one hour of conference per week. Private power and public policy: courses, strategy, and tactics of group power within the context of the American institutional setting. Business, agriculture, labor, the military, black protest, and other significant loci of power. Ramifications for a democratic society.

163A–163B–163C. Political Parties. (5–5–5) Three hours of lecture and one hour of discussion per week. Prerequisite: Students who have received credit for former course 163 may enroll for a maximum of 10 units in this series. 163A: Political parties considered in theory and practice as agencies of Western democratic governments. 163B: Structure, activities, and roles of the national government of the United States. 163C: Comparative study of the party systems in the states of the United States. Mr. Cavala (F)

Political Theory

112A–112B–112C. American Political Theory. (5–5–5) Two 1 1/2-hour lectures and one 1-hour conference per week. Prerequisite: 112A: consent of instructor. 112B: consent of instructor. Basic concepts and political theory as viewed within the context of American history and institutions.

Mr. Rogin (W, Sp)

14. The Theorist and His Theory. (5) Three hours of lecture and one hour of discussion per week. Prerequisite: one quarter of 113 or 118, or consent of instructor. Intensive study of one great political theorist. Will be covered by Mr. Pitkin (Sp)

118A–118B–118C–118D. History of Political Theory. (5–5–5–5) Three hours of lecture, one hour of conference and one hour of section per week. Separate section meetings will be scheduled for undergraduate and graduate students. Major political theories from the Greeks to modern period.

118A. Classical political theories and the political ideas of ancient Judaism, early Christianity, up to and including St. Augustine.

Mr. Thomas (F)

118B. Early modern theories up to the French Revolution, including Machiaveli, Hobbes, Locke, Rousseau.

Mr. Lipson (W)

118C. Modern theories of the nineteenth century including Hegel, Burke, the Utilitarians, and Marx.

Mr. Wolfinger (W, Sp)

118D. Recent and contemporary political theories.

Mr. Bendix (W)

119. Community and Intellectual Life. (5) Three hours of lecture and one hour of discussion per week. Intellectuals as a social group in the process of "mod
enization." Definitions of "the intellectual," Re- naissance and antecedents, men of letters in the eighteenth century, the Romantic reaction. Intellectuals in the theories of Marx and his followers are the main themes. Mr. Bendix (Sp)

INTERNATIONAL RELATIONS

120A—120B. International Relations. (5—5) Three hours of lecture and one hour of discussion per week. Prerequisite: none for 120A; 120A will be required for 120B.

120A. The nature of the international state system, analysis of political, military, cultural, economic and ideological factors affecting the behavior of states and international organizations in world politics.

Mr. Seabury (F); (Sp) (W)

120B. Detailed examination of a few of the central concepts of international relations, such as dependence, cooperation, competition, imperialism, nationalism, and strategic bargaining. Topics may vary from year to year.

121. International Organization. (5) Two 1 1/2 hours of lecture and one hour of discussion per week. Prerequisite: course 120A. An examination of the impact of the activities of international organizations (regional and global) upon the structure of the international political order.

(2p)

122A—122B. International Law. (6—5) Two 1 1/2-hour lectures and one 1-hour conference per week. Nature, sources, function and evolution of international law; principal law-making and adjudicatory agencies; international legal personality; treaties and executive agreements; jurisdiction over places and persons; diplomatic and consular intercourse; treaties and executive agreements; pacification; war and neutrality.

123. Regional Communities. (6) Two 1 1/2-hour lectures and one 1-hour conference per week. Examination of supranational regional communities: the processes of political integration and economic cooperation and the integration occurring within them. Mr. Haas (Sp)

124. Politics and Military Strategy. (6) Two 1 1/2-hour lectures and one 1-hour conference per week. The interrelationships among military strategy, technology, economics, ecology, etc. upon the nature and character of modern warfare and the political order. Mr. Ayres (F, W)

125. Soviet Foreign Policy. (5) Two 1 1/2-hour lectures and one 1-hour conference per week. A study of Soviet foreign policy and the impact on the activities of superpower policies on the world political scene. Mr. Price (Sp)

126. Soviet Underdevelopment and Change. (5) Two 1 1/2-hour lectures and one 1-hour conference per week. An analysis of the Soviet economy, the growth and change in Soviet policy, Soviet theories of world politics and the sources of external behavior. Areas and fields of activity: foreign policy and international and domestic politics.

Ms. Lepidus (F)

127. Totalitarianism and Dictatorship. (5) Two 1 1/2-hour lectures and one 1-hour conference per week. Comparative analysis of modern totalitarian political systems in developed and modernizing societies: characteristics of social control, ideology and the nature of coercion in such systems. Mr. Gregor (F); Mr. Janos (Sp)

COMPARATIVE POLITICS

140A—140B. Comparative Analysis of Political Systems. (5—6) Two 1 1/2-hour lectures and one 1-hour conference per week. Survey of social and political theories; methods of analyzing political systems; comparative analysis of political systems; the nature of comparative method. Mr. Ayres (F, W)

140C. Comparative Communism. (3) Three hours of lecture and one hour of discussion per week. The formation and evolution of communist elites; organization and political processes; theories of modernization; education and socialization; education and principles and practices; role of socioeconomic groups in communist society; revolutionary tactics and policies of the various communist states. Samples drawn from Asia, East Africa, Latin America.

Mr. Scapalino (Sp)

140D. Introduction to Theory and Practice of De- development Politics. (5) Two 1 1/2-hour lectures and one hour of discussion per week. An introduction to the major theories of development offered in growth economics, social change theory, and comparative politics. Evaluation of the impact of such theories on developing countries pursuing different goals and processes of development. Particular attention given to political strategies of agrarian reform, industrialization, and regional development and the distributive outcomes associated with general results of development. Mr. Das Gupta (W)

AREA STUDIES

141A—141B. Government and Politics in the Soviet Union. (5—5) Two 1 1/2-hour lectures and one 1-hour conference per week. An introduction to Soviet government and politics. Bases of Soviet political system. Political history of the USSR. The Communist Party: structure, organization, and contemporary dynamics. Formal institutions of government: federalism, the Soviets, the administrative system. Law, economics, and society as related to government and politics. 141B. Prerequisite: 141A or permission of instructor. A more advanced course based on 141A. Selected themes in Soviet internal politics and functional groups; political leadership, factionalism and succession crises. Mr. Breslaur (F, W)

141C. The study of the political process in relation to social structure and national diversity. A comparison of Communist political systems and an analysis of contemporary political developments. Mr. Janos (F)

141D. The rise of the nation state and the persistence of nationalist aspirations. Relations with the West and the Soviet Union with a particular reference to national communism and "demosfermism." Mr. Gregor (W)

141E—141F. Political Theory in Communist Societies. (5—5) Two 1 1/2-hour lectures and one 1-hour conference per week. An examination of Marxist-Leninist theories of society, the state, and international politics in recent years. The nature and characteristics of the Russian and other non-Russian adolescents of the world. Mr. Lenzowski (F, W)

142A—142B—142C. Government and Politics in the Middle East. (5—5—5) Two 1 1/2-hour lectures and one 1-hour conference per week. Mr. Ayres (F, W)

142C. Evolution and Revolution in the Middle East. Foundations of Islamic society and its political institutions; comparative analysis of the Islamic and Western patterns of political behavior; traditional, constitutional and revolutionary states; parties, mass organizations, ideologies, and development policies.

Mr. Gregor (W)

143A—143B—143C. Government and Politics in Northeast Asia. (5—5—5) Two 1 1/2-hour lectures and one 1-hour conference per week. The structure and evolution of political institutions in China, Japan, Korea. Emphasis upon such topics as nationalism, political modernization, and ideology. Mr. Ayres (F, W)

143D. Political Cultures of Southeast Asia. (5) For- merly 1410—1420. Two 1 1/2-hour lectures and one hour of discussion per week. The impact of cultural variables on political behavior. The effect on Southeast Asian political processes of political values, economic change, patron-client relations, and the psychological roots of colonialism. Mr. Jackson (W)

143E. Policy Problems of Southeast Asia. (5) Formerly 1410—1420. Two 1 1/2-hour lectures and one hour of discussion per week. Problem-oriented approach to the future of Southeast Asia. Effect on Southeast Asian political processes of population growth, migration to the cities, the impact of new food technologies, military strategy, and regional cooperation.

144. Government and Politics in Great Britain. (5) Two 1 1/2-hour lectures and one 1-hour conference per week. The British political tradition; evolution of political institutions and parties; the constitutional system; parliament, cabinet, and administration; functions of the welfare state.

145A—145B. Government and Politics in South Asia. (5—5) Three hours of lecture and one hour of discussion per week. A comparative analysis of development and change in the political systems of contemporary South Asia.

145C. The role which the United States has played in the Far East, examining such topics as America's role in Pacific Westernization, United States-Far Eastern foreign policy, Oriental attitudes towards America. Evaluation of present-day problems. Mr. Scalapino (W, Sp)

145D. Analysis of the origins and characteristics of American interests and involvements in South and Southeast Asia, especially in the Indian subcontinent, Indochina and Indonesia.

145E. Political Theory in Non-Western Societies. (5) Two 1 1/2-hour lectures and one 1-hour conference per week. Analysis of political thought in Far Eastern, South Asian and African societies. The impact of modern Western thought on traditional political theories and values. Emphasis on current ideological trends, nationalist movements, and the impact of modern Western and neo-Marxist thought.

Mr. Das Gupta (Sp)

146A—146B. Government and Politics in Africa. (5—5) Two 1 1/2-hour lectures and one 1-hour conference per week. A comparative analysis of African political systems, social, economic, and political change in pre-independence Africa. Focus on aspects of the pre-independence period which influence contemporary political events. Traditional African social and political systems; colonialism and independence; impact of African independence movements and political parties.

146B. The Politics of Independent Africa. Analytic discussion of the factors shaping modern political systems. Attention focused on problems of nation-building, integration of society and policy, and economic development. Specific topics include the single-party state phenomenon, the military in politics, and "neocolonialism." Comparative studies of individual African states will be introduced. Mr. Price (W)

146C. Selected Topics in African Politics. (5) Two 1 1/2-hour lectures and one 1-hour discussion per week. An in-depth analysis of a problem area, which will vary depending upon the interest of the instructor. Course may be repeated once subject to approval by the department.

Mr. Price (Sp)

147A—147B. Government and Politics in Western Europe. (5—5) Two 1 1/2-hour lectures and one 1-hour discussion per week. An analysis of political behavior and institutions in continental western Europe. Comparative study of the political behavior and political institutions of selected countries. Mr. Preidl (F, W)

148A—148B. Government and Politics in Latin America. (5—5) Two 1 1/2-hour lectures and one 1-hour conference per week. Political institutions, groups and parties in Latin American countries. Basic characteristics of political processes in Latin America and problems of political development and modernization and political change. Comparative study of political systems, institutions, groups and political parties.

Mr. Ayres (F, W)

PUBLIC LAW AND JURISPRUDENCE

151. Legal Theory. (5) Three hours of lecture and one 1-hour conference per week. An analysis of 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.

152. Legal Institutions. (5) Three hours of lecture and one 1-hour conference per week. The development of legal institutions and the development of legal concepts and the interrelations between law and government. The early legal institutions of Europe and their influence on the modern political and institutional systems of the modern world.


POLITICAL BEHAVIOR

161. Public Opinion and Voting Behavior. (5) Three hours of lecture and one hour of discussion per week. A comparative analysis of development and change in the political systems of contemporary South Asia.
SPECIAL STUDIES

H190A--H190B--H190C. Senior Honors Seminars. (6-8) Four hours of seminars per week. Prerequisite: senior honors candidates, consent of instructor. Offerings vary from year to year. May be 2 or 3 quarters. Credit and grade awarded upon completion of sequence. Application and details through the Undergraduate Office. Mr. Jackson (Sp)

191. Experimental Course. (1--5) Prerequisite: consent of instructor. Topics, experimental in nature, will vary from year to year. Mr. Jowitt (W)

PUBLIC ADMINISTRATION AND PUBLIC POLICY

181. Public Administration. (5) Two 1 1/2-hour lectures and one 1-hour conference per week. The function of administrative institutions in society; the growth of administration and its relationship to contemporary and comparative forms and theories of organization and bureaucracy; the responsibilities of public servants; the political power of bureaucrats in various regimes. Mr. Leonard (F, Sp)

182. Public Policy and the Planning Process. (5) Two 1 1/2-hour lectures and one 1-hour conference per week. The substantive policies of government in relation to public administration; and political programs in the process of policy formulation; governmental planning; administrative programming in the execution of governmental policies and public projects. Mr. Jackson (W)

183. The Public Service in the Modern State. (5) Two 1 1/2-hour lectures and one 1-hour conference per week. The role of civil servants in society; special attention is given to public administration as an art and as an academic discipline; contemporary and comparative forms and theories of organization and bureaucracy; the responsibilities of public servants; the political power of bureaucrats in various regimes. Mr. Leonard (F, Sp)

184. Policy and Administration of Public Finances. (6) Three hours of lecture and one 1-hour conference per week. Financial administration in the modern state; including economic, historical, and fiscal implications of governmental activity; the budget process in public administration; management devices to ensure administrative accountability and political responsibility. Mr. Leader (Sp)

185. Public Policy and Decision Theory. (6) Three hours of lecture and one hour of discussion per week. An inquiry into normative and decision-making, the concept of rationality—substantive and procedural, and their relationship to democracy, pluralism, elitism and mass politics. The differentiation between bureaucratic and collegial decision-making will also be explored. Mr. Fredri (W)

188. Administrative Behavior. (5) Two 1 1/2-hour lectures and one 1-hour conference per week. The analysis of administrative behavior with particular reference to public organization, including decision-making, leadership, small group behavior, and public organization as a social system related to modern technological culture. Mr. Fredri (F); Mr. Leonard (W)

197A--197B. Public Policy and Political Futures. (6--8) Three hours of lecture and one hour of discussion per week. Concepts and methods of political futures studies; analysis of public policy making processes; concepts of policy, and design of public policy in fields related to rapid technological innovations, particularly their international aspects. Mr. LaPorte (W)

198. Science, Technology, and Politics. (6) Two 1 1/2-hour lectures and one 1-hour conference per week. History of science and government in the United States; contemporary structure of science advisory and implementing systems; and perspectives in the uses of science for public objectives. Mr. LaPorte (W)

203A--203B. Comparative Analysis of Communist Political Systems. (4--4) One 2-hour session and one 1-hour conference per week. An analysis of the inner workings of the Communist systems with particular reference to institutional and ideological differences, presented at an advanced level for graduate students. Discussion and papers required. Mr. Jowitt (Sp)

204. Theories for Comparative Analysis. (4) Formerly 202. Two hours of lecture per week. Mr. Bendix (F)

206. The Nation-Building Process. (4) Three hours of lecture and one hour of discussion per week. This course focuses on the interplay of national and international forces in the development of the modern nation-state in the contemporary world. Mr. Janos (W)

207A--207B. Revolutionary Change. (4--4) One 2-hour session and one 1-hour conference per week. An exploration and comparative analysis of various forms of revolution in society. Materials are drawn from political philosophy, systems theory, and empirical research. Mr. Jackson (W)

208A--208B. Theory and Practice of Development Politics. (4) Two hours of lecture and one hour of discussion per week. Prerequisite: students from other disciplines are welcome. Major theories of development in growth economics, social change, and comparative politics. Political strategies of agrarian, industrial, and regional development and the distributive outcomes associated with general results of development. Credit and grade to be awarded upon completion of the sequence. Mr. Pajk (Sp)

209A--209B. Comparative Analysis of Western Political Systems. (4--4) Two hours of lecture and one hour of discussion per week. Social, economic, political and intellectual background of developments in Western political systems; the nature and aims of various forms of political theory. Mr. Jackson (W)

210A--210B. Comparative Analysis of Western Political Systems. (4--4) Two hours of lecture and one hour of discussion per week. The comparative analysis of political parties and political systems in the democratic societies of Western Europe and the United States; the comparative study of institutions, parties, and political behavior in developed and developing nations. Mr. Jowit (F)

211A--211B. Comparative Analysis of Western Political Systems. (4--4) Two hours of lecture and one hour of discussion per week. The comparative analysis of political parties and political systems in the democratic societies of Western Europe and the United States; the comparative study of institutions, parties, and political behavior in developed and developing nations. Mr. Jowit (F)

212A--212B. Comparative Analysis of Communist Political Systems. (4--4) One 2-hour session and one 1-hour conference per week. An analysis of the inner workings of the Communist systems with particular reference to institutional and ideological differences, presented at an advanced level for graduate students. Discussion and papers required. Mr. Jowit (Sp)

216. Communication and Political Behavior in Peasant Societies. (4) Formerly 254. Two hours of lecture and one hour of discussion per week. The role of mass and other media in the development of public opinion and participatory citizenship. The role of interpersonal communication in the diffusion of critical economic and political innovations to the village level. Mr. Jowit (W)

Seminars

207A--207B. Revolutionary Change. (4--4) One 2-hour session and one 1-hour conference per week. Analysis and comparative analysis of various forms of revolution in society. Materials are drawn from political philosophy, systems theory, and empirical research. Mr. Jackson (W)

208A--208B. Theory and Practice of Development Politics. (4) Two hours of lecture and one hour of discussion per week. Prerequisite: students from other disciplines are welcome. Major theories of development in growth economics, social change, and comparative politics. Political strategies of agrarian, industrial, and regional development and the distributive outcomes associated with general results of development. Credit and grade to be awarded upon completion of the sequence. Mr. Pajk (Sp)

POLITICAL THEORY

Courses

213A--213B. American Political Theory. (4--4) Two hours of lecture and one hour of discussion per week. Prerequisite: consent of instructor. This course attempts to provide a broad overview of American political thought. The instructor's approach is to be announced each year. Mr. Jowit (W)

214A--214B. Thomas in Western Political Theory. (4--4) Two hours of lecture and one hour of discussion per week. Prerequisite: consent of instructor. This course covers the political thought of Thomas Aquinas and will be given each year. Mr. Jowit (Sp)

215. Marxist Theory. (4) One 2-hour session and one 1-hour conference per week. Mr. Thomas (W)

216A--216B. Contemporary Theory and Political Science. (4--4) Two hours of lecture and one hour of discussion per week. The course will cover both classical and contemporary political theory—the former in depth and the latter more superficially. Mr. Jowit (F)

218A--218B. Colloquia in Political Theory. (4--4) Two hours of lecture and one hour of discussion per week. An advanced course in the study of political theory that is open to students taking the course for graduate credit. The course is open to graduate students and is open to juniors and seniors. Credit and grade to be awarded upon completion of the sequence. Mr. Jowit (W)

Seminars

216A. Theoretical Foundations of the Field. Mr. Jowit (W)

216B. Continuities in Theoretical Research. Mr. Jowit (W)

218A--218B. Colloquia in Political Theory. (4--4) Two hours of lecture and one hour of discussion per week. An advanced course in the study of political theory that is open to students taking the course for graduate credit. The course is open to graduate students and is open to juniors and seniors. Credit and grade to be awarded upon completion of the sequence. Mr. Jowit (W)

219A--219B. Perspectives in Political Theory. (4--4) One 2-hour session and one 1-hour conference per week. Mr. Jowit (W)

NOTE: For key to symbols, see page 34.
politics, with applications to political thinking, learning, and decision making. The course covers bargaining, electoral competition, and democratic theory.

**AREA STUDIES**

Seminars

240A—240B—240C. Western and Northern European Government and Politics. (4-4-4) Two hour session and one 1-hour conference per week.

241A—241B. Soviet Government and Politics. (4-4) Two hour per week. A historical overview of the Soviet Union and the Soviet Union's role in the world. Focus on the political, economic, and social aspects of Soviet society.

241A—241B. Soviet Government and Politics. (4-4) Two hour per week. Prerequisite: Introductory course in Soviet history. Focus on the political, economic, and social aspects of Soviet society.

242A—242B. Voting Behavior and Public Opinion. (4-4-4) Two hour lecture per week. Credit and grade will be awarded upon completion of the full sequence.

242A—242B. Voting Behavior and Public Opinion. (4-4-4) Two hour lecture per week. Credit and grade will be awarded upon completion of the full sequence.

242A—242B. Voting Behavior and Public Opinion. (4-4-4) Two hour lecture per week. Credit and grade will be awarded upon completion of the full sequence.

**POLITICAL BEHAVIOR (AMERICAN AND COMPARATIVE)**

Courses

251A—251B. Political Recruitment and Campaigns. (4-4) Two hour per week. Topics in political behavior in the American political system.

251A—251B. Political Recruitment and Campaigns. (4-4) Two hour per week. Topics in political behavior in the American political system.

251A—251B. Political Recruitment and Campaigns. (4-4) Two hour per week. Topics in political behavior in the American political system.

251A—251B. Political Recruitment and Campaigns. (4-4) Two hour per week. Topics in political behavior in the American political system.

251A—251B. Political Recruitment and Campaigns. (4-4) Two hour per week. Topics in political behavior in the American political system.
didate Selection. (4-4) Two hours of lecture and one hour of discussion per week. An examination of the elites and mass politics of political recruitment and candidate selection, with special attention to participation, organization, representation, and responsibility. Credit and grade to be awarded upon completion of the sequence.

PUBLIC ADMINISTRATION AND PUBLIC POLICY (AMERICAN AND COMPARATIVE)

Courses

280A. Public Organization Theory. (4) One 2-hour session per week. A survey of the literature of organization and management theory, emphasizing the major writers and distinctive contributions of various disciplines. The Staff (F, Sp)

280B. Comparative Administration. (4) A comparative analysis of the structures and processes which are used to control bureaucratic systems in selected political systems and the effect of these controls on the character of administrative performance. A final exam will be given. Mr. Leonard (W)

280C. Public Policy and Decision Theory. (4) One 2-hour session and one 1-hour conference per week. The process of public policy formulation, governmental planning and programming, and administrative decision-making. Mr. Fredrick (Sp)

Seminars

928. American and Comparative Interrelations. (4) One 2-hour session and one 1-hour conference per week. The relationship of the governmental, economic, social, and physical background in which metropolitan governments. Core readings and research paper emphasis on theoretical points of view. The Staff (F, W, Sp)

928A. Urban and Comparative Interrelations. (4) One 2-hour session per week. The social, economic, and political background in which urban metropolitan planning, decision-making, and administration. The Staff (W, Sp)

928B. Budgeting in Historical and Comparative Perspectives. (4-4) Three hours of seminar per week. Budgetary calculations and strategies primarily in American national government but also in Scottish and French industries and government. Core readings and research paper emphasis on theoretical points of view. The Staff (F, Sp)

928C. Budgeting in Historical and Comparative Perspectives. (4-4) Three hours of seminar per week. Budgetary calculations and strategies primarily in American national government but also in Scottish and French industries and government. Core readings and research paper emphasis on theoretical points of view. The Staff (F, Sp)

928D. The Politics of Taxation. (4) One 3-hour session per week. Taxation as policy and a unit of political analysis. Public organization tactics for getting taxes and revenue. Public tax preferences.

928E. Governmental Planning and Societal Purpose. (4) Two hours per week. The principles and processes of public planning for socio-economic goals and ecologic-environmental objectives.

287A.* T287B. Development Administration and Political Economy of the Third World. (4) One 2-hour session and one 1-hour conference per week. The structure and functions of public administration in the development process of "low-income" countries: the relations of public administration to a nation's political regime, social structure, and economic organization and objectives; and a demonstration of the relative success achieved by various regimes in achieving their public purposes. Credit and grade will be awarded upon completion of the sequence. Mr. LaPorte (F, Sp)

288B. Science and Politics. (4-4) One 2-hour session and one 1-hour conference per week. The structure of science and politics, public problems and scientific change, the government's role in science and technology and the administration of science and technology.

289A—*289B—*289C. Research in Public Organization. (4-4) Two 3-hour sessions and one 1-hour conference per week.

NONFIELD COURSES

291. Experimental Course. (1-8) Prerequisite: consent of instructor. Experimental in nature, will vary from year to year.

292. Directed Advanced Study. (1-9) Prerequisite: consent of instructor and graduate advisor. Open to qualified graduate students wishing to pursue special study and research under direction of a member of the staff. The Staff (F, W, Sp)

293. Independent Study In Preparation for the M.A. Essay. (1-8) Open to qualified first-year graduate students, with special attention to participation, organization, representation, and responsibility. Credit and grade will be awarded upon completion of the sequence. The Staff (F, W, Sp)

294. Professional Preparation for Teaching Assistants. (4) Special study under the direction of a staff member, with emphasis on the teaching of undergraduate courses in political science. The Staff (F, W, Sp)

602. Individual Study For Doctoral Students. (1-8) Individual study in consultation with the major field advisor, intended to provide opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. Not to be used for credit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

185A—*185B. Budgeting In Historical and Comparative Perspective. (4) See Interdepartmental Studies for the complete description of this course.

187A. Development Administration and Political Economy. (4-4) Two hours of lecture and one hour of conference per week. The structure of science and politics, public problems and scientific change, the government's role in science and technology, and the administration of science and technology. Mr. LaPorte (F, Sp)

Psychology

Department Office, 3210 Tolman Hall

Professors:

Frank A. Beach, Jr., Ph.D.

Jack Block, Ph.D.

Russell L. DeVinney, Ph.D.

Susan Einy-Frohlich, Ph.D.

Stephen E. Gilkison, Ph.D.

Harrison G. Gould, Ph.D.

Geoffrey Keppel, Ph.D.

Sheldon K. Jochim, Ph.D.

Richard S. Lazarus, Ph.D.

Louis M. Lattman, Ph.D.

Donald W. MacKinnon, Ph.D.

Mark R. Rosenzweig, Ph.D.

Assistant Professors:

Eleanor H. Rosch, Ph.D.

Stephen Palmer, Ph.D.

Rhona S. Weinstein, Ph.D.

Robert Schmids-Smith, Ph.D.

Ronald S. Zuckerman, Ph.D.

L&S: Psychology / 175

NOTE: For key to symbols, see page 34.
Social Science: Two courses from among the following:

Antropology 3, Linguistics 20, Sociology 1.

Quantitative: Two years of high school algebra or a course in college algebra or successful performance on the departmental diagnostic quantitative examination.

A departmental diagnostic quantitative examination will be administered during registration week each quarter. The purpose of this examination is to assess the student's preparation for the statistics-methodology requirement of the major. Test scores will be used to determine whether or not the student must obtain additional training in quantitative methods at Berkeley before being permitted to enroll in either 101A-101B or 102A-102B-102C.

Upper Division

1. Breadth: 100A-100B-100C.

2. Statistics-methodology: Either (a) 101A-101B or (b) 102A-102B-102C. 101A is a survey course in the area of specialization. Students are expected to affiliate themselves with one of the areas of specialization and to complete the core sequence in that area. Depending upon the area, additional courses and seminars in the area of specialization, and (4) individual study and research (298 and 299). Most programs require a major research or theoretical paper by the end of the junior year. The final requirements of all programs consist of the successful passing of the Qualifying Examination, taken usually during the third year, and the submission and approval of the dissertation.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSE

1. General Psychology. (6) 101A-101B. Three 1 hour lectures and one 2 hour laboratory per week. Prerequisites: course 1 and biologica prerequisite for the major or consent of instructor. Lecture topics include: introduction to the psychological study of behavior; descriptive and interpretive techniques; history of psychology. Mr. Jarrett (F, W, Sp), Mr. Hamburger (Sp).

2. History of Psychology. (5) Formerly 191X. (5) Two 2 hour lectures per week. Prerequisites: course 1 and consent of instructor. Survey of the development of psychological and behavioral science from antiquity to the present. Mr. Lee (F, W, Sp).

3. Psychological Methods. (5) Two 2 hour laboratory per week. Prerequisites: course 1 and consent of instructor. Explores the design, conduct and analysis of psychological experiments. Topics include: methods of research; the nature of scientific evidence; and the interpretation of psychological data. Mr. Cottrell (W).

4. Research Methods in Psychology. (5) Three 2 hour laboratory per week. Prerequisites: course 1 and consent of instructor. Experimental research methods and techniques. Topics to be covered include: design and data analytic techniques and research design. Topical units to be covered include: research design, comparison of means, comparison of frequency distributions, tests of hypotheses, regression and correlation. Mr. Jarrett (F), Mr. Helfer (W), Mr. Ladewig (W).

5. Experimental Psychology. (5) Three 2 hour laboratory per week. Prerequisites: course 101A-101B. Continuation of 101A with heavy emphasis on application. Students will be required to collect and analyze their own data. Reliability, validity and level of measurement; factorial designs and their analyses. Mr. Kamili (W).

6. Toward Understanding Human Behavior. (5) Three 2 hour laboratory per week. Prerequisites: course 102A-102B-102C. Research Design in Psychological Science. (4-4-4) Three 1 hour lectures and one 2 hour laboratory per week. Prerequisites: course 1 and completion of the quantitative prerequisite for the major or consent of the instructor. A broad survey of experimental design and statistical and data analytic techniques generally found useful by psychologists. The formulation of scientifically testable research problems as well as the theory of measurement will be emphasized. Mr. Jarrett (F, W, Sp).

7. Theory of Psychological Measurement. (3) One 1 hour lecture and two 2 hour seminars per week. Prerequisites: courses 100A-100B-100C and either 101A-101B or 102A-102B-102C or consent of instructor. To be offered alternate years. An introduction to the methodology of psychological measurement with emphasis on the notion of reliability, validity, and criterion validity. Relational methods including multivariate regression, and introduction to path analysis and special correlations. Mr. Glickman (Sp).

8. Introduction to Multivariate Psychological Experimentation. (5) Two 2 hour laboratory per week. Prerequisites: courses 102A-102B-102C or consent of instructor. To be offered alternate years. General techniques for analyzing psychological experiments yielding multiple measurements of observations. Emphasis on multivariate prediction methods, factor and component analysis, discrimination and classification, multiple regression, variance, and latent class and structural analysis. Topics will vary somewhat from year to year. Mr. Lee (F, W, Sp).

9. Topical Seminars in Quantitative Psychology. (3) Two hour lectures to be offered as indicated below. For a precise schedule of offerings check with the Undergraduate Office each quarter. Mr. Lee (F, W, Sp).

10. Test Theories. Prerequisite: consent of instructor, 105 recommended.

11. Factor Analysis. Prerequisite: consent of instructor, 105 recommended.

12. Psychological Scaling. Prerequisite: consent of instructor, 105 or 104 recommended.

13. Path Models and Causal Analyses. Prerequisite: consent of instructor, 104 or 105 recommended.

BIOLICAL PSYCHOLOGY

10. Introduction to Biological Psychology. (3) Two 2 hour lectures and one hour of discussion per week. Prerequisites: course 1 and biological prerequisite for the major or consent of instructor. Survey of relations between behavioral and biological processes. Topics include sensory and perceptual processes, neural maturation, neural bases of motivation, learning. Mr. Leiman (W).

11. Sensory Processes: Vision. (3) Formerly part of 111A. Two 2 hour lectures and one 2 hour laboratory per week. Prerequisites: course 100A-100B-100C or 110 or consent of instructor. Examination of various aspects of visual perception, formation and transmission of visual information, and object perception (diocular vision, object detection) in relation to anatomy and physiology of the visual system. Mr. Devalois (W).

11L. Laboratory in Vision. (3) Formerly part of 111A. Three 2 hour laboratories per week. Prerequisites: concurrent enrollment in course 111 and consent of instructor. Practical laboratory experience in visual psychophysics and perception; observation of physiological studies of single cell responses. Mr. Devalois (W).

12. Sensory Processes: Hearing. (3) Formerly 122. Two 2 hour lectures per week. Prerequisites: course 100A-100B-100C or consent of instructor. Lecture covers a broad range of topics in the psychology of hearing and the physiology of the auditory system. Mr. Helfer (F).

12L. Laboratory in Hearing. (3) Formerly 124. Two 2 hour laboratories per week. Prerequisites: course...
current enrollment in 112 and consent of instructor. Laboratory research on selected topics in hearing.

113. Experiments In Animal Psychology. (5) Two 1 1/2-hour lectures and six hours of laboratory per week. Prerequisites: course 1 and consent of instructor. Individual and group research in animal psychology. Mr. Ritchie (Sp)

114. Biology of Learning and Neural Plasticity. (5) Formerly part of 111B. Two 2-hour lectures. Prerequisite: course 100A--100B--100C or 110 or consent of instructor. A study of theoretical and experimental investigations of the biological substrates of learning, memory, and forms of neural plasticity related to the growth and maturation of the nervous system. Mr. Leiman (Sp)

114L. Laboratory In the Biology of Learning and Neural Plasticity. (3) Formerly part of 111B. Two 3-hour laboratory periods per week. Prerequisites: concurrent enrollment in course 114 and consent of instructor. Laboratory research on selected topics in the biology of learning and neural plasticity. Mr. Leiman (Sp)

115. Introduction to Comparative Psychology. (5) Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisite: course 1. Studies of animal behavior in evolutionary perspective, including analysis of behavior development, reproduction, aggression, territory.

116. Biology of Motivation. (5) Two 2-hour lectures per week. Prerequisite: course 100A--100B--100C or consent of instructor. Neural and hormonal bases of motivated behavior, treating such topics as regulation of feeding and drinking, sex behavior, aggression, sleep, dreaming, and waking.

116L. Laboratory In Motivation. (3) Two 3-hour laboratory periods per week. Prerequisites: concurrent enrollment in course 116 and consent of instructor. Laboratory research on selected topics in motivation.

117. Hormones and Behavior. (5) Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisites: course 1 or consent of instructor. Biological and psychological factors involved in sexual differentiation. Emphasis is placed upon physiological description. A study of sexual behavior, especially reproduction of non-human mammals. Process of sexual differentiation of the neuroendocrine system will be emphasized. Hormonal influences on feeding, biosyntheses and aggressive behavior.

118. Human Sexuality. (6) Formerly 191R. Three 1-hour lectures and one hour of discussion per week. Prerequisites: course 1 or consent of instructor. Biological and psychological factors involved in sexual differentiation. Emphasis is placed upon physiological description. A study of sexual behavior, especially reproduction of non-human mammals. Process of sexual differentiation of the neuroendocrine system will be emphasized. Hormonal influences on feeding, biosyntheses and aggressive behavior.

118A. Animal Learning (5) Formerly 120. Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisite: course 100A--100B--100C or consent of instructor. Course 101A is useful but not necessary. Theoretical and experimental study of conditioned and instrumental conditioning, and discrimination learning. Additional topics of current interest in the area of animal learning will also be considered.

118B. Human Learning and Memory. (5) Formerly 121. Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisite: course 1. Course 101A is useful but not necessary. Theoretical and experimental analysis of human learning, transfer, and memory. The course will stress the learning and retention of verbal material.

118C. Thinking. (5) Formerly 130. Three 1 1/2-hour lectures per week. Prerequisite: course 1. Course 101A is useful but not necessary. Review of principal concepts and research concerning processes of human thought. Complex problem solving; critical, productive and creative thinking; other related aspects of higher order cognitive functioning. Mr. Ritchie (Sp)

118D. Psycholinguistics. (5) Formerly 131A. Two 1 1/2-hour lectures and two 1-hour laboratory or discussion section per week. Prerequisites: course 1 and an introductory course in linguistics or consent of instructor.

121. Animal Learning. (5) Formerly 120. Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisite: course 100A--100B--100C or consent of instructor. Course 101A is useful but not necessary. Theoretical and experimental study of conditioned and instrumental conditioning, and discrimination learning. Additional topics of current interest in the area of animal learning will also be considered.

122. Human Learning and Memory. (5) Formerly 121. Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisite: course 1. Course 101A is useful but not necessary. Theoretical and experimental analysis of human learning, transfer, and memory. The course will stress the learning and retention of verbal material.

123. Thinking. (5) Formerly 130. Three 1 1/2-hour lectures per week. Prerequisite: course 1. Course 101A is useful but not necessary. Review of principal concepts and research concerning processes of human thought. Complex problem solving; critical, productive and creative thinking; other related aspects of higher order cognitive functioning. Mr. Ritchie (Sp)

124. Psycholinguistics. (5) Formerly 131A. Two 1 1/2-hour lectures and two 1-hour laboratory or discussion section per week. Prerequisites: course 1 and an introductory course in linguistics or consent of instructor.

125. Second Language Learning and Bilingualism. (5) Formerly 135. Two 2-hour lectures. Process and structure in second language acquisition, including development of "interlanguages." Processing of linguistic information by bilinguals (perception, recall, translation; structure of bilingual discourse. To be given in alternate years. Background in linguistics and psycholinguistics recommended. Ms. Ervin-Tripp (F)

126. Information Processing. (5) Formerly 129. Two 1 1/2-hour lectures and one 2-hour discussion/laboratory per week. Prerequisites: courses 100A--100B--100C and 101A--101B or consent of instructor. Principal concepts and research concerning human processing of visual, auditory, and symbolic information; object recognition and classification; perception and comprehension; development of theoretical models and experimental techniques in the study of imagery and other cognitive processes. Mr. Palmer (F); Ms. Rosch (Sp)

127. Topical Seminars In Cognitive Psychology. (5) Two 2-hour lectures per week. Prerequisites: consent of instructor. For a precise schedule of courses, check with the Undergraduate Office each quarter. Mr. Rosenzweig (F); Mr. Ritchie (W)

COGNITIVE PSYCHOLOGY

121. Animal Learning. (5) Formerly 120. Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisite: course 100A--100B--100C or consent of instructor. Course 101A is useful but not necessary. Theoretical and experimental study of conditioned and instrumental conditioning, and discrimination learning. Additional topics of current interest in the area of animal learning will also be considered.

122. Human Learning and Memory. (5) Formerly 121. Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisite: course 1. Course 101A is useful but not necessary. Theoretical and experimental analysis of human learning, transfer, and memory. The course will stress the learning and retention of verbal material.

123. Thinking. (5) Formerly 130. Three 1 1/2-hour lectures per week. Prerequisite: course 1. Course 101A is useful but not necessary. Review of principal concepts and research concerning processes of human thought. Complex problem solving; critical, productive and creative thinking; other related aspects of higher order cognitive functioning. Mr. Ritchie (Sp)

124. Psycholinguistics. (5) Formerly 131A. Two 1 1/2-hour lectures and two 1-hour laboratory or discussion section per week. Prerequisites: course 1 and an introductory course in linguistics or consent of instructor.

125. Second Language Learning and Bilingualism. (5) Formerly 135. Two 2-hour lectures. Process and structure in second language acquisition, including development of "interlanguages." Processing of linguistic information by bilinguals (perception, recall, translation; structure of bilingual discourse. To be given in alternate years. Background in linguistics and psycholinguistics recommended. Ms. Ervin-Tripp (F)

126. Information Processing. (5) Formerly 129. Two 1 1/2-hour lectures and one 2-hour discussion/laboratory per week. Prerequisites: courses 100A--100B--100C and 101A--101B or consent of instructor. Principal concepts and research concerning human processing of visual, auditory, and symbolic information; object recognition and classification; perception and comprehension; development of theoretical models and experimental techniques in the study of imagery and other cognitive processes. Mr. Palmer (F); Ms. Rosch (Sp)

127. Topical Seminars In Cognitive Psychology. (5) Two 2-hour lectures per week. Prerequisites: consent of instructor and, depending upon the course with which the seminar forms a sequence, course 121, 122, 123, 124, or 126. For a precise schedule of offerings, check with the Undergraduate Office each quarter. Mr. Rosenzweig (F); Mr. Ritchie (W)

DEVELOPMENTAL PSYCHOLOGY

140. Developmental Psychology. (5) Two 1 1/2-hour lectures and one 1 1/2-hour discussion section per week. Prerequisite: course 1. Survey of theory and research in developmental psychology with emphasis upon changes in behavior throughout the life span, including prenatal development. Ms. Bates (Sp)

141. Development During Infancy. (5) Formerly 141. Two 1 1/2-hour lectures and six hours of laboratory per week. Prerequisite: course 100A--100B--100C or consent of instructor. Cognitive, perceptual, and social development during the first two years of life with emphasis upon methods of observation and experimentation. Mr. Watson (W)

142. Cognitive Development. (5) Two 1 1/2-hour lectures and one 1 hour of discussion per week. Prerequisite: course 100A--100B--100C or consent of instructor. Theory and research on intellectual growth and development. Ms. Bates (Sp)

143. Child Language Development. (5) Formerly
144. Two 2-hour lectures per week. Prerequisites: course 100A–100B or consent of instructor. An introductory course in linguistics or consent of instructor. Theory and research on children's linguistic development, including the sound system, grammatical structure, basic semantic categories, and sociolinguistic features.
Ms. Ervin-Tripp (W)

144. Personality and Social Development. (8) Two 2-hour lectures per week. Prerequisites: consent of instructor. Personality and social development, focusing on personality characteristics and relationships with others.
Ms. Main (Sp)

148. Topical Seminars in Developmental Psychology. (1-3) Two 2-hour lecture-discussions per week. Prerequisites: consent of instructor and, depending upon the course with which the seminar forms a sequence, course 141, 142, 143, or 144. For a precise schedule of offerings, check with the Undergraduate Office each quarter.

148A. Development during Infancy

148B. Cognitive Development

148C. Child Language Development

148D. Personality and Social Development

PERSONALITY PSYCHOLOGY

150. Psychology of Personality. (5) Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisites: consent of instructor. An introduction to various systematic issues in the study of personality, and an evaluation of major theories and points of view.

151. Assessment of Personality. (5) Two 1 1/2-hour lectures and two 1 1/2-hour laboratories per week. Prerequisites: course 150 and consent of instructor. Theoretical and methodological issues in the assessment of personality; observational procedures; the interview; problems of test interpretation and psychodiagnosis.
Mr. Block, Mr. Gough (Sp)

153. Stress and Adjustment. (5) Two 1 1/2-hour lectures and one 1 1/2-hour discussion/lab per week. Prerequisites: course 150 and consent of instructor. The nature, stressors, and consequences of stress; physiological, psychological, and attitudinal aspects of the work environment.
Ms. Ervin-Tripp (W)

153A. Personality and Social Development

153B. Language in Social Interaction. (5) Formerly in linguistics or consent of instructor. Theory and research on the cognitive and experiential background in linguistics and psychology recommended.

168. Topical Seminars in Social Psychology. (5) Two 1 1/2-hour lectures per week. Prerequisites: consent of instructor and, depending upon the courses with which the seminar forms a sequence, course 161, 162, 163, or 167. For a precise schedule of offerings, check with the Undergraduate Office each quarter.

168A. Interpersonal Processes

168B. Attitudes, Beliefs, and Influence Processes

168C. Small Group Structure and Processes

169. Topical Laboratories in Social Psychology. (5) Two hours lecture and one 3-hour discussion/lab per week. Prerequisites: consent of instructor, and, depending upon the course with which the laboratory forms a sequence, course 161, 162, or 163. For a precise schedule of offerings, check with the Undergraduate Office each quarter.

169A. Interpersonal Processes

169B. Attitudes, Beliefs, and Influence Processes

169C. Small Group Structure and Processes

DIFFERENTIAL PSYCHOLOGY

171L. Differential Psychology. (3) Two 1 1/2-hour lectures per week. Prerequisites: course 101B or 102B or equivalent course. Individual and group differences in psychological characteristics. Structure and genetic bases of differential psychology. Historical development of psychological test methods.

171L. Laboratory in the Psychology of Abilities and Attitudes. (2) One hour lecture and one 2-hour laboratory per week. Prerequisites: consent of instructor. (May be taken concurrently with 171L).

172. Appraisal of Personality Differences. (5) Two 1 1/2-hour lectures per week. Prerequisites: course 101B or 102B or equivalent course; course 170 is recommended. Theory and evaluation of the principal personality instruments. An introduction to the history of psychological test methods.

172L. Laboratory in the Appraisal of Personality Differences. (1) One 1-hour lecture and one 2-hour laboratory per week. Prerequisites: course 172 and consent of instructor. (May be taken concurrently with 172L).

INDUSTRIAL-ORGANIZATIONAL PSYCHOLOGY

180. Industrial-Organizational Psychology. (3) Three 1-hour lectures and three 1-hour laboratory/discussions per week. Prerequisite: course 101A or 102A or consent of instructor. Primarily for majors. Introduction to the field of industrial psychology, covering the social, motivational, and economic aspects of the work environment. Theoretical and methodological issues in the development of techniques and practices in personnel selection and development.

182. Personnel Psychology. (5) Two 1 1/2-hour lectures and two hours of discussion per week. Prerequisites: courses 180 and 101B or 102B or consent of instructor. An introduction to the field of industrial psychology, covering the social, motivational, and economic aspects of the work environment. Theoretical and methodological issues in the development of techniques and practices in personnel selection and development.

183. Social Psychology of Organizations. (5) Three 1 1/2-hour lectures and one 1 1/2-hour discussion per week. Prerequisites: course 100A or 100B or consent of instructor. Psychological approaches to the study of the social, motivational, and attitudinal aspects of the work environment.

188. Topical Seminars in Industrial-Organizational Psychology. (5) Two 2-hour lectures per week. Prerequisite: consent of instructor. For a precise schedule of offerings, check with the Undergraduate Office each quarter.

SPECIAL COURSE OFFERING

190. Cluster Seminars. (1) Two hours of lecture per week. Prerequisites: Permission of instructor and admission to cluster program. Weekly discussion on the nature, methods and aims of contemporary psychology. Course to be taught on a pass/no pass basis.

M. Kieslich (in charge) (W)

197. Field Study in Psychology. (1-5) Individual conferences to be arranged. Prerequisite: course 1; appropriate upper division work in psychology (to be arranged by instructor); consent of instructor. A supervised experience relevant to specific aspects of psychology in on-campus settings. Individual and/or group meetings with faculty sponsor and written report required. Offered on a pass/no pass basis only. (May be repeated for up to 10 units total, and no more than 5 units may be counted toward the major.)

The Staff (W, Sp)

198. Directed Group Study. (1-5) Prerequisite: consent of instructor. Group study of a selected topic or topics in psychology. To be offered on a pass/no pass basis only.

The Staff (F, W, Sp)

GRADUATE COURSES

Graduate standing and the consent of the instructor are prerequisites for all graduate offerings. (Undergraduates may enroll only upon approval of a faculty adviser and consent of the instructor.) Courses beginning each decade are designated as prosemesters and are designed to provide the background essential for a student planning to concentrate in that area of specialization. These prosemesters are sufficiently general, however, for students from other areas of Psychology and from other departments to obtain breadth of training in complementary areas of study. Most prosemester courses are self-contained and may be taken separately. For most the sequence is not critical. See instructor before enrolling.

QUANTITATIVE

200A. Proseminar: Survey of Hypothesis Testing. (5) Three 1 1/2-hour lectures per week. Complex analysis of variance, nonparametric analysis, and hypothesis testing. Model fitting will be stressed as will post hoc comparison procedures.

200B. Proseminar: Regression and Test Theory. (5) Three 1 1/2-hour lectures per week. Correlational regression analysis, psychometrics, reliability, validity, latent trait models, test theory.

M. Jarrett (W)

200C. Proseminar: Factor Analysis and Multiple Regression Analysis. (5) Five 1 1/2-hour lectures per week. Techniques of multivariate analysis, discriminant analysis, and introduction to component analysis and factor analysis.

M. Keppel (W, Sp)

201A-201B. Design and Analysis of Psychological Experiments. (4-4) Three hours of lecture per week. Design and statistical analysis of psychological experiments. Emphasis on that presented in intuitive and practical point of view. Stress is given to the interaction between research design and the statistical analysis of an experiment. Problems of research design will also be covered along with computer models of psychological processes. Must be taken on a satisfactory/unsatisfactory basis. Mr. Keppel (Sp)

*202. Computers in Psychology. (5) Two 1 1/2-hour lectures per week. Survey course on the use of computers in psychology: hardware design and interface; on-line control of experiments; level of computer language as algorithmic (order-order); computer statistical programs; computer models of psychological processes. Must be taken on a satisfactory/unsatisfactory basis only.

209. Quantitative Seminar. (1) One 1 1/2-hour lecture per week. Prerequisites: graduate standing or consent of instructor. Reports and discussions of original research by students in the area of concentration. All participants need report in any given quarter, but all are expected to attend and to enter into the discussions. Required course for all students in the quantitative graduate program. Satisfactory/Unsatisfactory basis only. Mr. Jarrett in charge (F, W, Sp)
CLINICAL
230A. Proseminar: Theory and History of Clinical Psychology. (5) Two hours of lecture and one hour of clinical practicum per week. Examination of major theoretical and historical themes in the development of modern clinical psychology, with special attention given to contributions of the medical field, especially the role of health psychology and mental health professions in intervention and research, and emerging professional roles and institutions. Ms. Wachs (F, W, Sp)

230B. Proseminar: Community Psychology. (5) Two hours of lecture and one hour of clinical practicum per week. Prerequisite: consent of instructor. Theoretical framework for community psychology, history, scope, and direction of field; examples of social and community interventions; methodologies for implementing interventions and assessing their effectiveness. Ms. Weinstein (W)

230C. Proseminar: Child Clinical Psychology. (5) Two hours of lecture and one hour of clinical practicum per week. Prerequisite: consent of instructor. An examination of three major theoretical views of child development: neo-Freudian (Erikson), social learning (Bandura), cognitive developmental (Slagle, Kollberg), and one theory of family psychology (Kackoff, et al). Implications of these theories for conceptions of childhood psychopathology and for assessment and treatment. Mr. Cowan (Sp)


232A–232B–232C. Adult Individual Therapy. (5–5–5) One 2-hour lecture and six hours of practicum per week. Prerequisite: course 230A–230B–230C, 231A and/or consent of instructor. An introduction to classroom discussion and supervised practicum in the study of therapy with children and their families. Discussion focuses on therapy, research, and methods of intervention. Supervised experience with patients seen in the Psychology Clinic. Grades reported at end of three-quarter sequence. 232A: Mr. Mussen (Sp), 232B: Mr. DeValois (W), 232C: Mr. DeValois in charge (F, W, Sp)

233A–233B–233C. Group Psychotherapy. (5–5–5) One 2-hour lecture and six hours of practicum per week. Prerequisite: course 230A–230B–230C, 231A and/or consent of instructor. An introduction to classroom discussion and supervised practicum in the study of group psychotherapy. Classes focus on theory, research, and methods of intervention. Supervised experience with patients seen in the Psychology Clinic. Grades reported at end of three-quarter sequence. 233A: Mr. Coyle (F, W), 233B: Mr. Coyle (W), 233C: Mr. Coyle (Sp)


237A–237B–237C. Personality Development. (5–5–5) One 2-hour lecture and six hours of practicum per week. Personality measurement, current issues in measurement and appraisal, and analysis of individual differences in personality. Mr. Coyle (F, W, Sp)

238. Clinical Seminar. (1) One 1 1/2-hour lecture per week. Prerequisite: consent of instructor. Reports and discussions of original research in the area of clinical psychology. Not all participants need report in any given quarter, but all are expected to attend and to enter into the discussions. Required course for all students in the clinical graduate program. Satisfactory/Unsatisfactory basis only. Mr. Cowan in charge (F, W, Sp)

DEVELOPMENTAL
240A. Proseminar: Early Cognitive Development. (5) Three 1 1/2-hour lectures per week. Prerequisite: graduate standing or consent of instructor. An examination of theory, methods, and research findings primarily concerning human cognitive development in the first two years of life. Emphasis will be placed on methods. Ms. DeValois (F)

240B. Proseminar: Human Ethology and Early Social Development. (5) Three 1 1/2-hour lectures per week. The work of current British and American ethologists as these relate to human development will be critically reviewed. Prerequisite: consent of instructor. Ms. Weinstein (Sp)

240C. Proseminar: Socialization and Personality Development. (5) Three 1 1/2-hour lectures per week. The focus of the course is on the antecedents and correlates of personality development and early social behavior. Class discussions will be surveyd (particularly parent-child relationships and peer influences) and relevant research findings reviewed. Not all participants need report in any given quarter, but all are expected to attend and to enter into the discussions. Required course for all students in the developmental graduate program. Satisfactory/Unsatisfactory basis only. Ms. Main (W)

242A. Child Language Development. (5) Three 1 1/2-hour lectures per week. Stages and structures of emergence and development of language in normal children. Prerequisite: consent of instructor. Ms. Rosch in charge (F, W, Sp)

242B. Proseminar: Human Ethology and Early Social Development. (5) Three 1 1/2-hour lectures per week. The work of current British and American ethologists as these relate to human development will be critically reviewed. Not all participants need report in any given quarter, but all are expected to attend and to enter into the discussions. Required course for all students in the developmental graduate program. Satisfactory/Unsatisfactory basis only. Ms. Watson in charge (F, W, Sp)

243A. Language Development. (5) Three 1 1/2-hour lectures per week. Examination of the theoretical and methodological framework of psycholinguistics. Review of phonological, grammatical, semantic, and pragmatic properties, and comparison to developmental models, with special attention to interactions between linguistic and cognitive development. Prerequisite: consent of instructor. Ms. DeValois (F, W, Sp)

245. Personality Development. (5) Three 1 1/2-hour lectures per week. A consideration of the role of hormones in the mediation of male and female reproductive behaviors, including emphasis on hormones in the process of sexual differentiation and sex differences in behavior. Discussion and guest lectures on neural, endocrine, cellular, and molecular aspects of reproduction. Mr. Hatter, Mr. Kamil (F)

246A. Proseminar: Adolescents in Society. (5) Three 1 1/2-hour lectures per week. Prerequisite: graduate standing or consent of instructor. Discussion of recent issues in measurement and appraisal, and analysis of significant research paradigms. Ms. Craig (F, W, Sp)

247A. Personalistic Measurement. (5) Three 1 1/2-hour lectures per week. Personality measurement, current issues in measurement and appraisal, and analysis of methodological problems. Ms. Craig (F, W, Sp)

PERSONALITY
250A–250B. Proseminar Courses in Personality Psychology. (5) One 3-hour lecture per week. Basic and fundamental areas in personality psychology. Discussion of topics of current theoretical importance. Analysis of significant research paradigms. Ms. Craig (F, W, Sp)

251. Personality Measurement. (5) Three 1 1/2-hour lectures per week. Personality measurement, current issues in measurement and appraisal, and analysis of methodological problems. Ms. Craig (F, W, Sp)

Note: For key to symbols, see page 34.
SOCIAL-ORGANIZATIONAL

*120A. Proseminar: History and Systems; Social Interaction Processes. (6) Three 1 1/2-hour lectures per week.

*120C. Proseminar: Attitudes and Attitude Change; Human Meditation. (3) Three 1 1/2-hour lectures per week.

289. Social Seminar. (1) One 1 1/2-hour lecture per week. Prerequisite: graduate standing or consent of instructor. Reports and discussion of original research in the guidance of social psychology. Not all participants need report in any given quarter, but all are expected to attend and to enter into the discussions. Required course for all students in the program. Satisfactory/Unsatisfactory basis only.

Ms. Mallach in charge (F, W, Sp).


299. Directed Study. (1-6) Special study under the direction of a member of the staff.

The Staff (F, W, Sp).

299. Research. (1-6) Individual research.

The Staff (F, W, Sp).

*300. Seminar in the Presentation and Teaching of Psychological Material. (3) One 1 1/2-hour lecture per week. Principles and methods of the presentation of psychological material in lectures, demonstrations, publications and personal contacts, with emphasis on the teaching of undergraduate courses in psychology. May be repeated for credit.

401A—401B—401C. Clinical Internship (Psychology Clinic). (12) Prerequisites: previous field placement and consent of the Head of the Clinical Psychology Clinic. Application to the Department of Psychology for study, treatment and research on problems of mental health. Credit and grade will be awarded on completion of the internship appointment.

The Staff (F, W, Sp).

402A—402B—402C. Clinical Internship (Off-Campus). (3—12; 3—12; 3—12) Prerequisite: consent of Clinical Training Committee. Individual programs of practice and supervision in approved off-campus agencies. Credit and grade will be awarded on completion of the internship appointment.

The Staff (F, W, Sp).

602. Individual Study for Doctoral Students. (1—9) Independent study in course work or in special problems of the major field advisor, intended to provide opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the doctoral degree. May not be taken on a satisfactory/unsatisfactory basis.

IDS 122A—122B. Animal Behavior. (5—6) See Interdepartmental Studies for a complete description of this course.

IDS 190A—190B—190C. Principles and Applications of Psychoanalysis. (3—3—3) See Interdepartmental Studies for a complete description of this course.

IDS 204. Animal Behavior Research Reviews. (1) See Interdepartmental Studies for a complete description of this course.


IDS 218A—218B. Developmental Concepts in Mental Health. (3—3) See Interdepartmental Studies for a complete description of this course.

IDS 242. Environmental Psychology. (4) See Interdepartmental Studies for a complete description of this course.

IDS 272. Neurobiology of Language. (4) See Interdepartmental Studies for a complete description of this course.

IDS 292A—292B. Psychology and Aesthetics. (5—6) See Interdepartmental Studies for a complete description of this course.

Religious Studies

GROUP MAJOR IN RELIGIOUS STUDIES

Group Major Programs Office, 245 Campbell Hall

Advisers: Mr. Albert J. Raboteau (Christianity), Mr. Baruch M. Bokser (Judaism), Mr. Hamid Aigar (Islam), Mr. Padmanabh S. Jeti (Hinduism), Mr. Lewis Landau (Buddhism, Taoism, Confucianism), Mr. David Ferris (General Studies); other advisers: Mr. William Brinner, Mr. Michael Nagler, Mr. Wei-ming Tu; ex-officio: Dean Claude Welch.

The group major in religious studies offers specialization in one of five major religious traditions or in a combination of two or more general religious approaches, with an emphasis on breadth of crossover in either track. The major is designed primarily for its intrinsic value or as preparation for graduate work in related religions or as preparation for theological studies or a ministerial career, though it could serve the latter purposes for some individuals. Most religious studies courses are open to non-majors. Because of the wide variety of approaches possible in the academic study of religion and the need for detailed work in one of these approaches, students are encouraged to begin as early as possible in their careers. This is especially true for students contemplating specialization in a particular religious tradition (see Area Studies lists). Additional courses, if required (six courses): Interdepartmental Studies 155A—155B—155C (4-4-4); Near Eastern Studies 152A—152B—152C (5-5-5); 158A—158B—158C (5-5-5). Two of the five core courses in General Studies; two courses in one Eastern religion. Additional courses, if required, from the following list to make a total of at least 45 units: Near Eastern Studies (Hebrew) 101A—101B—101C (4-4-4); 102A—102B—102C (4-4-4); 103A—103B—103C (4-4-4); Near Eastern Studies 152A—152B—152C (5-5-5); 158A—158B—158C (5-5-5). Two of the five core courses in General Studies; two courses in one Eastern religion. Additional courses, if required, from the following list to make a total of at least 45 units: Near Eastern Studies (Arabic) 1A—1B—1C; Elementary Arabic (5-5); 101A—101B—101C, Intermediate Arabic (5-4-4); or equivalent. Required (five courses): Near Eastern Studies 101A—101B—101C—102A—102B—102C (4-4-4); Near Eastern Studies 158A—158B—158C—159A—159B (5-5-5). Two of the five core courses in General Studies; two courses in one Western religion (Christianity, Judaism, or Islam). Additional courses, if required, from the following list to make a total of at least 45 units: Near Eastern Studies (Arabic) 208A—208B—208C (4-4-4); Near Eastern Studies (Art and Archaeology) 195A—194B—194C (4-4-4); Near Eastern Studies (Aramaic) 208B—208D (4); South and Southeast Asian Studies (South Asian) 124 (4), 129 (4).

D. Hinduism. Reading knowledge of Sanskrit; South and Southeast Asian Studies (South Asian) 100A—100B—100C (5—5—5); Elementary Sanskrit (5—5-5); or equivalent. Required (five courses): Near Eastern Studies 152A—152B—152C (5-5-5); 158A—158B—158C (5-5-5). Two of the five core courses in General Studies; two courses in one Eastern religion; two of the five core courses in General Studies. Additional courses, if required, from the following list to make a total of at least 45 units: South and Southeast Asian Studies (South Asian) 121 (4), 124 (4), 129 (4), 141 (4), 160 (4).

E. Buddhism. Reading knowledge of Tibetan; Oriental Languages (Tibetan) 146—144—142, 156—154—152, Elementary Tibetan (4—3—3); 174A—174B—174C, Intermediate Tibetan (3—3—3), or Chinese; Oriental Languages (Chinese) 2A—2B—2C, Introduction to Classical Chinese (5—4—4); 110A—110B—110C, Readings in Chinese Buddhist Texts (4—4—4); or Sanskrit: South and Southeast Asian Studies (Sanskrit) 100A—100B—100C, Elementary Sanskrit (5—5—5); 105, 110, 152—154, 156—158 (5—5-5); Near Eastern Studies (Sanskrit) 5—5, 105, Readings in the Sastra (5), or 104, 105, 110, 113—114, 121—122 (5—5—5); Veda (5). Required (five courses): Oriental Languages 171A—171B—171C (4—4—4); South and Southeast Asian Studies (South Asian) 127 (4), 131 (4), 180 (4). Two of the five core courses in General Studies; two courses in one Western religion (Christianity, Judaism, or Islam). Additional courses, if required, from the following list to make a total of at least 45 units: Oriental Languages 140 (4), 141 (4), 142 (4), 143 (4); Religious Studies 170 (4); South and Southeast Asian Studies (South Asian) 140 (4), 141 (4).

II. GENERAL STUDIES

Four courses from a core of five:

Classics 178 (4) or Comparative Literature 165 (5) (Mr. Kinterleger); Religious Studies 100 (4) or Philosophy 112 (4); Religious Studies 110 (5); 115 (4); Sociology 146 (5) (Mr. Bellah). Three courses in a particular religious tradition (see Area Studies lists). Additional courses, if required, from the following list to make a total of at least 45 units: Anthropology 158 (5); Class-
Studies or General Studies may elect to attempt grad
calculations of the Gospels with special attention to Mark,
ition, figurative language, and all the other elements of
ation, figurative language, and all the other elements of
igation; topics vary from year to year. Students should
Sorbonne) (Sp) 119. Supervised Independent Study and Re
31. Aristotle and Classical Rhetoric. (5) Formerly
graduate program in the fall quarter only. The

dergraduate program in the fall quarter only. The
L&S: Rhetoric / 181
Mr. Stripp

10. Principles of Argumentation. (6) Formerly 4. Five to 4 1/2 hours of lecture per week. Designed for sophomores, but open to students in the upper division. Intensive work, in conjunction with study of significant contemporary public and social issues, in the essentials of public speaking and the forms of public address.
Platform theory and practice; principles of oral style.
Mr. Stripp

30. Rhetorical Theory and Practice. (6) Formerly 117. Four to 4 1/2 hours of lecture per week. An introduction to rhetorical analysis, designed to familiarize the student with the basic concepts and terms of the discipline. Emphasis will be upon argumentation, but forms of analysis of the kind required by Rhetoric 30 is prerequisite to all upper division courses unless otherwise specified.
Mr. Brandt

31. Aristotle and Classical Rhetoric. (Formerly 117) 4 to 4 1/2 hours of lecture per week. An historical survey of the development of rhetorical theory in the Classical Age. Emphasis will be on the important documents, especially Aristotle's Rhetoric.

NOTE: For key to symbols, see page 34.

Rhetoric
Department Office, 2125 Dwinelle Hall

Professors:
Robert L. Bololo, Ph.D.  Edward N. Barnhart, Ph.D. (Emeritus)
William J. Brandt, Ph.D.  Richard Haggopalian, M.F.A. (Emeritus)
Seymour B. Chatman, Ph.D.  Janette L. Richardson, Ph.D.
Phyllis Shively, Ph.D.  Thomas C. Vansuren, Ph.D. (Chaiman)

Associate Professor:
Tod G. Witty, Ph.D.

Assistant Professors:
Daniel F. Meola, Ph.D.  Clark C. Smith, Ph.D. (Emeritus)
Arthur J. Quinn, Ph.D.  John Leopold, Ph.D. (Acting)

Lecturers:
Ann M. Draper, J.D.  Ward E. Tabler, A.B., L.H.D.
Camilla L. Leabann, J.D.  Fred S. Stripp, Th.D.

Departmental Major Advisers: Mr. Chatman, Mr. Nathan, Mr. Quinn, Mr. Witty.

Graduate Adviser: Mr. Meola.

Rhetoric is the skill and theory of suasive discourse. It is a method by which students, whether interpreting or writing an essay or a poem or any art, keep control to their task the suasive dimensions of structure, intention, figurative language, and all the other elements of interaction with an audience. The Department of Rhetoric offers a curriculum whereby students begin with the mastery of skills (the 300 sequence), proceed to the study of theory (the 100 sequence), and then complete their work with the refinement of both in courses applying theory to the analysis of texts in areas of the student's interest. General areas of interest have been designated by sequence numbers: rhetorical theory and practice, literary forms, rhetoric and culture, oral interpretation, politics, law, and declarative discourse. Graduate courses deal with the history of rhetorical theory and special topics appropriate for advanced study.

MAJOR PROGRAM

To complete their major, students must take Rhetoric 1A–1B or 10, Rhetoric 1C, Rhetoric 30, 31, and 32, plus thirty-six units of upper division work. The upper division work must include at least one five-unit course in rhetorical theory or language arts (courses numbered 100–144) and at least one five-unit course in politics, law, or declarative discourse (courses numbered 152–175). Rhetoric 1A–1B or 10 and 30 are prerequisites to all upper division courses in the major. Grade C or better in courses 30, 31, and 32 is required to receive credit toward completion of the major program. A maximum of five units each of Field Studies in Rhetoric (197) and Research Group Studies (158) may be applied toward completion of the major on prior approval of the major adviser.

Passed or Not Passed. No course taken passed or not passed may be used to satisfy a requirement for the major.

Honors Program. A senior thesis is required of all majors seeking to earn the B.A. degree with honors. Five units of credit for Rhetoric 195H may be applied toward graduation for this project. To receive departmental honors the student must complete the honors course with a B+ or better and have an overall grade-point average of 3.3 or better and a grade-point average of at least 3.3 in all Rhetoric courses.

GRADUATE PROGRAM

The Department of Rhetoric offers programs leading to both the M.A. and Ph.D. degrees. Students are admitted to graduate study in the fall quarter only. The first three to five quarters are spent preparing for the M.A. oral examination, a 1 1/2-hour examination covering the major areas of study within the department. Pre-doctoral students with an M.A. from another department or institution must pass the M.A. oral review with a recommendation for continued graduate work by the end of their first year of study. For the M.A. a total of 36 units of course work is required, including 202A, 202B, 202C, 215A and 215B. There are no specific unit requirements beyond the M.A. for the Ph.D. degree. Each M.A. or Ph.D. candidate is also required to serve as a Teaching Assistant in the Rhetoric Department for one year and to complete successfully Rhetoric 300, "Rhetorical Pedagogy." Opportunities for continued employment beyond the required one year of teaching assistantships makes it possible for able students to seek promotion to the rank of Teaching Associate.

TEACHER TRAINING

There are opportunities for majors of senior standing to assist professors in teaching certain courses through a special tutorial program. Training and expertise in teaching are regarded as an essential part of the program leading to M.A. and Ph.D. degrees. The structure of the teacher training program makes it possible for able students to seek promotion to the rank of Teaching Associate.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSES

1A–1B. The Craft of Writing. (5–6) Four to 4 1/2 hours of meeting per week. Prerequisite: Subject A or exam is prerequisite for 1A. Course 1A is prerequisite for 1B. Rhetorical approach to reading and writing argumentative discourse. 1A: Close reading of selected texts; written themes developed from class discussion and analysis, including an argumentative response. 1B: Intensive argumentative writing drawn from controversy stimulated through selected readings and class discussion.

The Staff
and on the changing conception of rhetorical issues and practice. The Staff

32. Fundamentals of Oral Interpretation. (6) Formerly 3. Four to 4 1/2 hours of lecture per week. A continuation of Rhetoric 30. Pre-requisite: Rhetoric 30 or consent of instructor. A close reading of the works of modern and classical writers. Emphasis is on the point of view can be described as rhetorical—Richards, Burke, Cassirer, and others. Mr. Quinn

101. Rhetoric Theory and Practice: Middle Ages. (6) Formerly 154. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30 or consent of instructor. Examination of the way in which various rhetorical principles and patterns inform such verbal modes of expression as alliteration, romance, fabliau, sermon, saint's legend, etc. Ms. Richardson

32. Fundamentals of Oral Interpretation. (6) Formerly 3. Four to 4 1/2 hours of lecture per week. A continuation of Rhetoric 30. Pre-requisite: Rhetoric 30 or consent of instructor. A close reading of the works of modern and classical writers. Emphasis is on the point of view can be described as rhetorical—Richards, Burke, Cassirer, and others. Mr. Quinn

101. Rhetoric Theory and Practice: Middle Ages. (6) Formerly 154. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30 or consent of instructor. Examination of the way in which various rhetorical principles and patterns inform such verbal modes of expression as alliteration, romance, fabliau, sermon, saint's legend, etc. Ms. Richardson

125. Rhetorical Stance in Lyric Poetry, (5) Formerly 125. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Analytic and constructionist implication for interpretation of short poems considered as the utterances of dramatic speakers. Mr. Geiger

126. Rhetoric of Symbolism. (B) Four to 4 1/2 hours lecture per week. Prerequisite: Rhetoric 10. The concept of style and stylistics in general, and the stylistic study of a single author's style in particular. Concentration generally is on one or two directors (e.g. Antonioni, Bergman, Resnais). Course may be repeated for credit as course conditions change. Mr. Chatman

131. Rhetoric of Religious Discourse. (6) Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Consideration of the rhetoric of hermeneutics or biblical interpretation with special emphasis on the mythical, symbolic, and allegorical language as the bearer of persuasive intentions in religious discourses. The Staff

132. The Language of Film. (6) Four to 4 1/2 hours lecture per week. Prerequisite: consent of the instructor. An introduction to the stylistics of the hearable, audible, and visible. Mr. Bello

135. Rhetoric of Non-Literate Genres. (6) Four to 4 1/2 hours lecture per week. Prerequisite: Rhetoric 30 or consent of instructor. Consideration of the special problems of an author or speaker's presentation of himself in relation to the character of his intended audience. Mr. Willy

140. Oral Interpretation of Poetry and Prose. (6) Formerly 106 Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Relations of oral interpretations to critical analysis of literary texts. Principles and practice of effective oral reading. Open to students who have taken course 1C or 32. Mr. Geiger

142. The Lyric Mode. (6) Formerly 171 Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30, Rhetoric 1A-1B, or consent of instructor. Qualities of the various lyric modes developed through oral reading, advanced study of the traditional lyric voice in the major American and English literary periods. Mr. Bello

143. The Narrative and Dialogic Mode. (6) Formerly 172 Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30, Rhetoric 1A-1B, or 1C and 144 or consent of instructor. Same as 142, but with reference to the narrative and dialogic voices as developed in both poetry and prose. Mr. Bello

144. Readers Theatre. (6) Formerly 4 and 175. Four to 4 1/2 hours of lecture per week. Prerequisites: courses 1C, 30, and 32, or consent of instructor. Understanding literary genres through group performances. Mr. Chatman

152. Rhetoric of Constitutional Discourse. (6) Formerly 142. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Analysis of Constitutional documents from the Constitutional Convention to the present. Consideration of the rhetoric in works of Madison and Jefferson and its role in Supreme Court documents concerning interpretations of the Constitution and its Amendments. Mr. Smith

153. American Political Rhetoric. (6) Formerly 143A-142B. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Writings and speeches of modern speakers for major political movements; problems of ideological commitment, with special emphasis on the comparison of intellectual perspectives from the realities of politics, social science and culture. Mr. Willy

154. English Political Rhetoric. (6) Formerly 143A-142B. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. An assessment of rhetorical strategies in the rhetoric of contemporary political thought. Mr. Willy

159. Rhetoric of Nineteenth Century Imperialism. (6) Formerly 145. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Analysis of the rhetorical patterns in official and public documents relating to English, French and German imperial expansion policies in the latter half of the 19th century. Special attention to Middle Eastern and African spheres of interest. Mr. Willy

156. Rhetoric of the Nonfictional. (6) Formerly 146 and 147. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30 and 120. The collection of formal ideological structures as they appear in modern nonfictional and fictional prose. Mr. Willy

158. Rhetoric of Continental European Ideology. (6) Formerly 148. Four to 4 1/2 hours lecture per week. Prerequisite: Rhetoric 30 and 120. The collection of formal ideological structures as they appear in modern nonfictional and fictional prose. Mr. Willy

160. Oral Argument. (3) Formerly 105. Three hours of lecture per week. Principles and practice of oral argument. May be repeated for a maximum of 9 units. Mr. Stripp

161. Rhetoric of Legal Documents. (6) Formerly 144. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. An examination of specific codes and as an expression of codes and as an extension of the relations and intentions of filmakers. Reference to related codes will be made. Mr. Chatman

163. Legal Conceptions of Proof and Authority. (6) Formerly 158. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Examination of fundamental concepts and assumptions in Anglo-American procedure, rules of evidence and sources of authority for judicial decision. Major topics will include legal proof and issues of judicial reliance on precedent, natural law and expediency. The Staff

165. Rhetoric of Legal Philosophy. (6) Formerly 159. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Consideration of the basic philosophical issues in legal theory and the intellectual history of the rule by law. Grade includes theoretical analysis of philosophical disputes, as well as conventional legal documents. The Staff

171. Rhetoric of Scientific Discourse. (6) Formerly 161B. Four to 4 1/2 hours of lecture per week. Prerequisites: Rhetoric 30, 1A-1B, or 10. Studies in the rhetorical limitations and the discreetness of modern declarative (as distinct from primarily suasive and epideictic) genres: scientific discourse. Mr. Quim

172. Rhetoric of Social Theory. (6) Formerly 162 Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. An examination of rhetorical analyses and the intellectual history of the rule by law. Grade includes theoretical analysis of philosophical disputes, as well as conventional legal documents. The Staff

173. Rhetoric of Historical Discourse. (6) Formerly 161C. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30, 1A-1B, or 10. Studies in the rhetorical limitations and the discreetness of modern declarative (as distinct from primarily suasive and epideictic) genres: History. Mr. Quin

174. Rhetoric of Psychological Discourse. (6) Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. The nature of the art of argument and the dialectic of contemporary psychoanalytic thought. Mr. Willy

175. Rhetoric of Philosophical Discourse. (6) Formerly 161A. Four to 4 1/2 hours of lecture per week. Prerequisites: Rhetoric 30, 1A-1B, or 10. Studies in the rhetorical limitations and the discreetness of modern
GRADUATE COURSES

A prerequisite for all graduate courses is graduate status and approval of the graduate adviser.

200. Introduction to Graduate Study in Rhetoric. (4) Formerly 291A. Four hours of seminar per week. Prerequisite: graduate standing in Rhetoric. An introduction to research methodology, bibliography, and scholarly writing in the field of Rhetoric. Mr. Nathan

202A—202B—202C—202D. Principles of Rhetorical Theory. (4) Four hours of seminar per week. Prerequisites: Rhetoric 30 or consent of instructor. Intensive examination of issues in contemporary rhetorical theory. The nature and function of aesthetic criteria of invention theory. This course is normally required of all first-year graduate students. Mr. Brandt

210A—210B. History of Oral Literature and Oral Interpretation. (3-3) Three hours of seminar per week. Prerequisite: Rhetoric 30 or consent of instructor. Examination of oral literature with emphasis on the oral compositional aspects of the epic tradition; the shaping of oral communication as literature changes from oral composition, to written composition, to printed transmission. Credit and grade will be awarded upon the completion of the full sequence. Mr. Slone and Staff

210C. A History of Information. (4) Four to 4 1/2 hours of seminar per week. Contemporary approaches to interpreting literary structure and meaning, including assessment of the role of the interpretive function. Mr. Geiger

213A—213B. Methodology of Oral Interpretation: Individual Authors. (6-6) Intensive study of the oral implications in the works of specific authors by means of an extensive examination of their canons. Students must complete both parts of the sequence. Credit and grade will be awarded upon completion of the full sequence. Mr. Geiger

215A—215B. Explication and Oral Interpretation. (3-3) Three hours of seminar per week. Studies in textual analysis with emphasis on twentieth-century canons. Mr. Geiger

217. Poetics and the Lyric Voice. (5) Four or 4 1/2 hours of seminar per week. Investigations into the changing notions of "natural" voice—"tone of voice" in individual works; its general relation to cost and temporaneous poetic theory. Mr. Slone and Staff

221. Prosody and Oral Communication. (5) Four to 4 1/2 hours of seminar per week. Advanced study in the analysis of the aesthetic usage of metrics and rhythm, the history of metrics, and the relationship of metrics to oral transmission. Mr. Belk

225. Oral Tradition in Poetry. (5) Four to 4 1/2 hours of seminar per week. Advanced studies in the modes of oral composition of poetry, with special emphasis on similarities and differences in different traditions. Mr. Mella

230. Rhetoric and Rhetorical Criticism: Ancient Greece. (4) Four to 4 1/2 hours of seminar per week. Prerequisite: competence in Greek. Rhetoric in Ancient Greece: its influence on current rhetoric and as it permeated subsequent discourse. Topic to be announced. The Staff

231. Rhetoric and Rhetorical Criticism: Ancient Rome. (4) Four to 4 1/2 hours of seminar per week. Prerequisite: graduate status and approval of the graduate adviser; competence in Latin. Rhetoric in ancient Rome: its influence on current rhetoric and as it permeated various forms of Latin discourse. Ms. Richardson

232. Rhetoric and Rhetorical Criticism: The Middle Ages and Renaisances. (5-5) Examination of the developing connections between rhetorical theory and aesthetics, particularly poetics, in the Middle Ages and Renaisances, and the consequences of poetic practice. Credit and grade will be awarded upon completion of the full sequence. The Staff

239. Rhetoric and Ideology. (5) Four to 4 1/2 hours of lecture per week. Rhetorical differentiation of formal ideological structures as they appeared in medieval rhetoricians and as practiced by medieval writers. Ms. Richardson

234A—234B. Rhetoric and Poetics in the Middle Ages and Renaissance. (5) Examination of the similarities and differences in different traditions. Mr. Chatman


246. Studies in Legal Rhetoric. (5) Four to 4 1/2 hours of seminar per week. The nature and function of rhetorical analysis as a technique for the examination of legal materials. Mr. Brandt

252. Advanced Stylistics. (5) Four to 4 1/2 hours of seminar per week. The linguistic specification of stylistic aspects of the literary style: phonostylistics of "schemes" and meter, stylistic choice in grammar (particularly syntax), in vocabulary (including personal and related phenomena), and in discursive structure. Mr. Chatman

253. Style and Discourse. (5) Four to 4 1/2 hours of seminar per week. The several definitions of style (ornament, linguistic surface, individual manner, deixis, relation of speaker to audience) and how these fit together with theories of rhetoric. A consideration of the actual features selected by which style reveals itself (semantic, syntactic, etc.). Mr. Chatman

254. Advanced Narrative Analysis. (5) Four to 4 1/2 hours of narrative per week. Modern theories of narrative structure, in the context of permission and French Structuralist thinking, as well as Aristotelian and Neo-Aristotelian schools and theoretical models like those of Chatman. Mr. Chatman

266. Values and World View: Cultural Bases of Communication. (5) Four to 4 1/2 hours of seminar per week. Structural analysis of cultural patterns of communication; cultural dynamics of speech and social behavior; criteria of credibility in different cultures; relations of verbal to non-verbal behavior. The Staff

268. Advancement Studies In the Rhetoric of the Novels. (5) Four to 4 1/2 hours of seminar per week. Advanced intensive study of the novel, with attention to its broad structure and component elements and the relationship of character, plot, and audience, directed at the examination of various strategies used as modes of meaning and, ultimately, persuasiveness. Mr. Belk

270A—270B. Research Seminars In Rhetorical Theory. (A—1; B—0) One to five hours of seminar per week. Prerequisite: completion of M.A. Oral Examination. Individual study of the theory and practice of a single rhetorician or of a rhetorical movement. Offers very few year to year. Students should consult the department’s announcements for offerings in the current academic year. May be repeated for credit. Credit and grade will be awarded upon completion of the full sequence. The Staff (Mr. Sloane in charge)

276. Special Study. (1—5) One to five hours of lecture per week. Prerequisite: graduate status and approval of the graduate adviser. Open to qualified graduate students who wish to pursue special studies and research under the direction of a member of the staff. May be repeated for credit to a total of ten units. The Staff

289. Directed Research. (1—6) One to six hours of research per week. Prerequisite: approval of graduate adviser. Open to qualified graduate students who wish to pursue special studies and research under the director of a member of the staff. Primarily for students engaged in preparation of the doctoral thesis. Sections 1 through 15 to be graded on a satisfactory/unsatisfactory basis; section 16 to be graded on a letter grade basis. The Staff

300. Problems In Teaching Rhetoric. (1—6) Up to four and one-half hours of lecture per week. Prerequisite: graduate students and others by consent. 300A. Oral Interpretation. 300B. Argumentative Composition. 300C. Speech Sciences. 300D. Rhetoric. The Staff

301. Individual Study for Master’s Students. (1—6) Individual study for completing degree requirements in consultation with the field adviser. Units may not be used for either unit or residence requirements for a master’s degree. Must be taken on a pass/no pass basis. The Staff

302. Individual Study for Doctoral Students. (1—6) Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare for their defense examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the Ph.D. Degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff
Scandinavian

Department Office, 1305 Dwinelle Hall

Professor: Eric O. Johannesson, Ph.D.

Associate Professor: James L. Larson, Ph.D.

Berge G adecz Madzen, Ph.D.

Gregory P. Nybo, Ph.D.

Chancellor

Professor: John F. Lindow, Ph.D.

Seminar in Hispanic Linguistics (Spanish 209).

Introduction to Medieval Hispanic Literature (Spanish 220A–220B).

**4A–4B. Elementary Danish. (6–8) Five classroom hours and at least a 1-hour language laboratory per week.

4A. Elementary grammar, conversation. Ms. Gray (F)

4B. Elementary grammar, conversation, easy prose reading.

Ms. Gray (W)

**45. Intensive Elementary Swedish. (10) Ten hours of classroom and two hours of laboratory per week. Prerequisite: elementary grammar, conversation, composition, reading. This course is equivalent to Scandinavian 1A and 1B.

11A–11B. Intermediate Swedish. (5–6) Five class-

room hours per week. Prerequisite: course 1A–1B or the equivalent. Intermediate grammar, extensive reading, composition, conversation. 11A (Sp); 11B (Fr)

13A–13B. Intermediate Norwegian. (5–6) Five class-

room hours per week. Prerequisite: course 3A–3B or the equivalent. Intermediate grammar, extensive reading, conversation, composition. Ms. Shaterian 13A, (Sp); 13B, (F)

14A–14B. Intermediate Danish. (5–6) Five class-

room hours per week. Prerequisite: course 4A–4B or the equivalent. Elementary grammar, extensive reading, conversation, composition. Ms. Gray 14A (Sp); 14B (F)


Ms. Gray 212A (Sp); 212B (F)

UPPER DIVISION COURSES

LANGUAGE AND LITERATURE COURSES

101A–101B. Advanced Swedish. (4–4) Four hours of lecture per week. Prerequisite: course 1A–1B or the equivalent. Grammar, reading, composition.

103A–103B. Advanced Norwegian. (4–4) Four hours of lecture per week. Prerequisite: course 3A–3B or the equivalent. Grammar, reading, composition.

104A–104B. Advanced Danish. (4–4) Four hours of lecture per week. Prerequisite: course 4A–4B or the equivalent. Grammar, reading, composition.

14A–14B. Introduction to Swedish Literature. (4–4) Three classroom hours per week. Prerequisite: 101A–101B or the equivalent. Reading and analysis of representative Swedish works. 14A. From 1700 to 1870. 14B. From Strindberg to the present.

Mr. Johannesson 14A (Sp); 14B (F)

143A–143B. Introduction to Norwegian Literature. (4–4) Three classroom hours per week. Prerequisite: 103A–103B or the equivalent. Reading and analysis of representative Norwegian works. 143A. From 1800 to 1890. 143B. From Hamar to the present.

Ms. Nybo, 143A (Sp); 143B (F)

144A–144B. Introduction to Danish Literature. (4–4) Three classroom hours per week. Prerequisite: 104A–104B or the equivalent. Reading and analysis of representative Danish works. 144A. From Brandes to the present.

Ms. Gray, 144A (Sp); 144B (F)

150. The Scandinavian Languages: History and Structure. (4) Three hours of lecture and discussion per week. Prerequisite: 20 units of lower division courses in Swedish or the equivalent. Composition in conjunction with the reading of selected Swedish texts.

Mr. Lindow (W)

151. Advanced Swedish Composition. (3) Three classroom hours per week. Prerequisite: 20 units of lower division courses in Norwegian or the equivalent. Composition in conjunction with the reading of selected Norwegian texts.

Mr. Shaterian (W)

152. Advanced Danish Composition. (3) Three
classroom hours per week. Prerequisite: 20 units of lower division courses in Danish or the equivalent. Composition in conjunction with the reading of selected Danish texts.

H150. Special Study for Honors Candidates, (2–5) Enrollment is restricted by regulations

190. Directed Group Study for Advanced Undergraduates, (2–5) Prerequisite: at least two years of one of the Scandinavian languages. Advanced preparation and interpretation of modern Scandinavian texts.
The Staff (Mr. Madsen in charge) (F, W, Sp)

190. Supervised Independent Study and Research, (2–5) Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis.
The Staff (F, W, Sp)

COURSES IN SCANDINAVIAN LITERATURE

Courses listed below require no knowledge of a Scandinavian language. They are open to students with at least a junior standing and, with consent of instructor, to properly qualified students with sophomore standing.

107. The Plays of Ibsen, (4) Three 1-hour lectures per week. Reading and discussions of Ibsen's major plays.

Mr. Gray (Sp)

108. Strindberg, (4) Three 1-hour lectures per week. Reading and discussion of Strindberg's major works with emphasis on his dramas and their significance.

Mr. Madsen (F)

110. Scandinavian Drama of the Twentieth Century, (4) Three 1-hour lectures per week. Reading of modern Scandinavian dramas in translation. Discussions.

Mr. Madsen (Sp)

111. Hans Christian Andersen, (4) Three 1-hour lectures and discussions per week. Emphasis will be on Andersen's novels, travel books, and autobiographies.

Mr. Madsen (F)

112. Knut Hamsun, (4) Three 1-hour lectures and discussions per week. Reading and discussion of Hamsun's major works. Some attention will also be given to Andersen's novels, travel books, and autobiographies.

Mr. Nybo (W)

114. Ibsen Dinesen, (4) Three 1-hour lectures and discussions per week. Reading and discussion of Dinesen's best stories and tales.

Mr. Johannesson (Sp)

1120–1208. The Novel in Scandinavia, (4) Three 1-hour lectures per week. Course 120A is not prerequisite to 120B. Reading and discussion of great Scandinavian novels; lectures on the development of the novel.

Mr. Nybo 120A (F); 120B (Sp)

123. The Viking Age, (4) Three 1-hour lectures per week. Course 210 or equivalent is prerequisite. Emphasis will be on oral narrative traditions (legends, folktales and ballads). Proverbs, riddles, folk beliefs, music, will also be considered.

Mr. Lindow (F)

125. Old Icelandic Literature, (4) Three 1-hour lectures per week. Critical survey of mythology in ancient Scandinavia. Lectures and readings of selected material in English translation.

Mr. Lindow (Sp)

185. Scandinavian Folklore, (4) Three 1-hour lectures of Scandinavian folklore with primary emphasis on oral narrative traditions (legends, folktales, and ballads). Proverbs, riddles, folk beliefs, customs, music, will also be considered.

Mr. Lindow (F)

187. Contemporary Swedish Literature, (4) Three classroom hours per week. Reading and discussions of Swedish works in translation from World War II to the present.

Mr. Lindow (F)

173. Cultural and Intellectual Trends in Modern Sweden, (4) Formerly 51. Three hours of lecture per week. Reading and discussions of Swedish intellectual trends, illustrated with current events. Emphasis will be on the role of the intellectual in society. will also be considered.

Mr. Lindow (F)

175A–175B. Kierkegaard, (5–5) Three classroom hours and one hour of discussion per week. Prerequisite: 175A is prerequisite to 175B. 175A, Introduction to Kierkegaard. Critical analysis of three of Kierkegaard's major works, Either/Or, Concluding Unscientific Postscript, and Fear and Trembling, designed to provide a comprehensive introduction to the basic

texts of Kierkegaard's Existentialism. 175B, Problems in the Philosophy of Kierkegaard. Close critical study of a few of the central issues in Kierkegaard's philosophy which cannot be examined sufficiently in an introductory course: subjectivity as truth, indirect communication, inwardness, the existential dialectic, etc.

Mr. Larson (W, Sp)

GRADUATE COURSES

LANGUAGE COURSES


Mr. Lindow (W)

202. Old Icelandic, (4) Three 1-hour lectures per week. Descriptive and historical phonology and grammar. Some attention is given to Old Norwegian.

Mr. Beeler (W)


(F)


Mr. Lindow (Sp)

206. Readings of Old Icelandic Texts, (4) Three 1-hour lectures per week. Prerequisite: course 202 or equivalent. One Old Icelandic saga and one or two poems of the Edda will normally be read in this course. May be repeated with consent of instructor.

(Sp)

**208. The Poems of the Poetic Edda, (4) Three 1-hour lectures per week. Reading of some of the most important poems with emphasis on the mythological songs.

(Sp)

**215. Scandinavian Dialects, (4) Three 1-hour lectures per week. Course 210 or equivalent. One Old Icelandic saga and one or two poems of the Edda will Normally be read in this course. May be repeated with consent of instructor.

Mr. Lindow (F)

230. Seminar In Scandinavian Linguistics, (4) One 2-hour lecture per week. Conference work on chosen or assigned topics; at least one shorter paper a quarter is normally required.

Mr. Lindow (F)

LITERATURE COURSES

**2301. Proseminar In Bibliography and Literary Methods, (4) Three 1-hour lectures per week. Training in the use of bibliographical materials for the study of Scandinavian languages and literatures; analysis and interpretation of selected texts with emphasis on literary method. May be repeated for credit with permission of the Graduate Adviser and the Instructor.

Mr. Lindow (F)

Swedish Literature. Mr. Johannesson, Mr. Larson

Danish Literature. Mr. Madsen

Norwegian Literature. Mr. Nybo

Old Icelandic and Medieval Literature. Mr. Lindow

Swedish Language. Mr. Lindow

Norwegian Language. Mr. Madsen

Danish Language. Mr. Madsen

Icelandic. Mr. Lindow

220. The Icelandic Saga, (4) Three 1-hour lectures per week. Prerequisite: courses 202 and 206 or equivalent. Reading and analysis of representative works with emphasis on problems of origin and on the saga as a literary genre.

Mr. Lindow (W)

**225. The Scandinavian Ballad, (4) Three 1-hour lectures per week. Emphasis on oral narrative traditions (legends, folktales, and ballads). Proverbs, riddles, folk belief, music, will also be considered.

Mr. Lindow (F)

230. Eighteenth Century Scandinavian Literature, (4) Three 1-hour lectures per week. Reading and analysis of representative works.

Mr. Larson (F)

231. Romanticism in Scandinavia, (4) Three 1-hour lectures per week. Reading and analysis of representative works.

Mr. Larson (F)

**241. Modern Swedish Literature, (4) Three 1-hour lectures per week. Reading and analysis of representative works.

Mr. Johannesson (W)

**2434. Modern Norwegian Literature, (4) Three 1-hour lectures per week. Reading and analysis of representative works.

Mr. Nybo (W)

251. Seminar In Scandinavian Literature, (4) One 3-hour lecture per week.

The Staff (F, W, Sp)

255. Seminar in Scandinavian Folklore and Mythology, (4) One 3-hour class per week. Prerequisite: knowledge of Old Icelandic or of a modern Scandinavian language. Investigation of selected problems in Scandinavian Folklore and Mythology.

Mr. Lindow (Sp)

265. Special Study, (2–6) Designed for students en- gaged in a program of research or in a project of a research nature. The writing of a report. May not be substituted for available seminars for graduate courses.

The Staff (Mr. Lindow in charge) (F, W, Sp)

601. Individual Study for Master's Students, (1–6) Individual study in the comprehensive or language requirements in consultation with the field adviser. Units may not be used to meet either unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (F, W, Sp)

602. Individual Study for Doctoral Students, (1–6) Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (F, W, Sp)

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Science and Mathematics Education

Group Office, 347 Birge Hall

Professors:

Max Allert, Ph.D. (Zoology)
Stuart C. Beatty, Ph.D. (Astronomy)
Walter J. Freeman, Ph.D. (Physics)
John E. Heerst, Ph.D. (Chemistry)
Paul A. Hotel, Ph.D. (Agriculture)
Leon A. Hopkin, Ph.D. (Civil Engineering)
William J. March, Ph.D. (Botany)
Robert Rogers, Ph.D. (Physics)
John L. Kelley, Ph.D. (Mathematics)

Associate Professors:

Robert M. Glineer, Ph.D. (Medical Physics)
Lawrence F. Lowery, E.D.D. (Education)

Lecturers:

Donald S. Ciccione, Ph.D. (Science and Mathematics Education)
Edward M. Dahlke, Ph.D. (Psychology)

Watson B. Letcht, Ph.D. (Astronomy)

FOR KEY TO SYMBOLS, SEE PAGE 34.

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The undergraduate major program usually emphasizes The Department offers courses in the several Slavic languages and literatures and for interested students from other departments. A large number of its literature courses require no knowledge of any foreign language. For all students the major program includes an introduction to the cultural history and the literatures of other Slavic peoples at least an elementary knowledge of Russian. Under the auspices of the Department, courses in non-Slavic languages and literatures of Eastern Europe are given as opportunity arises. The MAJOR Lower Division. Emphasis on Russian: courses 1, 2, 3, 4, 5, 6, or their equivalents: course sequence 45A–45B–45C. Emphasis on a Slavic language other than Russian: courses 1, 2, 3, and 12 units of the other Slavic language; course sequence 45A–45B–45C. Upper Division. 45 units, including 15 units in the major language and, for students majoring in Russian, course sequence 128A–128B, course 136, 150, 158, or 159, and 5 additional units in Russian literature, and one of the following course sequences: 160A–160B, 160A–160C, or 160A–160D. For students majoring in another Slavic language, literature, or Slavic linguistics, both major and upper division language courses are required to take course sequence 128A–128B, in addition to the 10-unit survey sequence. Honors Program. With the approval of the major advisor, students with an overall grade point average of 3.3 or better, who have completed all courses in the major, may apply for admission to the honors program. This program will include courses 1950 (honors proseminar), in which a thesis will be written, and 10 units, in addition to those required for the major, in upper division language courses. For majors in Russian these are courses 134A–134B or, in special cases and with the permission of the Department, courses 125A–125B. Successful completion of the honors program requires the Russian language and literatures as required by the Department, or must complete the honors program. Applications for the program should be submitted at the major advisor. PREPARATION FOR GRADUATE STUDY Candidates for higher degrees must have completed the undergraduate major program in Slavic languages and literatures as required by the Department, or must present evidence that they have received equivalent training. Both the M.A. and Ph.D. programs require work in two Slavic languages or literatures, of which one must be Russian. Preparation in other European literatures, especially French, German, English, in comparative literature, in languages (especially French, German, Italian), and in Russian intellectual history is valuable for candidates in literature. For candidates in linguistics, preparation in French, German, Latin or Greek and in general and comparative linguistics is desirable.

GRADUATE PROGRAMS M.A. and Ph.D. programs are offered in Russian, Polish, Czech, and Serbo-Croatian, each with either linguistic or literary emphasis. The M.A. requirements include: reading knowledge of French or German; 36 units of upper division and graduate courses approved by the Department, including 210A-210B; at least one course in a second modern Slavic language; and a final comprehensive examination, partly written and partly oral. Courses 104A–104B may be waived by examination and 125A are required of major Russian. Ph.D. candidates must have an M.A. from this Department or show evidence of equivalent training. A reading knowledge of both French and German is required. Through course work and individual study as approved by the graduate advisor the student prepares for the general qualifying examinations, both oral and written. Ph.D. candidates must have an M.A. from this Department or show evidence of equivalent training. A reading knowledge of both French and German is required. Through course work and individual study as approved by the graduate advisor the student prepares for the general qualifying examinations, both oral and written. Not all the courses listed below may actually be offered in 1976-77; further, the quarter in which a particular course may be given and its instructor may be changed. Students should consult the Schedule of Classes issued each quarter for more precise information, and the Departmental bulletin board for the specific topics of courses with variable subject matter.

LOWER DIVISION COURSES The first unit of secondary school credit in a language is considered to be equivalent to the first quarter course in college; each successive unit of credit in the same language is equal to one additional course in a sequence of four quarter courses in college.

1. Elementary Russian, Beginning Russian (5). Five 1-hour meetings and two 1-hour laboratories per week. S. Kassatkin in charge (F, W, Sp)
2. Elementary Russian, (5). Five 1-hour meetings and two 1-hour laboratories per week. Prerequisite: course 1.
3. Elementary Russian, (5). Five 1-hour meetings and one 1-hour laboratory per week. Prerequisite: course 2.
4. Intermediate Russian, (5). Five 1-hour meetings and one 1-hour laboratory per week. Prerequisite: course 3.
5. Intermediate Russian, (5). Five 1-hour meetings and one 1-hour laboratory per week. Prerequisite: course 4.
6. Intermediate Russian, (5). Five 1-hour meetings and one 1-hour laboratory per week. Prerequisite: course 5.

RUSSIAN LANGUAGE WORKSHOP. (4–9) Prerequisite: course 1. Students who have accumulated more than five units in the course (or in the Group RUSS) are not eligible for re-enrollment. Individualized instruction covering the material of courses 2, 3, 4, 5, and 6. Prerequisite: permission of the major advisor.

21A–21B–21C. Intensive Russian. (8–8–8) Ten 1-hour meetings and two 1-hour laboratories per week. This course covers the same ground as courses 1 through 6 and qualifies for admission to 103A.

22. Elementary Polish. (4) Four 1-hour lectures and one hour of laboratory per week. F. J. Whittfield in charge (F)
24A–24B. Intermediate Polish. (4–4) Four 1-hour meeting per week. Prerequisite: course 23.
29. Elementary Czech. (4) Four 1-hour lectures and one hour of laboratory per week.
30A–30B. Intermediate Czech. (4–4) Four 1-hour meeting per week. Prerequisite: course 29.
31. Great Writers of Russian Literature. (4) Four 1-hour meeting per week. No knowledge of Russian is required.

UPPER DIVISION COURSES 103A–103B–103C. Advanced Russian. (5–5–5) Three 1-hour meetings and one 1-hour laboratory per week. Prerequisite: course 6 or 21C.

Preparation for the General Examinations in Russian is offered. The Staff (F)
45A–45B–45C. Survey of Russian Literature and Interramshen' trends. (4–4–4) Three 1-hour meetings per week. Students in the major program are advised to take this course in sequence.

45A. From the eleventh century to 1845. H. McLean
45B. From 1845 through the nineteenth century. J. Grossman
45C. The twentieth century. I. Masing-Delic

Slavic Languages and Literatures

Department Office, 5416 DWITELLE HALL

Professors:
Simon Karlinsky, Ph.D.
Hugh McLean, Ph.D.
F. J. Whitfield

Associate Professors:
J. Grossman, Ph.D.
Hugh McLean, Ph.D.

Assistant Professors:
J. Grossman, Ph.D.

Visiting Professor:
J. Fennell, Ph.D.

Senior Lecturers:
Serge Kassatkin, M.A.

Lecturers:
Olga Asbomoff, M.A.
Emilia Lackovar, Diplomirani Filozof

Departmental Major Advisers: Ms. M. P. Coote, Mr. F. J. Whittfield

Departmental Graduate Advisers: Mr. S. Karlinsky, Ms. J. Nichols.

The Department offers courses in the several Slavic languages and literatures and in Slavic linguistics, both for those pursuing the Department's own degree programs and for interested students from other departments. A large number of its literature courses require no knowledge of any foreign language. The undergraduate major program usually emphasizes Russian, but honor students may choose Czech, Polish, or Serbo-Croatian as their special field of study.
LECTURE COURSES ON SLAVIC LITERATURES

Except where otherwise indicated, these courses are given in English and require no knowledge of any other language.

130. Topics in Twentieth Century Russian Literature. (5-5) Three 1-hour lectures and one hour of discussion section per week. Prerequisite: courses 24B, 103B (may be taken concurrently) or consent of instructor. Lecture course given in Russian. Reading, analysis, and interpretation of representative authors from the nineteenth century to the present. All readings in the original. Course may be repeated without duplication of credit. Topic to be changed every quarter. J. Grossman (F, W, Sp)

132A-132B. Survey of Russian Literature. (5-5) Three 1-hour lectures and one hour of discussion section per week. Prerequisite: course 103A (to 125A), course 103B (to 125B). Prerequisite: course 24B. Sequence beginning (W), M. P. Coote (Sp)

139. Twentieth Century Russian Literary Criticism. (5) Three 1-hour lectures and one hour of discussion section per week. Prerequisite: course 103C (may be taken concurrently) or consent of instructor. O. Sorokin-Vasiiiev (W)

141. Literature of Eastern Orthodoxy among the Slavs. (5) Four 1/2-hour classes and one 1-hour discussion section per week. Prerequisite: course 103B (may be taken concurrently). Recommended for majors in Russian. Sequence beginning (F), J. Nichols

145. Manichaeism Old and New: The Problem of Evil in Slavic Literatures. (5) Three hours of lecture and one hour of discussion per week. Accessible to all students interested in philosophy and literature. Medival heretical movements will be discussed as historical background, but more attention will be given to modern literature with emphasis on Slavic writers. C. Milosz (W)

147. Slavic Folklore. (5) Formerly 137. Three hours of lecture and one hour of discussion per week. The course will be concerned chiefly with oral traditional literature (tales, epics, lyrics, proverbs), but customs, beliefs, and other forms of folklore will also be discussed. M. P. Coote (Sp)

150A-150B. Survey of Polish Literature and Intellectual Trends. (5-5) Three 1-hour lectures and one hour of discussion section per week. Sequence beginning (F), C. Milosz 150A. To 1848. 150B. Since 1848.

156. The Polish Theater. (5) Three 1-hour lectures and one hour of discussion section per week. C. Milosz (W)

159. Contemporary Polish Poetry and Fiction. (5) Three 1-hour lectures and one hour of discussion section per week. C. Milosz (F)

160A-160B. Survey of Czech and Slovak Literature. (5-5) Three 1-hour lectures and one hour of discussion section per week. Sequence beginning (W), M. P. Coote

170A-170B. Survey of Serbian and Croatian Literature. (5-5) Three 1-hour lectures and one hour of discussion section per week. Sequence beginning (W), S. Karinsky

180. Russian Prose. (5) Three 1-hour lectures and one hour of discussion section per week. Prerequisite: course 103C (may be taken concurrently) or consent of instructor. J. Grossman (in Russian. Reading, analysis, and interpretation of representative authors from the nineteenth century to the present. All readings in the original. Course may be repeated without duplication of credit. Topic to be changed every quarter. O. Sorokin-Vasiiiev (F)

H195. Honors Prosseminar. (5) Two 2-hours of discussion, or individual meetings with the instructor, per week. Advanced study for seniors in the honors program, culminating in the writing of a thesis. The Staff (W, Sp)

199. Supervised Independent Study and Research. (1-5) Enrollment is restricted by regulations listed on page 34. Additional limitation: overall grade-point average of at least 3.00. Must be taken on a pass/fail or pass basis. The Staff (W, Sp)

GRADUATE COURSES

210A-210B. Old Church Slavonic. (3-3) Two 1/2-hour meetings per week. Sequence beginning (W), F. J. Whitfield

211. Readings In Old Russian. (4) Prerequisite: Slav 210A-210B. F. J. Whitfield (F)

220. Comparative Slavic Linguistics. (4) Two 1/2-hour meetings per week. Prerequisite: courses 210A-210B. F. J. Whitfield (W)

225. Historical Russian Grammar. (4) Three 1-hour meetings per week. Prerequisite: courses 210A-210B. J. Nichols (W)

229. Russian Oral Tradition. (4) Three hours of lecture per week. Prerequisite: much of the reading is in nonstandard Russian, and requires a good command of the language. Major emphasis will be placed on the epic (Byliny), but other forms of orally transmitted literature also will be discussed. H. McLean (SP)

230A-230B-230C. Old Russian Literature. (4-4-4) Three hours of lecture per week. Prerequisite: reading knowledge of Old Russian. 230A. Eleventh through thirteenth century. J. Fennell (Sp)

*230B. Fourteenth through sixteenth century. H. McLean (W)

*230C. Seventeenth century. H. McLean (Sp)

*231. Eighteenth Century Russian Literature. (4) Three hours of lecture per week. J. Nichols (W)

290. Studies in Slavic Literatures and Linguistics. (4) One 2-hour meeting per week. Advanced studies in the several fields of Slavic literatures and linguistics. Course content varies. Course may be repeated without duplication of credit. The Staff (W, Sp)

NOTE: For key to symbols, see page 34.
281. Proséminaire: Aims and Methods of Literary Scholarship. (4) Two 1 1/2-hour lectures per week. Course designed particularly for new graduate students in the Department whose programs will emphasize the study of Slavic literatures.

282. Proséminaire: Aims and Methods of Linguistic Scholarship. (4) Two 1 1/2-hour lectures per week. Course designed particularly for new graduate students in the Department whose programs will emphasize the study of Slavic linguistics. J. Nicholls (F). *290. Seminar. (4–4) One 2-hour meeting per week. Advanced study in Slavic languages and literatures. Topics will vary from year to year and will be announced at the beginning of each quarter. Two-quarter sequence required for completion in Seminar 290. Credit and grade to be awarded at close of sequence. The Staff (F, W, Sp).

288. Special Study for Graduate Students. (2–9) Preliminary exploration of a restricted field involving research and a written report. The Staff (F, W, Sp).

289. Directed Research. (2–9) Normally reserved for students directly engaged upon the doctoral dissertation. To be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp).

282. **Scholarship.** (4) Two 1 1/2-hour lectures per week. Course designed particularly for new graduate students in the Department whose programs will emphasize the study of Slavic linguistics. J. Nicholls (F).

GROUP MAJOR IN SOCIAL WELFARE
Major Office, 117 Haviland Hall
Major Advisers: Mr. Neil Gilbert, Mr. James R. W. Leby
The group major in social welfare, leading to the degree of Bachelor of Arts in the College of Letters and Science, offers a social welfare sequence of general interest to liberal arts students. It provides students with an opportunity to test their career interest in social work prior to pursuing graduate professional education and prepares them for community service positions beginning directly after graduation. Applications are considered in fail only, on a first-come/first-served basis. Number of units and prerequisite courses completed are considered for admission.

MAJOR REQUIREMENTS

**Lower Division.** Psychology 1, Sociology 1A, and Statistics 2. Recommended: Anthropology 3, Economics 2, Political Science 1.

Upper Division. Social Welfare 102A–102B (3–3), 103A–103B (2–2), 110A–110B (5–5), and five courses chosen from the following list, with three of the courses taken in one department and two selected from the other departments: Anthropology 140, 142, 143, 144, 145, 150, 152; Economics 100A, 100B, 155, 157; Political Science 108, 181, 182, 183; Psychology 140, 150, 151, 155, 160; Public Policy 181, 182, 184, 185; Sociology 120, 140, 142, 157, 162.

Honors Program. Eligible social welfare majors, upon recommendation of their advisers, may enroll in an honors program. A candidate for honors must complete an honors seminar in social welfare and social work practices (Social Welfare H195A–H195B). A senior essay is part of the final quarter of the seminar. The essay, which will be of a creative and integrative nature, will culminate in an individual library research project on a topic of special interest to the student. It will meet criteria established to assure breadth and depth and will be produced with reference to a timetable for compilation. Some time in the senior seminar is devoted to the planning and writing of the essay.

**Sociology**

Department Office, 410 Barrows Hall

Professors: Robert N. Bellah, Ph.D. (Ford Professor of Sociology; Comparative Studies) Kenneth E. Beck, Ph.D. John A. Clausen, Ph.D. (Chairman) Gertrude Jaeger, Ph.D. Herbert Blumberg, Ph.D. William Kirkland, Ph.D. David Mattz, Ph.D. Michael Burawoy, M.A. (Acting) Helen Edwards, Ph.D. (University Professor)

Associate Professors: Robert Blumberg, Ph.D. Troy Duster, Ph.D. Barbara Heyns, Ph.D. Victoria Bonneil, Ph.D. Edward Hays, Ph.D. (University Professor)


Lecturers: Martin A. Trow, Ph.D. (Public Policy) Alan B. Wilson, Ph.D. (Economics)

THE MAJOR

Students intending to major in sociology are advised to prepare themselves by taking background work in such areas as history, philosophy, cultural anthropology, psychology, economics, and political science.

**Prerequisite Courses in the Major:** A student must have successfully completed Sociology 1A–1B and 2 or its equivalent in either statistics or logic prior to entrance into the major.

**Lower Division.** Sociology 5, Evaluation of Evidence, is required for completion of the major and students should take this course in their sophomore year.

**Upper Division:** A student must take not less than 35 upper division units in sociology to satisfy the following requirements:

2. Two courses from the following core list: 148 or 149, 119, 110A or 110B, 118, 124, 123, 130, 140, 146, 148 or 149, 178 or 179.
3. Five elective upper division or graduate courses. Two of these may be elected from the categories of Sociology 191, 197, 198, 199, or courses taken in other departments. Of the five elective courses, two may be taken pass/not pass. Written approval is necessary for courses taken in other departments to be counted for major credit.

**Honors Programs:** Majors who enter their senior year with a grade-point average of 3.0 or better and a 3.0 grade-point average in the major may join the honors program, after conferring with a major adviser, by combining a 190 course in sociology (or other suitable department) with Sociology H195A or H195A and H194B. See Honors Thesis Program.

Students who plan to go on to graduate work in sociology or other related disciplines and professions are strongly urged to take both Sociology 157 and 158 and to take advanced work in methods.

**THE GRADUATE MAJOR**

Facilities for graduate study and research, leading to the M.A. and Ph.D. degrees, include courses, seminars, and research training under faculty supervision in the areas of comparative institutions, demography, development and sociology, industrial sociology, methodology, political sociology, race relations, social change, social psychology, social stratification, sociology of culture, of health and medicine, of law, of religion, and urban sociology. Candidates for admission must apply by February 1, except those applying for a fellowship, who must apply by November 1. No action will be taken on an application until the Department has received all required materials. In addition to the Graduate Division application, the applicant must complete the Department's own application form; applicants should also obtain the Department's own letter of recommendation forms rather than those supplied by the Graduate Division. Applicants must submit two copies of their transcripts, one to the Graduate Division and one to the Department. It is also required that applicants submit evidence of creative capacity as exhibited in written work. Applicants who are graduates of an American college or university must take either the Graduate Record Examination (apply to Educational Testing Service either at 1947 Center St., Berkeley, California 94704, or at Box 955, Princeton, New Jersey 08540) or the Miller Analogies Test. However, the Department has a preference that students take the Graduate Record Examination rather than the Miller Analogies Test. The undergraduate major need not have been in sociology. The character and quality of the individual's prior education and experience is more important than the actual field of study.

**M.A. Degree Requirements.** Coursework (36 Required Graduate Units).

One course or seminar in sociological theory is required, and one course or seminar in sociological methods. A maximum of 12 units may be counted from work taken in: upper division sociology courses, Social Welfare, Anthropology, Economics, Political Science, Psychology, and Sociology.

Lithuanian

*Lithuanian 270. Structure of Modern Lithuanian. (4) Three hours of lecture per week.

Social Welfare

Staff and courses are listed under the School of Social Welfare.
were written. The three additional papers may or may complete and file his dissertation. Under special cir-

Before the qualifying examination, the student must have completed all required courses and demon-

Within a period of no more than five years from the date

Within a period of no more than five years from the date of formal Advancement to Candidacy, the student must complete and file his dissertation. Under special circumstances, the department may recommend to the Graduate Division a one-year extension of Candidacy if the extension has been approved by the dissertation committee chairman and by the graduate adviser. 

Before formal Advancement to Candidacy for the Ph.D. degree, the student must have written and received approval by the proposed committee of a dissertation prospectus. Within a period of no more than five years from the date of formal Advancement to Candidacy, the student must complete and file his dissertation. Under special circumstances, the department may recommend to the Graduate Division a one-year extension of Candidacy if the extension has been approved by the dissertation committee chairman and by the graduate adviser. 

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science. 

LOWER DIVISION COURSES

1A-1B. Introduction to Sociology. (5-5) Two hours of lecture and two hours of discussion per week. Prerequisite: course 1A or equivalent is prerequisite to 1B. Credit and grade to be assigned at the completion of each course. 

1A. Sociological Analysis. Application of sociological ideas to fundamental problems of group life. Topics include social behavior, class, social stratification, groups and organizations, social stratification, collective behavior. 

1B. Dynamics of Modern Society. Growth and composition of human populations; urbanization and industrialization in western and non-western societies; social trends and crises as they affect major institutions, race, religion, ecosystems, and political order. 

5. Evaluation of Evidence. (5) Three hours of lecture and two hours of discussion per week. Prerequisite: open to students who have received credit for course 104 prior to Fall 1975. A review of methodology, including the assessment of data relating to social life. Topics to be covered include: posing a sociological problem, gaining access to data, measuring, establishing relationships, and causal connection among data, and relating data to theoretical context. 

20. Population and Society. (4) Three lecture hours per week. Introduction to sociological analysis using demographic data and concepts.

UPPER DIVISION COURSES

100. Social Evolution. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course, or consent of the instructor. Major views of social development; cultural cycles, progress, social and cultural evolution. 

105A-105B. Introduction to Sociological Metho-

108B. Peoples of Color: Continuities, Conflicts, and Cowards. (5) Three lecture hours and two consultation hours per week. Prerequisite: course 100A recommended but not required. Focus on the history of social movements of peoples of color in the United States. 

110. Social Class. (5) Three lecture hours and two consultation hours per week. Prerequisite: course 110A recommended but not required. There will be a great variation in focus of attention, depending on the instructor. Some courses will cover the social structure of the work-place, work experience of the individual, the dynamics of social stratification, the individual's role in society, and the interplay of religion with other spheres of social life. 

115. The Sociology of the Possible. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course, or consent of the instructor. The role of formal education in modern society; the play of religion with other spheres of social life. 

116. Sport as a Social Institution. (4) Three hours of lecture per week. Prerequisite: one lower division sociology course, or consent of the instructor. The roles of coach, athlete, fan—their interplay with other spheres of social life. 

129. Industrial and Occupational Sociology. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course, or consent of the instructor. The role of formal education in modern society; the play of religion with other spheres of social life. 

130. Sociology of the Family. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course, or consent of the instructor. The role of formal education in modern society; the play of religion with other spheres of social life. 

134. Sociology of War and Conflict. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course, or consent of the instructor. Analysis of social thought about possible social arrangements from Plato through the writers of modern social science fiction and planners of the future. 

135. The Study of Social Change in New Nations. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course, or consent of the instructor. Analysis of social thought about possible social arrangements from Plato through the writers of modern social science fiction and planners of the future. 

138. Sociology of War and Conflict. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course, or consent of the instructor. Analysis of social thought about possible social arrangements from Plato through the writers of modern social science fiction and planners of the future. 

139. Comparative Institutions. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course, or consent of the instructor. Analysis of social thought about possible social arrangements from Plato through the writers of modern social science fiction and planners of the future.
148. Elementary Collective Behavior. (3) Three lecture hours and two tutorial hours per week. Prerequisite: one lower division sociology course or consent of instructor. Social contagion and crowd behavior, paradox features, popular arts and interests, fashions, mass behavior, formation and manipulation of public opinion. Mr. Montejano (W)

149. Social Movements and Public Action. (5) Three lecture hours and two consultation hours per week. Prerequisite: restricted to majors in sociology and to those non-majors who have completed two upper division social movements, the formation and play of public opinion, and the behavior of interest groups. Mr. Kornhauser (Sp)

**150. Human Migration. (5) Three lecture hours and two consultation hours per week. Prerequisite: Sociology 1A or consent of instructor. History of international migration and analysis of its types. Study of current migration in the United States and in selected foreign countries. Statistical, social and demographic problems connected with migration.**

151. Sociology of Women. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course or consent of instructor. Historical and comparative analysis of wom- en's varying roles, statuses, and life opportunities. Consideration of the feminism movement, past and present. Analysis of the struggles over conflicting definitions of woman's "nature" and "potential." Mr. Blau (W)

154. Sociology of Illness and Medicine. (4) Three lecture hours and one consultation hour per week. Prerequisite: Sociology 1A or consent of instructor. Social and cultural factors associated with the definition, occurrence and experience of illness. Analysis of the sick role and the social systems of which it is a part. Mr. Eberhard (Sp)

158. Contemporary Sociological Theories. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course or consent of the instructor. An examination of sociological theories, with particular emphasis on modern society—"urban", "industrial", "pluralist", "totalitarian". Special attention to problems of experts and intellectuals. Mr. Wiensky (W)

160. Urban Sociology and Ecology. (6) Three lecture hours and two consultation hours per week. Prerequisite: course 157. Major theoretical perspectives, urban location and types of cities; social and demographic structures and processes associated with urban location. Mr. Wiensky (Sp)

161. Sex Stratification and the Social Experience of Man. (5) Three lecture hours and two consultation hours per week. Prerequisite: Sociology 1A or consent of instructor. The position of men in American society examined from the standpoint of social stratification. The role of women in the social system. Mr. Bock (F); Mr. Burawoy (Sp)

190. Seminar on Advanced Topics. (5) Two seminar hours and two tutorial hours per week. Prerequisite: one lower division sociology course or consent of instructor. An examination of sociological theory, and the development of paradigms and theoretical perspectives in sociology. Mr. Ofshe (Sp)

**194A-H194B. Senior Honors Theses. (5-5) Restricted to senior honors candidates. For students planning a research project in their major, advisable preparation (see description of major). Credit and grade to be awarded upon completion of 194A or upon completion of the two-quarter sequence 194A-194B.**

195. Supervised Independent Study and Research. (1-5) One to five hours per quarter. Credit assigned upon completion of the full sequence. Mr. Lowenthal (Sp)

197. Field Study In Sociology. (1-5) One to five hours per quarter. Prerequisite: consent of the instructor. Group study of selected topics which can be announced at the beginning of each quarter. Mr. Montejano (F); Mr. Blau (W); Mr. Lowenthal (Sp)

**200A-200B. Advanced Interpersonal Behavior. (4-4) Two hours of lecture or seminar plus two tutorial hours per week. Prerequisite: course 209A is recommended but not prerequisite to 210A. Students may take the lecture course 209A or the seminar 209B, or they may take 209A-209B in sequence, with credit and grade assigned upon completion of the full sequence.**

200A. Societalization and Personality. (4) Two lecture hours and two consultation hours per week. Prerequisite: course 209A or 209B. An examination of social psychology, particularly from the viewpoint of George H. Mead; the nature of the social situation, social roles, the self, socialization, the social act.

200B. Socialization and Personality. (4) Three lecture hours and two consultation hours per week. Prerequisite: graduate standing in sociology or psychology.

201A-210B. Racial and Ethnic Minorities. (4-4) Two lecture hours of seminar plus two tutorial hours per week. Prerequisite: course 210A is recommended but not prerequisite to 210B. Students may take the lecture course 210A or the seminar 210B, or they may take 210A-210B in sequence, with credit and grade assigned upon completion of the full sequence. Focuses on the study of selected topics in interpersonal behavior and small group processes: evolution of power structures, conflict, and intergroup conflict from an interdisciplinary perspective.

210A-210B. Advanced Interpersonal Behavior. (4-4) Two hours of lecture or seminar plus two tutorial hours per week. Prerequisite: course 209A is recommended but not prerequisite to 210B. Students may take the course lecture 210A or the seminar 210B, or they may take 210A-210B in sequence, with credit and grade assigned upon completion of the full sequence.

217. History of Social Thought. (4-4) Two seminar hours and two consultation hours per week. Prerequisite: course 217 or 227A-227B or equivalent. History, philosophy and social theory of the last two centuries. Mr. Montejano (F); Mr. Clausen (W)

218A-218B. Seminars In the History of Social Thought. (4-4) Two seminar hours and two consultation hours per week. Prerequisite: course 217 or 227A-227B or equivalent. Study of selected topics in the history of social thought. Mr. Setznick (F)

222. Sociology of Education. (4) Two lecture hours and two consultation hours per week. Prerequisite: Sociology 220A. Sociology of educational systems and processes; the role of education and socialization in human development and the socialization of the individual. Mr. Heyns (F)

224. Social Change. (4) Two lecture hours and two consultation hours per week. Credit and grade assigned separately for each course. A critical and contrasting examination of various approaches in social psychology and of paradigmatic empirical studies associated with each. The approach- es will be included: symbolic interactionism, neo- behaviorism, psychodynamic analyses, cognitive theories, and theories of exchange. Mr. Ofshe, Mr. Lowenthal (W)

230A-230B-230C. Research Methods Seminar Series. (4-4-4) Two hours of discussion and two tutorial hours in each quarter. Prerequisite: one lower division course in social science and permission of instructor. The seminars meet biweekly throughout the year and two tutorial hours biweekly throughout the year. Prerequisite: 230A pre- requisite to 230B and 230B prerequisite to 230C. An alternative format for methods seminars, satisfying the same requirements as comparable 202 seminars. For- mal matters of staff-meth-odology, consultation in statistical methods, planning, discussing, or analyzing a major re- search activity in which the faculty member is currently engaged. Credit and grade are assigned only upon completion of the full sequence.

235A-235B. Basic Viewpoints In Social Psychology. (4-4) Three lecture hours and one tutorial hour per week. Prerequisite: Students may take 235A-235B or 230A-230B but, however, it is prerequisite to 235B. Credit and grade are assigned separately for each course. A critical and contrasting examination of various approaches in social psychology and of paradigmatic empirical studies associated with each. The approach- es will be included: symbolic interactionism, neo- behaviorism, psychodynamic analyses, cognitive theories, and theories of exchange. Mr. Ofshe, Mr. Swanson (F); Mr. Swanson (W)

250A. Socialization and Personality. (4) Two lecture hours and two consultation hours per week. Goals and process of socialization; the self, organized social roles, the individual and social groups, interaction patterns in family, peer group and school. Mr. Clausen (W)

257. Analysis of Social Action. (4) Two lecture hours and two consultation hours per week. Prerequisite: Sociology 1A or consent of instructor. An examination of social psychology and of paradigmatic empirical studies associated with each. The approach- es will be included: symbolic interactionism, neo- behaviorism, psychodynamic analyses, cognitive theories, and theories of exchange. Mr. Ofshe, Mr. Swanson (F); Mr. Swanson (W)

258A. Sociology of Education. (4) Two seminar hours and two consultation hours per week. Prerequisite: one lower division course, or consent of the instructor. Historical and contemporary aspects of sociology in off-campus organizations. Mr. Wiensky (Sp)

**267. Modern Social Structure In the Near East. (4) Three lecture hours per week. Prerequisite: Sociology 1A or consent of the instructor. The study of modern social structure with American.**

268. Soviet Society. (4) Three lecture hours per week. Prerequisite: Sociology 1A or consent of the instructor. Soviet Russia from 1917 to the present. Social and economic development and contemporary Soviet society. Ms. Bonnell (Sp)

**174. Sociology of Literature. (5) Three lecture hours and two consultation hours per week. The relation of literature to the social order and to systems of social control. Analysis of the social role of the writer.** Mr. Lowenthal (W)

**175. Social Conflict. (4) Three hours of lecture per week. Prerequisite: course or consent of instructor. The study of interpersonal aggression, violence, and intergroup conflict from an interdisciplinary perspective.**

176. Interpersonal Behavior in Small Groups. (3) Three lecture hours per week. Prerequisite: one lower division sociology course or consent of instructor. An examination of sociological theories of behavior and communication in small groups. Topics such as status relations, communication, coalitions and interpersonal conflict are examined in light of field and laboratory research. Mr. Ofshe (F)

178. Personality and Social Structure. (5) Three lecture hours and two consultation hours per week. Prerequisite: a course in introductory sociology. An analysis of the establishment and growth of personality, and of varieties of personality, as a consequence of social experience and an evaluation of social-psychological and sociological explanations of the developments. Mr. Blumer (F)

185. Structural Social Analysis. (4) Three lecture hours and two consultation hours per week. Prerequisite: Sociology 1A or consent of instructor. An analysis of sociology today, the development of sociological analysis. The concepts and methods of sociology. Mr. Clausen (W)

199. Supervised Independent Study and Research. (1-5) One to five hours per quarter. Enrollment is restricted by regulations listed at the beginning of each quarter. Mr. Lowenthal (Sp)
249. Social Movements. (4-4) Two hours of seminar and one tutorial hour per week. Prerequisites: Students may take the seminar 249A or the seminar 249B or the seminar 250A or the seminar 250B with credit and grade assigned upon completion of the sequence. Common problems facing Marxism and functionalism in the development of a theory of social change.

Mr. Burawoy (W, Sp)

**272A—272B. Basic Issues in Sociological Theory. (4-4)** Two hours of lecture plus two tutorial hours per week. Prerequisites: students may take 272A or 272B in sequence. Contribution of sociology to theory and research in politics. Analysis of structure and ideology of organized groups.

260A: Mr. Knorrhauser (W)

*261A—261B. Sociology of Comparative Politics. (4-4) Two hours of lecture and two tutorial hours per week. Prerequisite: course 261A is recommended but not prerequisite to 261B. Students may take the lecture course or the seminar course. 261A is an overview of a variety of social and historical phenomena.
civilization. In addition, students are encouraged to avail themselves of relevant courses in other departments.

The program maintains a balance between ancient and modern studies and linguistic and cultural disciplines. Programs of study thus can be devised to fit the needs of students with interests ranging through Indo-Aryan comparative grammar, Modern Hindi fiction, Buddhism, Yoga, Upanisadic thought, and South Asian archaeology. Opportunities exist for a limited number of students to participate in such research, teaching, and language training programs in Pakistan. The Department has at its disposal the resources of the Center for South and Southeast Asian Studies, the South/Southeast Asia Library Service, and is closely connected with the Interdisciplinary Group in Buddhist Studies Ph.D. program.

MAJOR PROGRAM

A major is offered in South and Southeast Asian studies with emphasis in language, civilization, or archaeology. Since the major requirements have been revised recently, it should be noted that they affect only those majors who declare after September 1976.

General requirements for the major are: Lower division:
1) South Asian 10A–10B; 2) South Asian 15; Upper division: South Asian 100.

In addition, specific requirements for each emphasis are as follows:

I. Language:
A. Hindi-Urdu: 1) Hindi-Urdu 1A–1B–1C; 2) Hindi-Urdu 100A–100B–100C; 3) South Asian 123; one other South Asian literature course in translation or one advanced Hindi-Urdu literature course; 4) 13 upper division units to be chosen from Lists I through V below.
B. Sanskrit: 1) Sanskrit 100A–100B–100C; 2) Sanskrit 101, 102, 103; 3) 10 upper division units to be chosen from Lists I through V below; 4) Linguistics 20 is recommended.
C. Tamil: 1) Dravidian 1A–1B–1C; 2) Dravidian 100A–100B–100C; 3) 21 upper division units to be chosen from Lists I through V below.

II. South Asian Archaeology:
1) A minimum of 10 upper division units in a South Asian language (preferably modern); prerequisite, 15 lower division units of a South Asian language; 2) South Asian 192A–192B; South Asian 193A–193B; Anthropology 2; Near Eastern Archaeology 192A–192B or Near Eastern Archaeology 193A–193B; Anthropology 133 or Anthropology 134: prerequisite, consent of the instructor; 3) electives may be chosen from South Asian 1 through V below.

III. South and Southeast Asian Civilization:
1) Sanskrit 100A–100B–100C plus 25 upper-division units one year of a modern South or Southeast Asian language (15 lower division units) plus 31 upper-division units distributed as follows: a) one literature course from List I below; b) one course in religion or philosophy from List II below; c) one course in history or social science from List III below; d) one course in the fine arts from List IV below; e) 2 or 3 upper-division units (25 or 31 as indicated above) from South Asian 1 through V below.

Courses recommended for fulfillment of the upper division unit requirement:

List I. Literature: South Asian 121, 122, 123, 124, 125, 142; Southeast Asian 110, 128, 146

List II. Religion and Philosophy: South Asian 131, 140, 141, 160; Southeast Asian 147; IDS 155

List III. History and Social Science: History 187A, 187B, 187C; Anthropology 188A, 188B; Political Science 101

List IV. Fine Art: History of Art 138A, 138C, 136C, 137; any upper division course on South or Southeast Asian music (with consent of instructor)

List V. Archaeology: Relevant courses in Anthropology, Geography, Geology, Statistics, or other departments as the student's specific field or archaeology requires.

With written permission from the student's adviser, other relevant courses may be substituted for not more than two of the courses listed above, particularly in the event that certain of these courses may not be offered or new courses may be added to the curriculum. For the language emphasis, a minimum of two upper division courses in literature or literature in translation must be taken in fulfillment of the general upper division requirement.

Honors Program. The major has an honors program. To be eligible for admission, a student must attain a 3.3 grade-point average or higher in courses completed in the major and in all courses completed in the University. An honors thesis is required.

GRADUATE STUDY

Programs of graduate study and research leading to the M.A. degree are offered with emphases on Dravidian (Tamil), Hindi and Urdu, Sanskrit, South Asian archaeology, and South Asian civilization. Programs leading to the Ph.D. degree are offered with emphases on Dravidian (Tamil), Modern Indo-Aryan: Hindi and Urdu, Sanskrit, and South Asian archaeology.

Degrees. All students admitted to programs leading to a graduate degree will be expected to have, in addition to a B.A. or its equivalent, some formal academic background in South or Southeast Asian languages and area studies. Students should in general be prepared to have undertaken training equivalent to that required of the departmental major in one of the various areas. M.A. candidates with insufficient preparation may be required to make up deficiencies without credit toward the M.A. unit requirement.

The M.A. degree is generally offered under Plan II (see Index under Graduate Division) which requires the student to take courses totaling at least 36 upper division and graduate units, of which at least 18 must be graduate. The distribution of courses is determined in consultation with the graduate adviser, following the special requirements for each degree. In special cases, the program may be carried out under Plan I for which a Master's thesis is submitted.

Except in unusual circumstances, a student must complete the M.A. program in at most six quarters. Further information about University degree regulations can be found in this catalog.

As part of the M.A. requirement, students must pass a reading examination in a language, outside of their major field, which they and the adviser decide is relevant to the students' major interest. Examples are Dutch, French, German, Japanese, and Russian.

Before being admitted to candidacy, the student will complete the examination according to Plan II. The dissertation will conform to procedures and regulations set by the Graduate Division and the Graduate Council.

South Asian

LOWER DIVISION COURSE

10A. Introduction to the Civilization of India. (6) Four and one-half hours of lecture per week. Readings, lectures, and discussions in the culture and civilization of India from the Indus valley and Brahminic civilization to the advent of Islam. Special emphasis on the development of religious, philosophical, and aesthetic systems in traditional India. Staff (F)

10B. Introduction to the Civilization of India. (6) Four and one-hour lecture per week. Prerequisite: course 10A. Readings, lectures, and discussions on the development of Indian civilization from the advent of Islam to the present. Special emphasis on the medieval religious movements of Bhakti and Indian art. Staff (W)

15. Great Books of India. (4) Three hours of lecture per week. Reading and discussion of 10 classic works of Indian literature in translation. The books ranging from the Sanskrit epics to Kipling's Kim are representative of different historical periods, religions, and languages and genres. Each book, however, has been chosen because it defines or speaks for a central element of Indian culture. Staff (Sp)

UPPER DIVISION COURSE

100. Methods for Reading South and Southeast Asian Texts. (6) Four and one-half hours of lecture per week. Texts from the areas of literature, mythology, religion, and philosophy will be studied in relation to problems of methodology, particularly of writing papers on methodological problems arising from their readings. The final exam will cover materials dealt with in the course. Staff (W)

**121. Early Indian Literature. (4)** Three hours of lecture per week. A study of early Indian literature, primarily using translations from classical Sanskrit literature: epics, drama, and lyric poetry.

Mr. van Nooten

122. Medieval Indian Devotional Literature. (4) Formerly South Asian 121B. Three hours of lecture per week. Study of selected devotional and religious traditions, through readings in English translation, primarily of devotional poetry.

Ms. Schomer (W)

133. Literary Traditions of North India: Hindi and Urdu. (3) Three hours lecture per week. Prerequisite:
Consent of instructor. No previous knowledge of Hindi-Urdu required. Historical survey of Hindi and Urdu literature, with emphasis on pre-modern traditions. Extensive study of translation. Emphasis on characteristic genres and their development.

Mr. Schomer (F)

124. Modern Indian Literature. (4) Three hours of lecture per week. Lectures and discussion of 19th and 20th century Indian literature, based on readings in English or in English translation. Stress is placed upon the development of contemporary Indian literature and culture through this literature.

Mr. Schomer (Sp)

1*125. Tamil Literature in Translation. (3) Three 1-hour lectures per week. Prerequisite: no previous knowledge of Tamil will be presupposed. The flavor, aesthetic goals, and structure of classical Tamil literature. An analysis in depth of a few representative works with special emphasis on the nature-love poetry of the earlier period of Saivite religious poetry.

Mr. Hart

127. Brahmanism and Hinduism. (4) Three hours of lecture per week. Readings in selections from the Hindu scriptures—the Vedas, the Brāhmaṇas, the Upaniṣads, the Epics (the Gītā) and the Sutras of the traditional systems of Indian philosophy. Mr. Jaini (F)

130. Historical Survey of Indo-Aryan Languages. (4) Three hours of lecture per week. Prerequisites: One year of an Indo-Aryan language or Linguistics 20 or completion of the relationship of Indo-Aryan to Indo-European languages. Linguistic development of Old Indo-Aryan (Vedic and Sanskrit), Middle Indo-Aryan (Prāṣādika and Prakrit) and Modern Indo-Aryan languages. The rise of literary languages. South Asia as a linguistic area.

Mr. Pray and Mr. van Nooten

131. Indian Buddhism. (4) Three hours of lecture per week. General introduction to the systems of Buddhist thought in India. Selected readings from the Hinayana and Mahayana scriptures in translation. An survey of the historical development of the Buddhist samgha and its impact on the peoples of South and Southeast Asia.

Mr. Jaini (W)

140. Hindu Mythology. (4) Three 1-hour lectures per week. Literary and religious aspects of Hindu myths. Reading of selected mythological texts in translation.

Mr. Goldstein (F)

1*141. Religion in South India. (4) Three hours of lecture per week. The development and practice of religion in South India. Emphasis will be on sources translated directly from Indian languages. Subjects covered include: the indigenous religion, the effect of Brahmanical religion, bhakti movements, and the practices of Hinduism in modern South India.

Mr. Hart

1*142. Indian Poetry in Translation. (5) Four and one half hours of lecture per week. Lectures and discussions on ancient Indian Poetry, based on readings of selected works from the Vedas, the Upaniṣads, the Sanskrit and Prakrit poetry.

Mr. Nathan

1*145. Eroticism and Religion in Indian Literature. (4) Three hours of lecture per week. Study of the religious ideas about sexuality in Indian literature. Course work includes lecture and readings (in translation) from Vedic, epic, classical, devotional, and tantric literature. Assignments consist of readings and essays comparing Indian and Western approaches to eroticism in literature.

Mr. Nathan

160. Jainism and Other Heterodox Systems. (4) Three hours of lecture per week. Prerequisite: consent of instructor. Mr. Jaini (Sp)

1*182A–192B. South Asian Prehistory. (4–4) Three hours of lecture per week. A survey of archaeological discoveries in India, Pakistan, Ceylon, and Afghanistan relating to the Stone Age and Chalcolithic periods. Emphasis will be placed on the factors leading up to the rise of South Asia's earliest civilizations.

Mr. Dales (W)

1*183A–193B. South Asian Archaeology: Protohistoric and Early Historical Periods. (4–4) Three hours of lecture per week. A survey of archaeological discoveries in India, Pakistan, and Afghanistan relating to the Harappan (Indus) civilization and the periods leading up to the rise of Buddhism in the subcontinent.

Mr. Dales (W)

194. Field Project in Pakistan. (10–18) Four to six hours of lecture and 50 hours field and laboratory per week. Prerequisites: a knowledge of basic archaeological techniques, either from previous field experience or from courses such as Anthro 133 & 134. Practical training in archaeological techniques at UC Berkeley's excavation at Balakot, Pakistan: excavation strategy, recording of strata, sections, objects; supervision of local workmen; drawing of objects; collecting scientific samples, identification of preliminary reports.

197. Field Studies in South and Southeast Asia. (1–6) Individual conferences to be arranged. Prerequisite: consent of instructor. Supervised experience relevant to the student's specialization and courses in South Asian studies in off-campus locations. Regular individual meetings with faculty sponsor and written reports required.

198. Directed Group Study for Upper Division Students. (1–4) Hours of meeting are variable. Tutorial instruction in areas not covered by regularly scheduled courses.

199. Supervised Independent Study and Research. (1–6) Must be taken under a faculty sponsor. Enrollment is restricted by regulations shown on page 34.

(GRADUATE COURSES)

2*101. Readings in Jain Sanskrit Texts. (4) Three hours of seminar per week. Prerequisite: one year of Sanskrit and course 160. The aim of the seminar is to give the student competence with Jain doctrine and practice through selections from both canonical and non-canonical sources, notably the Acara-pratipa, Uttaradhyayana, Samayasara, and Tatvartha-sutra, and relevant commentaries in Sanskrit.

Mr. Jaini

2*202. Problems of Analysis of South Asian Texts. (4) Three hours of lecture per week. Prerequisites: graduate standing in any field techniques in the various genres of South Asian poetry from the various languages. Class discussions and student work will culminate in an edition of a text, a translation and appropriate apparatus.

Mr. Nathan

2*210. Linguistics in India. (4) Three 1-hour meetings per week. Prerequisite: some familiarity with linguistics and an understanding of some Indian languages, or consent of instructor. The linguistic description and analysis of Sanskrit as created and developed by the Sanskrit grammarians.

Mr. Staal

2*211A–211B. Readings in Indian Literature. (4–4) Three seminar hours per week. A seminar which will deal with problems of convergence and divergence of South and North Indian classical and modern literature.

Staff (W)

2*112. Indian Philosophical Texts. (4) Three 1-hour meetings per week. Reading of Sanskrit texts on Indian Philosophy (e.g., Sankara or other Vedanta & Mimamsa) for students with some knowledge of Sanskrit.

Mr. Steal (W)

2*17A–217B–218C. Readings in Indian Buddhist Texts. (4–4) Three hours of lecture per week. Prerequisite: one year of Sanskrit and/or consent of instructor. 217A is prerequisite to 217B. 215A: A survey of the origins and development of the Abhidharma texts and commentaries in Pāli and Sanskrit. 215B: Selected readings from the Visuddhimagga and the Abhidharmakosa-bhasya. 215C: Advanced readings in Buddhist texts leading to a comparative study of the Hinayana and Mahayana schools of Buddhism.

Mr. Jaini (F, W, Sp)


250A. South and Southeast Asian Studies.

250B. Dravidian.

250C. Hindu-Urdu.

250D. Malay-Indonesian.

2*250E. Nepal.

2*250F. Sinhala.

250G. Students may enroll in more than one section of 250, but the total number of units of Special Study in any one quarter may not exceed 12.

Staff (F, W, Sp)

2*259. Seminar in South Asian Archaeology. (4) Formerly covered as Eastern Near Eastern Studies 259. Three hours of seminar per week. Prerequisite: consent of instructor. Discussions and research into major aspects of South Asian Archaeology. Subject will be selected through consultation with instructors and student.

Mr. Dales (W)

288. Seminar. (3) Hours of meeting are variable. Directed Group Study. Content varies from quarter to quarter. Students may receive credit for more than one seminar in the same quarter. May be repeated for additional credit with consent of instructor.

Mr. Hart (F, W, Sp)

601. Individual Studies for Master Students. (1–8) Individual study for the comprehensive or language requirements in consultation with the graduate advisor. Unpaid may not be used to meet either unit or residence requirements for a Master's degree. Must be taken on a satisfactory/unsatisfactory basis.

602. Individual Study for Doctoral Students. (1–8) Individual study in consultation with the major field advisor, intended to provide an opportunity for qualified students to prepare themselves for the various examination requirements of candidates for the Ph.D. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

IDS 155. Philosophies of India. (4) See Interdepartmental Studies for the complete description of this course.

Mr. Steal

*IDS 212. Advanced Seminar in Buddhist Studies. (4) See Interdepartmental Studies for the complete description of this course.

Mr. Steal, Mr. Lancaster

Southeast Asian

UPPER DIVISION COURSES

*1101. Thai Literature in Translation. (4) Three hours of lecture per week. A survey of Thai literature including the classical, Buddhist, and modern literary works.

Staff

128. Indonesian Literature in Translation. (3) Three hours of lecture per week. Survey of literary traditions in Indonesia from ancient to contemporary times. Readings of old texts, mystical treatises, poetry, short stories, novels, and plays.

Mr. Hart (F)

*1411. Peoples of Indonesia. (4) Three hours of lecture per week. A comparative survey of the various ethnic groups of the Indonesian archipelago, in both historical and contemporary context. Prehistory, language, social organization, belief systems, economics, politics.

Mr. Hart (W)

146. Southeast Asian Literature in Translation. (4) Three hours of lecture per week. A general survey of the literatures of Thailand, Burma, Cambodia, Malaysia, and Indonesia, with an emphasis on their Indian origins.

Staff

*147. Religion in Indonesia. (4) Three hours of lecture per week. Belief systems as a framework within which the people of Indonesia may be compared. Deanalysis and classification of types of religious development and change and discussion of new religious movements.

Mr. Hart (W)

Dravidian

LOWER DIVISION COURSE

1A–1B–1C. Introductory Tamil. (5–5–5) Five hours of lecture per week. Grammar of modern Tamil will be covered followed by readings in simple texts. Practice will also be given in spoken Tamil. Sequence begins in Fall.

Mrs. K. Hart (F, W, Sp)

UPPER DIVISION COURSES

100A–100B–100C. Readings in Tamil. (5–5–5) Formerly 110A–110B–110C. Five 1-hour meetings per week. Prerequisites: Dravidian 1A–1B–1C. Sequence begins in Fall.

Mr. Hart (F, W, Sp)

GRADUATE COURSES

210A–210B–210C. Seminar in Advanced Tamil. (4–4–4) Three hours of seminar per week. Prerequisite: second year Tamil. The seminar consists of readings in advanced Tamil. The exact texts to be determined by the needs of the student. May be repeated for additional credit with consent of instructor.

Mr. Hart (F, W, Sp)

288. Seminar. (2) Students may receive credit for more than one seminar in the same quarter. May be repeated for additional credit with consent of instructor.

Staff (F, W, Sp)

NOTE: For key to symbols, see page 34.
Hindi-Urdu

LOWER DIVISION COURSE

1A–1B–1C. Introductory Hindi and Urdu. (5–5–5) Five hours of lecture and one-hour laboratory per week. Survey of grammar, graded exercises and readings drawn from Hindi and Urdu literature, leading to mastery of grammatical structures and essential vocabulary and achievement of basic reading and writing competence. 

Mr. Pray (F, W, Sp)

115. Urdu Poetry. (4) Three hours of lecture per week. Prerequisites: Hindi-Urdu 1A–1B–1C or equivalent. Representative readings in Hindi and Urdu literature, leading to mastery of grammatical structures and essential vocabulary and achievement of basic reading and writing competence. 

Ms. Jain (F, W, Sp)

120. The Hindi Short Story. (4) Three hours of lecture per week. Reading and analysis of representative modern Hindi short stories. Ms. Schomer

121. The Hindi Novel. (4) Three hours of lecture per week. Critical reading of a major Hindi novel. Ms. Schomer

142–143B–143C. Studies in South Asian Languages. (2–4, 2–4, 2–4) Two to four hours of lecture per week. Prerequisite: consent of instructor. Directed study in South Asian languages other than Hindi-Urdu. Staff (F, W, Sp)

190. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis. Staff (F, W, Sp)

GRADUATE COURSES

221. Hindi Bhakti Poetry. (4) Three hours of lecture per week. Readings in the medieval bhakti poems of the Hindi area: Kabir, Surdas, Mirabai, Tulsidas. Ms. Schomer

*122. Modern Hindi Poetry. (4) Three hours of lecture per week. Readings in 20th century Hindi poetry, with special emphasis on the Chayavati poets. Ms. Schomer

Malay/Indonesian

LOWER DIVISION COURSE

1A–1B–1C. Introductory Indonesian. (5–5–5) Five hours of lecture and one-hour laboratory per week. Survey of grammar, graded exercises and readings drawn from Indonesian literature, leading to mastery of basic grammatical patterns, essential vocabulary and achievement of basic reading and writing competence.

Staff (F, W, Sp)

UPPER DIVISION COURSE

100A–100B–100C. Readings in Indonesian-Malay. (5–5–5) Five hours of lecture and one-hour laboratory per week. Prerequisites: Malay-Indonesian 1A–1B–1C or equivalent. Representative readings in Malay and Indonesian literature and expository prose, exploring a variety of literary forms and styles. Systematic study of grammatical and lexical problems arising from these readings. Advanced exercises in composition. 

Staff (F, W, Sp)

GRADUATE COURSE

298. Group Study. (1–8) Students may receive credit for more than one semester in the same quarter. May be repeated for additional credit with consent of the instructor.

Staff (F, W, Sp)

Sanskrit

UPPER DIVISION COURSE

100A–100B–100C. Elementary Sanskrit. (5–5–5) Four and one-half hours of lecture per week. Elements of Sanskrit grammar and appreciation of Sanskrit texts. Attention will be paid to spoken Sanskrit.

Mr. Goldman (F, W, Sp)

101. Epics Sanskrit. (5) Four and one-half hours of lecture per week. Prerequisite: course 100C or equivalent. Readings from the Sanskrit Epics and Purana. This course may be repeated for credit as materials will vary from year to year.

Mr. Goldman (F, W, Sp)

102. Classical Sanskrit Poetry. (5) Four and one-half hours of lecture per week. Prerequisite: course 100C or equivalent. Introduction to the Kavya style. Selections from various poets and styles. Selections will vary from year to year, therefore the course may be repeated for credit with consent of instructor.

Staff

103. Readings in the Sāstrā. (5) Four and one-half hours of lecture per week. Prerequisite: course 100C or equivalent. Introduction to Sanskrit scientific, scholarly, and commentarial texts. Selection of materials will vary in accordance with needs and interests of students. May be repeated for credit when subject matter differs.

Mr. Goldman

104. Introduction to the Vedas. (5) Four and one-half hours of lecture per week. Prerequisite: course 100C or consent of instructor. Introduction to the grammar of the Vedic language. Readings of selected passages from the Rig Veda, other brāhmaṇas, brahmanas, and vocabulary of the period. May be repeated for credit as materials will vary from year to year.

Mr. van Nooten

105. Palli. (5) Four and one-half hours of lecture per week. Prerequisite: course 100C or consent of instructor. Introduction to the grammar of the Pali texts. Selected readings of Buddhist texts. Readings will vary from year to year. This course may be repeated for credit with consent of instructor.

Mr. Goldman

106. Buddhist Sanskrit. (5) Four and one-half hours of lecture per week. Prerequisite: course 100C or consent of instructor. Introduction to grammar of Buddhist Sanskrit and readings of Buddhist Sanskrit texts.

Mr. van Nooten

107. Linguistic Theories of the Hindu. (4) Three hours of lecture per week. A brief and general survey of Indian grammar from its inception in the Vedas until the semantic speculations of the Middle Ages, followed by a more intensive study of part of Panini's grammar, to show its structured rules and sensibility.

Mr. van Nooten

150. Sanskrit Prose Composition. (4) Three hours of lecture per week. Prerequisite: course 100C or equivalent. Practice in translation from Sanskrit to English. Systematic study of grammatical and lexical problems through composition. Discussion and evaluation of the composition will be conducted in Sanskrit.

Mr. Goldman

H185. Senior Honors. (2) Prerequisite: limited to senior honors candidates. Directed study centering upon preparation of an honors thesis.

Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis.

Staff (F, W, Sp)

GRADUATE COURSES

200. Readings In Sanskrit. (5) Four and one-half hours of lecture per week. Advanced reading of Buddhist and Middle-Indic texts. Such texts are read as are suited to the student's needs. This course may be repeated for additional credit with consent of the instructor.

Mr. Goldman

*201. Sanskrit Religious Texts. (5) Four and one-half hours of lecture per week. Critical reading of an Upanisad or a similar text at an advanced level.

Staff

203. Advanced Sanskrit. (5) Four and one-half hours of lecture per week. Prerequisite: course 100C or an equivalent. Reading of Sanskrit texts with linguistic emphasis. The texts to be read will vary from quarter to quarter. The course may be repeated with consent of the instructor.

Mr. van Nooten

*204. Introduction to Vedic Ritual. (4) Three hours of lecture per week. Prerequisite: two years of Sanskrit or consent of instructor. The main types of domestic (grhya) and state ritual. Sources for the study of the ritual. The Vedic schools and their principal texts. The Some sacrifices. The principal recitations, chants, and offerings. Discussion of representative textual passages and recordings.

Mr. Staal

Spanish and Portuguese

Department Office, 4321 Dwinelle Hall

Professors:
Arthur L. Askins, Ph.D.
G. Arnold Chapman, Ph.D.
José Durand, Doctor en Filosofía
Louis A. Mueller, Ph.D.
John H. R. Pohl, Ph.D.
Nigel G. Sylvester, Ph.D.
Edward S. Morby, Ph.D.
Dorothy C. Shadi, Ph.D.
Lesley B. Simpson, Ph.D.
Robert J. Todd, Ph.D.
Benjamin M. Woodbridge, Jr., Ph.D.
L. Elaine Hoover, Ph.D.
Ronald W. Sowa, Ph.D.

Associate Professor:
John D. Cheadle, Ph.D.
Charles B. Faucett, Ph.D.
Milton M. Azevedo, Ph.D.
Dru Dougherty, Ph.D.

Assistant Professors:
Derecho, LL.D.* (Emeritus)
Robert J. Todd, Ph.D.
John K. Walsh, Ph.D.
K. L. Elaine Hoover, Ph.D.

Departmental Major Advisers: Mr. Dougherty, Mr. Faucett, Mr. Walsh.

The sequence of undergraduate and graduate programs of the Department of Spanish and Portuguese is designed to lead from the acquisition of competency in written and spoken Spanish or Portuguese, through an acquaintance with the structure and history of one or both of these languages and a critical understanding of the development and achievements of their literatures in the Old World and in the New, to training in advanced study and independent research. The Department's policy is to maintain a balanced strength between language and literature and between Peninsular and Hispanic-American facets of a unified field.
THE MAJOR IN SPANISH

Lower Division. Courses 1, 2, 3, 4, 5, and 25 (or their equivalents). Students transferring from other institutions with advanced standing and intending to major in Spanish must present evidence (by examination or otherwise) that their preparation includes the equivalent of Spanish 25.

Upper Division. 45 units of upper division work in the Department, including the core courses: Spanish 100, 101, 102, 104A–104B, 107A–107B–107C; and four elective courses (i.e., upper division courses in Spanish other than core courses) taken under the following conditions: Spanish 104A–104B or Spanish 107A–107B–107C to be completed before enrollment in any elective course of Spanish. Specific courses are required, but students, in consultation with a graduate adviser, will lay out a program designed to prepare them for qualifying examinations preceding advancement to candidacy. As early as possible, they must demonstrate a reading knowledge of Italian, Latin, and French, by a written examination in one of these languages, and by either written examination or appropriate coursework in the others. A reading knowledge of German is recommended. The precise nature of the qualifying examinations will depend on the student's choice of two alternative plans of preparation, both of which require a detailed knowledge of Spanish literature, history, and culture. They must demonstrate familiarity with Romance philology, with emphasis on Spanish. Plan I further requires a knowledge of a second romance language, and of selected modern literature. This course covers the material of Spanish 1–3. Divided into 15 units (14A–15 units; 14B: 1–5 units; 14C: 1–5 units). Students may enter at the beginning of any level for which they are qualified. They are strongly urged to enroll for more than the 2-unit minimum: single-unit enrollments are allowed only in order to complete any of the three levels. Students may complete additional units as they wish and will be given credit for any additional units that are successfully completed. All units for must be completed during the quarter the student is enrolled in the course.

25. Advanced Spanish. (F) 4 one-hour class meetings per week. Prerequisite: course 5 or equivalent (F, W, Sp)

Lower Division Courses in English Translation

39. Spanish and Spanish-American Literature in English Translation. (4) Three class hours per week. Open to students in all departments of the University. No knowledge of Spanish necessary.

*39A. Spain: Medieval Period, Renaissance, and Golden Age. Mr. Fowl (F)

*39B. Spain: Neo-Classical Period to Present Day. Mr. Fowl (F)

*39C. Spanish America: To the end of the Nineteenth Century. Mr. Fowl (F)

*39D. Spanish America: Modernism and the Contemporary Period.

UPPER DIVISION COURSES

Prerequisite to all upper division courses: Spanish 25 or the equivalent, unless otherwise stated.

100. Introduction to Spanish Linguistics. (3) Three class hours per week. Mr. Craddock. (F, W, Sp)

101. Advanced Grammar. (F) 116. Three class hours per week. Mr. Chapman. (F, W, Sp)

NOTE: For key to symbols, see page 34.
102. Advanced Composition. (Formerly 117) Three class hours per week. Prerequisite: course 101. Mr. Faulhaber, Mr. Murillo (F, W, Sp).

104A-104B. Survey of Spanish-American Literature. (4-4-4) Three class hours per week. Sequence beginning (F, Sp). Mr. Durand, Mr. Monguio.

107A-107B-107C. Survey of Spanish Literature. (4-4-4) Three class hours per week. Sequence beginning (F, Sp). Mr. Craddock, Mr. Dougherty, Miss Hoover, Mr. Walsh.

108. Introduction to the Ballad. (4) Three class hours per week. Mr. Askins (Sp).

110. The Generation of '98. (4) Three class hours per week. Mr. Murillo (W).

111A-111B. Cervantes. (4-4) Three class hours per week. Mr. Chapman (Sp).

116. A Survey of Spanish Lyric since the Renaissance. (4) Three class hours per week. Miss Hoover (F).

119B. Modern Peninsular Drama: From the Romantic Period to the Present. (Formerly 105) Three hours of lecture per week.

120. Nineteenth Century Spanish Fiction. (Formerly 103) Three class hours per week. Mr. Dougherty (W).

125. Spanish Phonetics. (4) Three class hours per week. Mr. Azevedo (W).

126. Medieval Spanish Literature. (4) Three class hours per week. Mr. Askins (Sp).

127. Eighteenth-Century Spanish Literature. (4) Three class hours per week. Mr. Poll.

128. Contemporary Spanish Literature. (4) Three class hours per week. Mr. Dougherty (W).

129. The Spanish-American Essay. (4) Three class hours per week.

130. Twentieth-Century Spanish-American Poetry. (4) Three class hours per week. Mr. Monguio (F).

171. Advanced Spanish For Bilingual Students. (4) Three class hours and one laboratory hour per week. Prerequisite: permission of instructor. A unified study of phonetics, grammar, lexicon, and composition. Primarily for students whose native language is Spanish. Mr. Murillo (W).

192. Senior Course In Hispanic Literature. (3) Three hours of lecture per week. Course may be repeated for credit when topic changes, but not more than four units may be counted in the major. Topics for Winter 1977: Spanish spoken in the United States. Mr. Craddock (W).


199. Supervised Independent Study and Research. (2-4) Enrollment is restricted by regulations listed on page 34. Restricted to senior honor students with advanced standing in the subject. Open to students majoring in Spanish who have completed 30 units of university-level work, including 20 units of upper-division work in Spanish and Spanish-American literature. Topic for Fall 1976: Recent Latin American Prose; topic for Spring 1977: The Picaresque Novel. Mr. Durand (F), Mr. Rivers (W).

193. Advanced Course in Hispanic Linguistics. (4) Three hours of lecture per week. Prerequisite: course 100 or consent of instructor. Course may be repeated for credit when topic changes, but not more than four units may be counted in the major. Topics for Winter 1977: Spanish spoken in the United States. Mr. Craddock (W).

194. Advanced Course in Hispanic Linguistics. (4) Three hours of lecture per week. Prerequisite: course 101 or consent of instructor. Course may be repeated for credit when topic changes, but not more than four units may be counted in the major. Mr. Faulhaber.

LITERATURE: THEORY AND BIBLIOGRAPHY

204A-204B. Techniques of Literary Scholarship. (3-3) Formerly 203A-203B. One 2-hour meeting per week. Mr. Askins (F).

242. Literary Theory and Criticism. Formerly 202A-202B. One 2-hour meeting per week.

242A. Poetry. (3)

242B. Drama. (3)

242C. Prose fiction. (3) Mr. Dougherty

246. Hispanic Paleography. (3) Formerly 203C. One 2-hour meeting per week. Mr. Askins, Mr. Faulhaber.

248. Spanish Versioning. (Formerly 216) One 2-hour meeting per week.

LITERATURE: STUDIES

Medieval

250. Medieval Epic Poetry. (3) One 2-hour meeting per week. Course may be repeated for credit when topic changes.

251. Libro de buen amor. (3) One 2-hour meeting per week.

252. La Celestina. (3) One 2-hour meeting per week. Mr. Faulhaber.

254A-254B. A Single Author or a Special Topic. (3-3) One 2-hour meeting per week. Course may be repeated for credit when topic changes. Topic for Winter 1977: Cancionero of the 15th Century. Mr. Rivers (W).

The Golden Age

255A-255B. The Camedia and Related Minor Genres. (3-3) One 2-hour meeting per week. Course may be repeated for credit when topic changes. Mr. Murillo

256A-256B. Lyric Poetry. (3-3) One 2-hour meeting per week. Course may be repeated for credit when topic changes. Mr. Murillo

257A-257B. The Ballad. (3-3) Formerly 208A-208B. One 2-hour meeting per week. Mr. Askins

258. Epic Poetry. (3-3) One 2-hour meeting per week. Mr. Murillo

259A-259B. A Single Author or a Special Topic. (3-3) One 2-hour meeting per week. Course may be repeated for credit when topic changes. Mr. Dougherty.

The Enlightenment

263A-263B. Studies in the Literature of the Enlightenment. (3-3) Formerly 206A-206B. One 2-hour meeting per week. Course may be repeated for credit when topic changes. Mr. Faulhaber.

Modern Spanish

265A-265B. Narrative and Expository Prose. (3-3) One 2-hour meeting per week. Course may be repeated for credit when topic changes. Mr. Polt

266A-266B. Lyric Poetry. (3-3) One 2-hour meeting per week. Course may be repeated for credit when topic changes. Mr. Polt

267A-267B. Drama. (3-3) One 2-hour meeting per week. Course may be repeated for credit when topic changes. Mr. Dougherty

268A-268B. A Single Author or a Special Topic. (3-3) One 2-hour meeting per week. Course may be repeated for credit when topic changes. Mr. Murphy.

Spanish American

270A-270B. The Colonial Period. (3-3) One 2-hour meeting per week. Mr. Durand (F).

273A-273B-273C. The Modern Period. (3-3) One 2-hour meeting per week. Mr. Chapman

274A-274B. Poetry. (3-3) Formerly 205A-205B. One 2-hour meeting per week. Course may be repeated for credit when topic changes. Mr. Polt

274C. Prose fiction. (3) Mr. Dougherty

278A-278B-278C. The Novel. (3-3-3) Formerly 204A-204B-204C. One 2-hour meeting per week. Mr. Chapman
LITERATURE: SEMINARS

280A-280B-280C. Seminar in Spanish-American Literature. (3-3-3) One 2-hour meeting per week. Course may be repeated for credit when topic changes. Topic for Spring 1977: Inca Garcíoa de la Vega. Mr. Durand (Sp).

285A-285B-285C. Seminar in Spanish Literature. (3-3-3) One 2-hour meeting per week. Course may be repeated for credit when topic changes. Topic for Spring 1977: Garcíoa de la Vega. Mr. Riviers (Sp).

297. Seminar on Conventes. (3) Formerly 229. One 2-hour meeting per week. Course may be repeated for credit when topic changes. Mr. Murillo (F).

290. Special Advanced Study. (2-6) Restricted to candidates for higher degrees with an adequate preparation for the subject proposed for special study, and by previous arrangement with members of the departmental staff. Sections 1 through 20: letter graded. Sections 21 through 40: satisfactory/un satisfactory grading. The Staff (Graduate Advisers in charge) (F, W, Sp).

601. Individual Study for Master's Students. (1-8) Individual study in consultation with the graduate adviser, to provide an opportunity for students to prepare for the comprehensive examination. May be taken only after completion of all unit and language requirements, and only in the quarter in which the examination will be attempted. Must be taken on a satisfactory/unsatisfactory basis. The Staff (Graduate Advisers in charge) (F, W, Sp).

602. Individual Study for Doctoral Students. (1-8) Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare for the qualifying examination required of candidates for the Ph.D. and to be taken in the quarter immediately preceding that examination. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (Graduate Advisers in charge) (F, W, Sp).

10-20. Beginning Spanish for Graduate Students. (No credit) Preparation for the graduate reading examinations. Sequence beginning (W)

LOWER DIVISION COURSES

Evaluation of Credit Previously Received. The first year of secondary school credit in Portuguese is considered to be equivalent to the first quarter course; each successive year of credit is equal to one additional course (5 units) in a sequence of four quarter courses in college.

1. Elementary Portuguese (Beginner's Course). (5) One 2-hour meeting per week. Mr. Chapman

2. Elementary Portuguese (Continuation of 1). (5) Five 1-hour class meetings per week. Prerequisite: 1. Intermediate Portuguese (Continuation of 2). Mr. Askins (Sp).

3. Intermediate Portuguese. (5) Five 1-hour class meetings per week. Prerequisite: 2. Intermediate Portuguese (Continuation of 1). Mr. Askins (Sp).

4. Intermediate Portuguese (Continuation of 3). (5) Five 1-hour class meetings per week. Prerequisite: 3. Intermediate Portuguese. Mr. Woodbridge (Sp).

5. Intermediate Portuguese (Continuation of 4). (5) Five 1-hour class meetings per week. Mr. Chapman (W).

6. Intermediate Portuguese (Continuation of 5). (5) Five 1-hour class meetings per week. Mr. Chapman

7. Intermediate Portuguese (Continuation of 6). (5) Five 1-hour class meetings per week. Mr. Askins (Sp).

8. Spoken Portuguese. (4) Five 1-hour class meetings per week. Prerequisite: course 3 or equivalent. Course designed to increase vocabulary and to improve grammar and pronunciation by means of oral expression. (W)

LOWER DIVISION COURSES IN ENGLISH TRANSLATION

*293C-293D. Brazilian Literature in English Translation. (4-4) Three class hours per week. Open to students in all departments of the University. No knowledge of Portuguese necessary.

UPPER DIVISION COURSES

Prerequisite to all upper division courses: 20 units or equivalent of Portuguese or another Romance Language. With the approval of the graduate adviser, upper division and graduate credits in Portuguese literature may be applied toward the M.A. degree in Spanish.

1. Portuguese for Advanced Students. (3) Three class hours per week. An intensive course for students with no previous study of Portuguese. Mr. Askins (Sp).

2. The Contemporary Brazilian Novel. (4) Three class hours per week. Mr. Woodbridge.

3. Gli Vicente and Camões. (4) Three class hours per week. Major works in Spanish as well as in Portuguese. Mr. Askins (W).

4. Studies in Luso-Brazilian Literature. (4) Three class hours per week. Course may be repeated for credit with permission of instructor. Mr. Woodbridge (Sp).

5. Introduction to Portuguese Linguistics. (4) Three class hours per week. Prerequisite: consent of instructor. Analysis of selected problems of the Portuguese language, in an effort to contrast it with Spanish and with other varieties of Romance speech. Mr. Asvedo.

6. Special Study for Undergraduates. (2-4) Prerequisite: consent of instructor. Special tutorial or seminar on selected topics. Mr. Askins, Mr. Sousa, Mr. Woodbridge (F, W, Sp).

7. Supervised Independent Study and Research. (2-4) Prerequisite: consent of instructor. Individual conferences on special programs of study or research. Hours of meeting are variable. Prerequisite: graduate standing. Individual conferences on special programs of study or research in a restricted field not covered by available courses or seminars. Mr. Askins, Mr. Woodbridge (F, W, Sp).

8. Special Study for Graduate Students. (2-6) Hours of meeting are variable. Prerequisite: graduate standing. Individual conferences on special programs of study or research in a restricted field not covered by available courses or seminars. Mr. Askins, Mr. Woodbridge (F, W, Sp).

9. Special Advanced Study. (2-6) Restricted to candidates for higher degrees with an adequate preparation for the subject proposed for special study, and by previous arrangement with members of the departmental staff. Sections 1 through 20: letter graded; Sections 21 through 40: satisfactory/un satisfactory grading. Mr. Askins, Mr. Woodbridge (F, W, Sp).

10. Catalan for Advanced Students. (3) Three class hours per week. Prerequisite: 20 units or equivalent of another Romance language, or consent of instructor. An intensive course for students with no previous study of Catalan. Mr. Faullhaber in charge.

11. Catalan (Continuation of 1). (5) Five 1-hour class meetings per week. Prerequisite: Course 1 or equivalent. Mr. Faullhaber in charge.

12. Catalan (Continuation of 2). (5) Five 1-hour class meetings per week. Prerequisite: Course 2 or equivalent. Mr. Faullhaber in charge.

LOWER DIVISION COURSES

Evaluation of Credit Previously Received. The first year of secondary school credit in Catalan is considered to be equivalent to the first quarter course; each successive year of credit is equal to one additional course (5 units) in a sequence of four quarter courses in college.

1. Elementary Catalan (Beginner's Course). (5) One 2-hour meeting per week. Mr. Faulhaber in charge.

2. Elementary Catalan (Continuation of 1). (5) Five 1-hour class meetings per week. Prerequisite: Course 1 or equivalent. Mr. Faulhaber in charge.

3. Elementary Catalan (Continuation of 2). (5) Five 1-hour class meetings per week. Prerequisite: Course 2 or equivalent. Mr. Faulhaber in charge.

UPPER DIVISION COURSES

Prerequisite: 20 units or equivalent of another Romance language, or consent of instructor. An intensive course for students with no previous study of Catalan. Mr. Faullhaber in charge.

101. Catalan for Advanced Students. (3) Three hours of lecture per week. Prerequisite: 20 units or equivalent of another Romance language, or consent of instructor. An intensive course for students with no previous study of Catalan. Mr. Faullhaber in charge.

102. Readings in Catalan. (4) Three hours of lecture per week. Prerequisite: Catalan 1, Catalan 101 (or equivalent), or consent of instructor. Selected readings in Catalan prose and poetry. Course may be repeated for credit when readings change. Mr. Faulhaber in charge.

Statistics

Department Office, 357 Evans Hall

Professors:
Edward W. Barankin, Ph.D.
Richard B. Barlow, Ph.D.
Peter J. Bickel, Ph.D.
Norman L. Kaplan, Ph.D.
David Blackwell, Ph.D.
Lester E. Dubins, Ph.D.
David R. Brillinger, Ph.D.
H. B. Garber, Ph.D.
Robert J. Serfling, Ph.D.
Lester D. Dole, Ph.D.
David A. Freedman, Ph.D.
Howard J. Wold, Ph.D.
Joseph L. Hodges, Ph.D.
Louis A. Jaeckel, Ph.D.

Associate Professors:
Rudolph J. Beran, Ph.D.
Kaj A. Doksum, Ph.D.
P. Warwick Milly, Ph.D.

Assistant Professors:
Charles E. Antoniak, Ph.D.
Howard J. D'abre, Ph.D.
Louis A. Jascel, Ph.D.

Departmental Major Adviser: Mr. Hodges.

The Department of Statistics offers the undergraduate a thorough introduction to the theory of probability and of statistics, their extensions in several directions such as stochastic processes and sampling surveys, and some of their applications in general and in special fields such as social science and engineering.

The undergraduate courses are divided into several basic cycles according to their emphasis and mathematical background. One cycle, emphasizing theory but including some application in the laboratories, includes courses 20 and 100A-100B (or 200A-200B-L-M-N). Statistics 100 requires two years of calculus (Statistics 200 requires more); the first half is devoted to probability and the second half to statistics. A second cycle, requiring four quarters of calculus and emphasizing interpretation and concepts, is based on 134A-134B, 147 (the first two quarters are devoted to probability, the remainder to statistics) or 134A-134B and 141 or 142 (stochastic processes). Another cycle emphasizing interpretations and concepts, which requires one year of calculus, consists of 134A followed by 135A-135B (one quarter of probability and two of statistics). A fourth cycle, emphasizing concepts and applications and requiring calculus only in its first three quarters, is the sequence 130A-130B-130C.

NOTE: For key to symbols, see page 34.
the probability model is developed as needed for the statistical study. A cycle intended mainly for social scientists, requiring no mathematics, involves 2, 131 with 131L, 132 with 132L. A student may not receive full credit for partially parallel courses. The interests of the members of the staff are too varied to be reflected completely in the courses given each year. The courses numbered from 152 to 169 cover a wide range; attention is also drawn to 191, given to recent developments.

LOWER DIVISION COURSES

1A. Introduction to Probability. (3) Three 1-hour lectures per week. Prerequisite: students who have completed a course in probability will receive only partial credit.) Elementary concepts of probability; random variables and expectation; variance; binomial and Poisson distributions; bivariate and Poisson approximations. (F, W, Sp)

1B. Introduction to Statistical Inference. (3) Three 1-hour lectures per week. Prerequisite: course 1A. (Students with advanced knowledge of probability will receive only partial credit.) Elementary concepts of statistical inference. Estimation with applications to the estimation of means, variance, and correlation. Determination of sample size, choice of estimate and problems of design. Testing hypotheses; simple examples of chi-square tests; the correlation coefficient. (F, W, Sp)

2. Introduction to Statistics. (5) Three 1-hour lectures and three 1-hour laboratories per week. Prerequisite: high school algebra. (Students who have completed a course in probability will receive only partial credit.) Elementary treatment of basic ideas in probability and statistical inference. Models; Prerequisite: second year calculus. Discrete probability models. Random variables. Binomial and Poisson distributions. De Moivre-Laplace theorem. (F, W, Sp)

10A, 100B-100C, 100D. Introduction to the Theory of Probability and Statistics. (5-5) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: one quarter of calculus. (Students who have completed a course in probability will receive only partial credit.) Elementary treatment of basic ideas in probability and statistical inference. Models; Prerequisite: second year calculus. Discrete probability models. Random variables. Binomial and Poisson distributions. De Moivre-Laplace theorem. Multivariate distribution. (F, W, Sp)

130A-130B. Concepts of Probability. (4-4) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: for students having completed 131, 132, 134A, or 135 may receive only two units for 130A. Further study of probability theory. Hypothesis testing and estimation. The conceptual and applicational aspects are treated carefully, the more difficult theorems being stated without proof. Useful for students taking only one quarter. (F, W, Sp)

130A: 130B: 130C. Statistical Inference. (4-4-4) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite for 130C: one quarter of calculus. Students who have taken part of Statistics 100, 131, 132, 134A, 135 may receive only two units for 130C. Meant for students of arts background. Basic concepts and principal tools of probability theory, hypotheses testing and estimation. The conceptual and applicational aspects are treated carefully, the more difficult theorems being stated without proof. Useful for students taking only one quarter. (F, W, Sp)

131. Statistical Inference for Social Scientists, (4) Three 1-hour lectures per week. Prerequisite: a mathematics course such as Mathematics 190. May not be taken for credit by students having completed 130A or 130B. Further study of topics in probability and statistics relevant to social science applications. Linear estimation and normal regression. Multivariate distribution. Multivariate testing. Correlation and multiple regression. (F, W, Sp)

131L. Laboratory Course in Statistical Inference for Social Scientists. (1) One 2-hour laboratory per week. May be taken only in conjunction with Statistics 131. Prerequisite: course 131. (W, Sp)

132. Second Course In Statistical Inference for Social Scientists. (4) Three 1-hour lectures per week. Prerequisite: course 131. May not be taken for credit by students having completed 130B. Further study of topics in probability and statistics relevant to social science applications. (W, Sp)

132L. Second Laboratory Course in Statistical Inference for Social Scientists. (1) One 2-hour laboratory per week. May be taken only in conjunction with Statistics 132. Prerequisite: course 132L. (W, Sp)


134B. Prerequisite: course 134A or 100A. Characteristic function, central limit theorem. Markov chains, stationary distribution; introduction to continuous random variables with applications. Poisson processes. Introduction to the Wiener process. (F, W, Sp)

135A-135B. Methods of Statistics. (4-4) Three hours of lecture and two hours of laboratory per week. Prerequisite: 135A-135B present the principal inference methods used in research and engineering. (W, Sp)

135A. Prerequisite: course 100A or 134A. May not be taken for more than one unit by students having completed 130B or 131. Sampling distributions. Estimation and hypothesis testing. Applications of x, t, F, and chi-square tests. Analysis of discrete data (Poisson, binomial, multinomial distributions. Fitting lines.) (F, W)


141. Introduction to Continuous Parameter Stochastic Processes. (4) Three hours of lecture per week. Prerequisite: course 134A or 100B. Thorough treatment of the finite Markov chains, Poisson processes, branching processes, renewal theory, discrete parameter Gaussian processes. Illustrative applications from various fields. (F, W, Sp)

147. Concepts of Statistics. (4) Three hours of lecture and two hours of laboratory per week. Prerequisite: course 134A. May not be taken for credit by students having completed 135A, 135B, 130A, or 131. A comprehensive survey course in statistical theory and methodology basic to applications in science and engineering, for students having a good background in the concepts of probability theory. (F, W, Sp)

150. Elements of Nonparametric Inference. (5) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: Statistics 150. Good background in finite Markov chains, Poisson processes, branching processes, renewal theory, discrete parameter Gaussian processes. Illustrative applications from various fields. (F, W, Sp)

161. Statistical Inference in Linear Models. (5) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: one of the courses Statistics 100C, 130B, 130C, or 132, and one of the courses Mathematics 111, 113B, or 190B. May not be taken for credit by students having completed 135A, 135B. Optimum point estimation in univariate linear models. Hypothesis testing and related confidence sets in the normal case. (W, Sp)

162. Introduction to Multivariate Analysis. (6) Three hours of lecture and four hours of laboratory per week. Prerequisite: one of the courses Statistics 100C, 132, or 161, and one of the courses Mathematics 111, 113B, or 190B. Multivariate distributions, multiple correlation and multiple regression. Hotelling's T^2-test, multivariate analysis of variance. (Sp)

166. Sampling Surveys. (4) Three 1-hour lectures per week. Prerequisite: course 134A or 154A or 135A or consent of the instructor. Theory of sampling and analysis of sampling methods. Unrestricted stratification, cluster and double sampling procedures. (Sp)

168. Laboratory Course in Sampling Surveys. (1) One 2-hour laboratory per week. May be taken only in conjunction with Statistics 166L. Prerequisite: course 166. (Sp)

169. Dynamic Programming. (4) Two 1 1/2-hour lectures per week. Prerequisite: course 100A or 134A.
General theory of dynamic programming, illustrated by detailed study of examples. (W)

181A. Bayesian Statistics. (4) Three hours of lecture per week. Prerequisite: upper division course in statistics. Factorization of joint distributions. Conjugate families. Bayesian inference in binomial, Poisson, and normal models. Bayesian interpretation of the chi-square test of association and of the F-test and of the general linear model. (Sp)

191. Experimental Courses in Probability and Statistics. (4) Three 1-hour lectures per week. Prerequisite: consent of instructor. Recent developments of especial interest to the instructor exposited as a senior level course.

**191B. History of Probability. (3) Two hours of lecture per week. A broad survey of development of the mathematical concepts underlying the theory of probability and the attempted applications to the real world, beginning with the ancient Greeks and continuing through the birthplace.** (Sp)

**191C. Introduction to Statistical Computing. (4) Two hours of lecture and two hours of laboratory per week. Prerequisite: an upper division statistics course and knowledge of computer programming. Topics selected from: Monte Carlo simulation; computer generation of random numbers; iterative optimization of procedures; curve fitting; study of available program packages. (Sp)**

H198. Special Study for Honors Candidates. (1-7) The Staff (F, W, Sp)

198. Directed Study for Undergraduates. (1-5) Prerequisite: consent of instructor. Special tutorial or seminar on selected topics. The Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1-5) Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis.

### GRADUATE COURSES

Courses 210A—210B—210C constitute the bases of the graduate courses for students whose primary interest is in mathematical statistics; course 205A—205B—205C, for those with primary interest in probability. Courses 230, 236, 240, and one of 232, 242 represent the core program for students interested in statistics as a tool in empirical research, either experimental or observational.

200A. Introduction to Probability and Statistics at an Advanced Level. (4-4) Three 1-hour lectures per week. Prerequisite: consent of instructor. Review of upper division mathematics; Sec. 1 has stronger emphasis on theory. Intended for students who have not taken probability. Students who have completed a course in probability will receive only partial credit. Advanced treatment of topics in probability including: discrete probability models, axiomatic development, laws of large numbers. Distribution functions, binomial, hypergeometric, Poisson, normal, central limit theorem. Probability density functions, conditional probability, expectation, variance, Chebyshev inequality, law of large numbers. Additional topics. (F, Sp)

200B—200C. Introduction to Probability and Statistics at an Advanced Level. (4-4) Three 1-hour lectures per week. Prerequisite: course 200A or consent of instructor. 200B, change of variables, Poisson, Poisson, normal, central limit theorem. Probability density functions, conditional probability, expectation, variance, Chebyshev inequality, law of large numbers. Additional topics. (F, Sp)


205A—205B—205C. Probability Theory. (4—4—4) Three 1-hour lectures per week. Prerequisite: course 201 (may be corequisite) or consent of the instructor. Expectations, conditioning. Distributions and characteristic functions. Independence and marginals; convergence theorems, central limit theory. Stationarity, ergodic theorems. Elementary Markov chains. Sequence beginning (F) (F, W, Sp)

210A—210B—210C. Advanced Theory of Statistics. (4—4—4) Three 1-hour lectures per week. Prerequisite: a year of upper division probability and statistics. Mathematics 111 or (113B). Course 200A or 205A is prerequisite to 210B. A survey of mathematical statistics including the theories of hypothesis testing, point estimation, confidence sets and multiple decision procedures, with applications in areas such as formal analysis, analysis of variance, multivariate analysis, non-parametric inference, and sequential analysis. Sequence beginning (F) (F, W, Sp)

210M. Laboratory for Statistics 210B. (1) One 2-hour laboratory per week. (W)

210N. Laboratory for Statistics 210C. (1) One 2-hour laboratory per week. (W)

216A—216B. Theory of Nonparametric Inference. (4—4) Three 1-hour lectures per week. Prerequisite: course 210A or equivalent. The theory of nonparametric and robust methods for problems such as the one- and two-sample problems, the hypotheses of randomness and independence, testing and estimation occurring in linear models. Asymptotic null distributions, power and efficiency. 216A: (F, W) 216B: (F, W, Sp)


230A—230B. Analysis of Variance. (5—5) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: course 230A. Introduction to experimental design. Randomization models. Blocking, confounding, and fractional replication in 2^n experiments. Response surface exploration. (Sp)

232. Experimental Design. (5) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: course 230A. Randomization models. Blocking, confounding, and fractional replication in 2^n experiments. Response surface exploration. (Sp)


238. Sequential Experimentation. (4) Two 1-hour lectures and one 2-hour laboratory per week. Prerequisite: one of course 100C, 130B, 132, 135A, 200C. Wald probability-ratio tests. Truncated sequential tests. Sequential design. Information maximization. Sequential estimation. Two-stage procedures. (Sp)


242. Multivariate Analysis. (5) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: course 230A. Topics selected from the following, with testing and estimation in each case: Sampling theory for multivariate normal populations. Multivariate analysis of variance and covariance. Classification and discriminant analysis. Component and factor analysis. Statistical correlations. Stochastic difference equations. (Sp)


NOTE: For key to symbols, see page 34.

L&S: Statistics / 199
252. Special Stochastic Processes. (4) Three hours of lecture per week. Prerequisite: one of the courses 100A, 134A, 200A, or consent of the instructor. Concepts and applications of the Poisson process, the Wiener process, Markov processes, diffusion processes, geometric Brownian motion. (F)

253. Applied Probability. (4) Three hours of lecture per week. Prerequisite: one of the courses 100A, 134A, 200A, or consent of the instructor. Renewal processes, branching processes, Markov chains, death processes, queueing processes. Storage, ruin and traffic problems. (F)


259. Topics in the Mathematical Sciences Research. (1-2) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: familiarity with concepts of probability and consent of instructor. Introduction to studies conducted at the Statistical Laboratory, predominantly in biology, health, and astronomy. Laboratory includes collection and analysis of data, including regression, analysis of variance, nonparametric techniques, and latent structures. (Fall, Winter, Spring)

260. Information Theory. (4) Three 1-hour lectures per week. Prerequisite: course 205B or consent of instructor. Separability, sample continuity, Martingale Processes, and further topics. (W)

262. Information Theory. (4) Three 1-hour lectures per week. Prerequisite: course 203A or 205A. Topics in information 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. (F, W, Sp)

263. Decomposable Processes. (4) Three 1-hour lectures per week. Prerequisite: course 261 or consent of instructor. Recent developments and topics in non-independent processes. Coalescence, Levy-theo process. Poisson processes and Brownian processes. (W)

265. Markov Processes. (4) Three 1-hour lectures per week. Prerequisite: course 260 or consent of instructor. Markov independence. Time continuous transition probabilities. Strong Markov property. Semi-group representation of the theory. (Fall, Winter, Spring)


276. Seminars 278A. Current Literature. (3) Supervised presentation, by students, of current supervised literature. (F, W, Sp)

278B. Special Seminars. (2-6) Special topics, by means of lecture and discussion. (F, W, Sp)

278C. Seminar in Applied Probability and Statistics. (2-4) Special topics with informal lectures by researchers in substantive fields and by members of staff. (Sp)

Note: Students with 84 to 105 units must already have had general chemistry and general biology. Those with 106–120 units must have, in addition, organic chemistry.

Honors Program: Students with an overall grade-point average of 3.0 or higher and a grade-point average of 3.3 or higher in the major may apply at the beginning of the senior year to the professor in charge of the Thesis Course (Zoology 196) for admission to the Honors Program. Students accepted in the Honors Program will complete the senior seminar (Zoology 198) and prepare a thesis (Zoology H196). However, in order to graduate with honors students must finish their work with an overall grade-point average of 3.3 or higher.

Preparation for Graduate Study. Those planning to enter graduate study in Zoology are expected to have a background in general biology. All candidates for the Ph.D. must pass a written qualifying and an oral examination. The crucial part of the Ph.D. program is the thesis, based upon original research in which the candidate demonstrates the ability to conduct independent study and to incorporate the results in a thesis. Service as a teaching assistant is normally required as part of the Ph.D. program in zoology. Details of the Ph.D. program may be obtained from the departmental office.

Graduate Degrees in Zoology. The Department of Zoology offers the following degrees: (1) a Master of Science degree. Details of which may be obtained from the departmental office. The program for the Ph.D. varies considerably, according to the background and interests of the individual student. All candidates for the Ph.D. must pass a written qualifying and oral exam- ination. The outline of the main facts and principles of biology, with emphasis on human biology. (Students may not receive credit for this course if they have previously taken course 30, Biology 1A–1B, or 11A–11B.)

15. Man in the Tropics. (Formerly 108) Three hours of lecture per week and demonstrations to be arranged. Prerequisite: open without prerequisite to all students, but desired for those not specializing in Zoology. The structure and function of the tropics, with emphasis on ecological relations between man and other species. (Students may not receive credit for this course if they have previously taken Biology 1A–1B or 11A–11B.)

Mr. Eakin (W)

30. Introductory Human Biology. (Formerly 108) Three hours of lecture and one hour of discussion per week. Open to all students but not planning major in Biology or Zoology. No credit given to students who have taken Zoology 10, Biology 1A–1B, or 11A–11B.

Mr. Eakin (W)

120A. Biology of Chemical Mediation. (Formerly numbered 120, Two 1/2 hour lectures and one hour of discussion per week. Prerequisite: course 108 or equivalent. Chemistry. Hormonal and para- 

Mr. Bern (F)

120B. Biology of Chemical Mediation. (Two 1/2 hour lectures and one hour of discussion per week. Prerequisite: course 108 or equivalent. Chemistry. Hormonal and par- 

Mr. Bern (W)

124. Invertebrate Physiology. (Three hours of lecture and one hour of discussion per week. Prerequisite: course 108 or equivalent. Introduction to the various aspects of the physiology of invertebrates. Students with an understanding of the neuropeptide composition of invertebrates. Students with an understanding of the neuropeptide composition of invertebrates. (May be taken concurrently.) Limited to 10 students.

Mr. Smith (W)

124L Topics in physiology, respiration, secretion, and water balance.

Mr. Smith (W)

124M: Topics in nervous and hormonal mediation, effectors, and sense organs.

Mr. Smith (W)

131. Physiological Ecology. (Two 1/2 hour lectures and one hour of discussion per week. Prerequisite: course 108 or equivalent. Comparative physiology of the invertebrates with emphasis on the various aspects of the physiology of invertebrates, stress, and adaptation to new conditions, such as temperature, water, ions, and gases.

Mr. Locht (Sp)

131L Laboratory in Physiological Ecology. (Two 1/2 hour laboratories per week, except several Saturday field trips.

Mr. Balas (F), Mr. Meier (F)

135A–135B. Biology of the Vertebrates. (5–5) Two 1/2 hour lectures and two 1/2 hour laboratory periods per week, with written reports and special readings. Prerequisites: Biology 1A–1B. An introduction to the biology of the vertebrates, stressing the role of the nervous system, comparative anatomy, and evolution.

Mr. Ghiselin (W), Mr. Smith, Mr. Simmons (Sp)

105. Animal Evolution. (Two 11/2 hour lectures and two 1/2 hour laboratory periods per week, plus written reports and special readings. Prerequisites: Bi- ology 1A–1B or equivalent. The course in evolution of the animal kingdom, with emphasis on basic processes, selection theory, adaptive responses, and patterns of speciation and phylogenetic relationships.

Mr. Eakin (F), Mr. Stebbins (W), Mr. Simmons (Sp)

1D–1B. Natural History of the Vertebrates. (5–5) Two 1/2 hour lectures, one 2/3 hour laboratory, and one 1/2 hour discussion section per week. Prerequisites: an equivalent or consent of instructor. Comparative study of the various aspects of the physiology of invertebrates, stress, and adaptation to new conditions.

Mr. Smith (W)


Mr. Smith (W)

124M: Topics in nervous and hormonal mediation, effectors, and sense organs.

Mr. Smith (W)

131. Physiological Ecology. (Two 1/2 hour lectures and one hour of discussion per week. Prerequisite: course 108 or equivalent. Comparative physiology of the invertebrates with emphasis on the various aspects of the physiology of invertebrates, stress, and adaptation to new conditions, such as temperature, water, ions, and gases.

Mr. Locht (Sp)

131L Laboratory in Physiological Ecology. (Two 1/2 hour laboratories per week, except several Saturday field trips.

Mr. Balas (F), Mr. Meier (F)

135A–135B. Biology of the Vertebrates. (5–5) Two 1/2 hour lectures and two 1/2 hour laboratory periods per week, with written reports and special readings. Prerequisites: Biology 1A–1B. An introduction to the biology of the vertebrates, stressing the role of the nervous system, comparative anatomy, and evolution.

Mr. Ghiselin (W), Mr. Smith, Mr. Simmons (Sp)

105. Animal Evolution. (Two 11/2 hour lectures and two 1/2 hour laboratory periods per week, plus written reports and special readings. Prerequisites: Bi- ology 1A–1B or equivalent. The course in evolution of the animal kingdom, with emphasis on basic processes, selection theory, adaptive responses, and patterns of speciation and phylogenetic relationships.

Mr. Eakin (F), Mr. Stebbins (W), Mr. Simmons (Sp)
132. Marine Reproductive Biology. (5) Three hours of lecture and laboratory per week. Prerequisites: Biology 1A & 1B. A survey of morphological, developmental, physiological, behavioral, ecological, and evolutionary aspects of reproduction in marine organisms. Mr. Wake (Sp)

135. Animal Behavior. (4) Three hours of lecture and 2 hours of demonstration and discussion per week. Prerequisite: Biology 1B. Principles of behavioral ecology and neurobiology emphasizing the roles of evolution, behavior, and development in understanding animal behavior. Special emphasis on the evolution of behavior. Mr. Barlow (Sp)

136. Neurobiology. (3) Three 1-hour lectures per week. Prerequisite: Biology 1 recommended. An introduction to current research in this area. Emphasis on understanding how knowledge of basic neuroscience is being used to answer questions about specific problems concerning normal behaviors and those of disease states. Mr. Pitelka (Sp)

140. Animal Ecology. (3) Three hours of lecture and one hour of optional discussion section per week. Prerequisite: Biology 150 or consent of instructor. An introductory course designed to provide a general understanding of the biology of animals with emphasis on their interactions with the environment. Mr. Caldwell (Sp)

142. Marine Ecology. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: Biology 140. An introduction to topics concerning the biology of marine environments. Mr. Barlow (Sp)

142L Laboratory and Field Studies in Marine Ecology. (5) One field trip, one formal discussion and three hours of laboratory per week. Prerequisite: Marine Ecology 142. Field trips to locations in the San Francisco bay and tidepools of Marin County.先生: Wake (Sp)

143. Marine Biology. (10) Ten hours of lecture and thirty hours of fieldwork and laboratory per week. Prerequisite: Biology 150. Population structure and organization of marine communities; the discussion section will review recent literature on marine science. (F)

143L Laboratory and Field Studies in Marine Biology. (2) Two 3-hour laboratories per week with the possibility of field work. Prerequisite: course 143 (or concurrently) and consent of instructor. Limited to ten students. Mr. Caldwell (Sp)

150. Laboratory Studies of Animal Behavior. (3) Two 3-hour laboratories per week with the possibility of field work. Prerequisite: course 135 (or concurrently) and consent of instructor. Limited to ten students. Mr. Caldwell (Sp)

156. Laboratory in General Animal Parasitology. (10) Full-time laboratory work, 3-hour laboratories per week plus one hour of discussion per week. Prerequisite: Biology 1, or equivalent. General and comparative features of the phenomenon of parasitism. Emphasis upon the distinction between the various taxonomic groups of animal parasites. Mr. Mr. Sydney (F)

159. Experimental Protozoology. (5) Two 1-hour lectures and two 3-hour laboratory per week. Prerequisite: Biology 140. A study of protozoan, helminth, and other invertebrate parasites with selected experiments. Mr. Simmons (Sp)

162. Evolutionary Cytogenetics of Vertebrates. (3) One hour lecture and one 3-hour laboratory per week, to include student projects and reports. Prerequisite: basic course in genetics; cytology recommended; and consent of instructor. The theoretical and practical applications of cell division and population structures, systems, and phylogeny. Mr. Patterson (Sp)

163. Mammalogy. (8) Two 1-hour lectures and two 3-hour laboratory per week plus weekend field trips. Prerequisite: course 107A-107B. An advanced course in the biology of mammals. Mr. Patton (F)

164. Ornithology. (5) Two 1-hour lectures and one 4-hour laboratory or field trip per week, plus two weekend field trips. Prerequisite: course 107A. An advanced course in the biology of birds. Mr. Johnson (Sp)

165. Herpetology. (5) Two 1-hour lectures and one 4-hour laboratory per week. Prerequisite: course 107A-107B or equivalent. Advanced study of amphibians and reptiles. Mr. Robbins (Sp); Mr. Wake (Sp)

166. Ichthyology. (5) Two 1-hour lectures and two 4-hour laboratories per week; some weekend field trips. Prerequisite: Biology 1A & 1B or 11B-11C or consent of instructor. Lectures, laboratory, field work, and individual study of marine invertebrates. Class limited to twenty-five students. Mr. Belamuth (W)

167. Biology of Marine Invertebrates. (10) Full-time laboratory work, 3-hour laboratories per week plus one hour of discussion per week. Prerequisites: Biology 1A & 1B or 11B-11C; or consent of instructor; Lectures, laboratory, field work, and individual study of marine invertebrates. Class limited to twenty-five students. Mr. Belamuth (W)

168. Comparative Histology of Vertebrates. (3) One hour lecture and one 3-hour laboratory per week, to include student projects and reports. Prerequisite: course 107A-107B. A basic course in the biology of fishes. Mr. Barlow (F)

170. American Game Birds and Mammals. (2) Formerly numbered IDS 170. One hour of lecture and three hours of laboratory work per week, plus individual conferences, on the biology and classification of North American game birds and mammals. Mr. Martin (W); Mr. Berg (Sp)

171. Physiology of Invertebrates. (5) Two 1-hour lectures and a 2-hour laboratory per week. Prerequisite: Biology 150 or 150A. Comparative treatment of cellular developmental biology. Mr. Barrett (F)

202. Cell Biology Research Reviews. (1) One and one-half hours of lecture per week. Prerequisite: consent of instructor. A forum to discuss of basic problems and recent literature in descriptive cytology and cytochemistry. Mr. Allert (Sp)

216. Seminar on Fine Structure. (2) One 2-hour meeting per week. Prerequisite: consent of the instructor. Developmental, genetic, and morphological aspects of cell structure and function. Mr. Harris (F)

191A. Topics in Population Biology. (3) Two 3-hour lectures per week. Prerequisites: Zoology 140 and IDS 122 (or equivalents) and permission of instructor. Comparative study of functional organization and adaptive significance of life cycles in vertebrates; population consequences of varying strategies. Mr. Pileika (F)

H196A-H196B. Theoretical Course. (3-3) Prerequisites: overall grade-point average of 3.0 or a grade-point average of 3.3 in the major. Individual study and research on a special problem to be chosen in consultation with the staff. Preparation of a comprehensive thesis on a broader aspect of the work. H196A may be taken alone; if both H196A and H196B are taken, grade is given on completion of both courses. (F, W, Sp)

197. Extra Session Work. (1-4) Work on assigned topics carried on in the field, or in Berkeley when the University is not in session. May be taken 1-4 times per semester. Requires permission of the instructor and University of California diving staff member. Maximum number of all 197 units may not exceed 10. The Staff (Mr. Strohman in charge) (Sp, F, V, Sp)

199. Supervised Independent Study and Research. (1-5) Prerequisite: background courses in chosen subjects. Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis. The Staff, Mr. Strohman in charge (Sp, F, W, Sp)

GRADUATE COURSES

For admission to a graduate course, a student should have permission of the Instructor (which may be given to graduate students and to seniors with not less than a B average), and should have had 18 units of basic upper division preparatory work.

125. Molecular and Cellular Aspects of Development. (3) Two 1-1/2 hour lectures per week. Prerequisite: courses 104, 105, and 150 or equivalent. Advanced treatment of cellular developmental biology. Regulation of cell biosynthesis and differentiation. Mr. Will (Sp)

202. Cell Biology Research Reviews. (1) One and one-half hours of lecture per week. Prerequisite: consent of instructor. Review of current research in this area with emphasis on the biochemical aspects of studies on motility, cell membranes, cellular interactions during development, and relationships of RNA metabolism to differentiation and the regulation of cellular metabolism. Mr. Strohman (F, W, Sp)

216. Seminar on Fine Structure. (2) One 2-hour meeting per week. Prerequisite: consent of the instructor. Developmental, genetic, and morphological aspects of cell structure and function. Mr. Harris (F)
219. Seminar In Developmental Biology. (2) One 2-hour meeting per week. Prerequisite: course 105 or equivalent. Consent of instructor. Mr. Eakin (Sp)

**220. Special Topics in Biology of Chemical Mediation.** (2) One 2-hour lecture and discussion period per week. Prerequisite: consent of instructor. Topics will vary from year to year. Mr. Eakin (Sp)

221. Seminar In Comparative Endocrinology. (2) One 2-hour meeting per week. Prerequisite: course 120, or Physiology 141, or equivalent. Recommended: course 220. Mr. Bern (Sp)

222. Seminar In Marine Biology. (2) One organizational meeting, one 2-hour meeting per week, plus one week spent at Bodega Marine Laboratory. Prerequisite: consent of instructor. Topics to vary. May be repeated for credit.

**223. Seminar In Physiological Ecology.** (2) One 2-hour meeting per week. Prerequisite: consent of instructor. Mr. Lich (W)

226. Seminar In Comparative Neurophysiology. (2) One 2-hour meeting per week. Prerequisite: consent of instructor. Critical discussion of current problems. Mr. Rowell, Mr. Steinhardt, Mr. Bentley (W)

**227. Seminar In Animal Behavior.** (One 2-hour meeting and discussions per week. Prerequisite: course 235 or equivalent and consent of the instructor. Ms. Rowell (W); Mr. Caldwell (Sp)

242. Comparative Population Ecology. (4) Two 1-hour lectures and two 2-hour laboratory periods, plus written reports. Prerequisite: course 140 or equivalent. A comparative review of population and life cycle characteristics; types of population organizations evolved among higher animals, especially vertebrates. Mr. Pitelka (W)

244. Seminar In Animal Ecology. (2) One 2-hour lecture per week. Prerequisite: consent of instructor. Participation in preparation and presentation of a seminar. The topic for each quarter will be determined prior to the first meeting and announcements will be based on the selected topic. Mr. Austin (Sp)

246. Genetic and Epigenetic Aspects of Carcinogenesis. (2) Two 1-hour lectures per week. Prerequisites: 105 and 181, or consent of instructor. Lecture and discussion concerning current research on gene expression and neoplastic transformation. Mr. Martin (F)

249A–249B. Principles and Concepts of Modern Zoology. (2–2) One 2-hour lecture and discussion period per week and recommended reading. Prerequisite: graduate standing and consent of instructor. Beginning graduate students are expected to attend. Must be presented on a pass/no pass basis. Sequence begins (F). Mr. Harris (in charge) (F); Mr. Rowell (in charge) (W)

266. Research. (1–12) Credit awarded according to work planned and accomplished. Must be taken on a pass/fail basis. The Staff (Su, F, W, Sp)

269. Special Study for Graduate Students. (1–4) Reading or other advanced study arranged with a staff member. The Staff (Su, F, W, Sp)

401. General Biological Microtechniques. (3) Two hours of lecture and four hours of laboratory per week. Prerequisites: two quarters of biology and consent of instructor. Preparation of invertebrate and vertebrate tissues for light microscopy. Basic histological and histochemical laboratory techniques including whole mounts, use of anesthetics, fixation, embedding, sectioning and staining of tissues. The paraffin method is emphasized. Mr. Austin (W)

501. Individual Study for Master’s Students. (1–6) Individual study for the comprehensive examinations or language requirements in consultation with the graduate adviser. Units may be used to meet either unit or residence requirements for a master’s degree. Must be taken on a satisfactory/unsatisfactory basis. Mr. Austin (W)

502. Individual Study for Doctoral Students. (1–6) Individual study in consultation with the graduate adviser, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (Su, F, W, Sp)

Zooiology Seminar. (No credit) Meetings for the presentation of original work by the faculty, visiting lecturers, and graduate students. Attendance by all graduate students is recommended. Mr. Licht (F); Mr. Shrohman (W); Mr. Colwell (Sp)

IDS 100. Problems In Marine Biology. (15) See Interdepartmental Studies for the complete description of this course.
204 / LIBRARY AND INFORMATION STUDIES

Bibliography

1. Methods of Library Use. (3) Three hours of lecture per week. Students will learn how to approach the U.C. Library’s resources in a systematic way to meet their needs, via lecture, section, problem sets, examinations and a term paper. They will also learn to evaluate these techniques to future independent research. (F, W, Sp)

104. The Book as an Artifact. (3) Three hours of lecture per week. A survey of the evolution of writing and reading, with emphasis on the book, with emphasis on its various aspects and their role in the lives of children. Historical perspective: milestones and the current scene in publishing. Mr. M. Cooper (Sp)

126. Survey of Children’s Literature. (3) Three hours of lecture per week. Children’s literature as a genre of literature; its role in the lives of children. Historical perspective: milestones and the current scene in publishing. Not acceptable towards fulfillment of requirements for the M.L.S. degree. Mrs. Roger (F)

199. Individual Study. (1-5) Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis.

Librarianship


202L. Typographical Laboratory. (1) One hour of laboratory per week. Prerequisite: course 202. May be taken concurrently. Operational aspects of book construction; includes typesetting, papermaking, hand printing, etc. Mr. W. Cooper (Sp)

203A. Origins and Spread of Printing and Publishing in Europe. (4) Two hours of lecture and two hours of laboratory per week. Mr. Harlan, Mr. Mosher

203B. History of Printing and Publishing: 1550-1800. (4) Three hours of lecture and one hour of laboratory per week. Prerequisite: course 202. Mr. Harlan, Mr. Mosher

203C. History of Printing and Publishing: 1800-1950. (4) Three hours of lecture and one hour of laboratory per week. Prerequisite: course 202. Mr. Harlan, Mr. Mosher

208. Library User Studies. (3) Two hours of lecture per week. Survey of studies that use the methods of the behavioral sciences to examine library and information service use and information gathering behavior. Mr. W. Cooper

209. Library in the Community. (3) Three hours of lecture per week. Analysis of the community for the librarianship and the behaviors of the community toward the library use. Methods of relating the library with the community. Mr. W. Cooper

215. Popular Culture in the Public Library. (3) Two to three hours of lecture per week. An analysis of the content of popular books, films, song lyrics, etc., and implications for public library programs. (W)

220. Reference and Bibliography. (4) Three hours of lecture per week. Reference and bibliographical sources; general and special reference and bibliographical sources, including national and subject bibliographies. Mr. Harlan, Mr. Mosher (W)

221. Special Topics in Reference and Bibliography, (1-8) One to eight hours of lecture per week. Prerequisite: consent of instructor. Specific topics, hours, and credit vary from offering to offering. May be repeated for credit, with change of content. Mr. Mosher (Sp)

222. Computer-Based Reference Services. (4) Three hours of lecture and 1 hour of laboratory per week. Application of computer techniques to library reference work. Bibliographic data bases in machine-readable form. Mr. Bourne (F)

225. Law Librarianship: Legal Research, Reference, and Bibliography. (3) Three hours of lecture per week. Open to students in the School of Librarianship and to third year students in the School of Law. Introduction to legal bibliography, cases and reports, statutes, administrative regulations and decisions, legislative history, legal citations and digests, legal periodicals and indexes, secondary materials, legal bibliography tools. (Sp)

228A. Children’s Literature. (4) Three hours of lecture per week. Survey of specific aspects of children’s literature: twentieth-century trends; criticism and evaluation; trends in use of illustration. Mrs. Roger (F, W, Sp)

228B. Library Work with Children and Young Adults. (3) Three hours of lecture per week. Prerequisite: course 228A. Reading interests; types of library material; levels of reading ability; book selection; library programming. Mrs. Roger (W)

228C. Children’s Literature; Oral Interpretation. (3) One 2 1/2-hour lecture per week. Prerequisite: consent of the instructor. Developmental historical background of reading and interpretation. Topics vary from offering to offering. May be repeated for credit with change of content. Mr. W. Cooper (Sp)

234. Problems of Organization of Knowledge. (4) Three hours of lecture per week. Analytical investigation of concepts of knowledge, information, interpretation, meaning, and of related concepts, from the point of view of their basic problems of description and organization of recorded discourse. Mr. Wilson (W)

236. Library and Information Service Policy. (3-4) Two or three hours of lecture per week. Prerequisite: consent of instructor. Problems in analysis and evaluation of alternative policies for provision of bibliographic, library, and information service. Topics vary from offering to offering. May be repeated for credit with change of content. Mr. Wilson (Sp)

240. Introduction to the Information Sciences. (3) Three hours of lecture per week. A survey of the problems of information science from the viewpoint of the information sciences, including those techniques and machines that deal with the analysis, interpretation and organization of information, with the scientific methods of the conceptual and physical tools of the information sciences to information analysis, indexing, retrieval, and evaluation. Mr. Maron (F)

241. Theoretical Problems in Information Transfer and Retrieval. (4) Three hours of lecture per week. Problems in the design and evaluation of automatic literature search and information systems. Intended as a mature introduction for students with some background in logic, mathematics, and computer science. Mr. Maron (Sp)

242A-242B. Principles of Information Retrieval. (3-3) Two hours of lecture per week. Prerequisite: consent of instructor. Analysis of problems of information storage and retrieval. Stress on techniques that can in principle be programmed on a general purpose digital computer. Topics to be covered include: automatic indexing, random accessing machines, use of weighted indexes; associative searching. Credit and grade will be awarded upon completion of sequence. Mr. W. Cooper, Mr. Maron

243. Automatic Data Retrieval and Question-Answering. (3) Two hours of lecture per week. Prerequisite: consent of instructor. A survey and analysis of current data retrieval systems. An examination of some of the major logical, linguistic, programming and file organization problems relating to automatic question-answering systems. Mr. W. Cooper

246. Evaluation of Information Systems and Services. (3) Three hours of lecture per week. A general survey of principles and methodologies for evaluating libraries and other information systems. The meaning and logical role of measures of retrieval effectiveness. The conception of a measure of cost-effectiveness analysis. Mr. W. Cooper

248. Design of Mechanized Information Retrieval Systems. (4) Three hours of lecture per week. Prerequisite: course 246 or equivalent, or consent of instructor. Survey of problems of development of mechanized information storage and retrieval systems. Topics include: algorithms, computer concepts, design of computer programs for information retrieval, file organization, evaluation of systems. Mr. Bourne (Sp)

250. Introduction to Bibliography. (8) Two 1-hour discussion meetings and eight to ten hours of laboratory and tutorial instruction or equivalent individual or group study. Historical background of methods of on-line retrospective searching, query formulation and search strategy, management considerations. Student work and demonstrations with representation of all types of library materials. Mr. Bourne (F)

251. Cataloging and Classification. (4) Two hours of lecture and two hours of discussion per week. Standard techniques of identification, description, and subject access to bibliographic units: emphasis on structure and uses of codes and schemes. Survey of cooperative and centralized cataloging activities. Mr. W. Bourne (F, W, Sp)

Special Topics In Cataloging and Classification. (1-8) One to eight hours of lecture per week. Prerequisite: consent of instructor. Specific topics, hours, and credit vary from offering to offering. May be repeated for credit, with change in content.

Library Technical Services. (3) Three hours of lecture per week. Prerequisite: course 251. Survey of developments and problems, with emphasis on management aspects of acquisitions, cataloging, classification, storage, and preservation of library materials; personnel administration in technical services; application of mechanized systems. Mr. Buckland (Sp)

Descriptive Bibliography. (3) Three hours of lecture per week. Historical and analytical bibliography as methods of investigation, based on McKerrow and Bowers; methods of bibliographical description based on Mumford and Greif; literature of analytical bibliography. Mr. Harlan

Libraries and Information Agencies. (3) Three hours of lecture per week. The history, functions, and organization of libraries and other information agencies; user requirements and socioeconomic factors influencing the design of such agencies; existing and potential programs of agencies; concepts of organization and systems analysis. Mr. Swank (F)

History of Libraries. (4) Three hours of lecture per week. A historical introduction to the libraries of the Western world, from antiquity to the present. (F)

*263A. History of Ancient and Medieval Libraries. (4) Three hours of lecture per week.

*263B. History of Scholarly Libraries. (3) Three hours of lecture per week. Prerequisite: course 262.

*263C. History of Popular Libraries. (4) Three hours of lecture per week.

*265A-265B. Comparative and International Libraries. (3-3) Three hours of lecture and laboratory per week. Prerequisite: consent of instructor. A general introduction to comparative study in librarianship and to internationalization in library service. Mr. Swank (F, W, Sp)

265A: Scope, limitations, purposes, values, history, literature and sources; the sociological, political, educational, economic and historical factors which influence the nature of library development. 265B: Examination of the development, status, and problems of libraries and of the role of the librarian in certain countries. 265A is essential preparation for 265B. Credit and grade to be awarded upon completion of their combined course.

Library Management. (4) Four hours of lecture per week. Basic management functions as applied in libraries of all types: planning, organizing and staffing, budgeting, personnel management, operational studies, and analysis of case studies. Mr. Buckland, Mr. Swank (W, Sp)


Introduction to Library Systems Analysis. (4) Three hours of lecture per week. The system approach to decision making and policy analysis in libraries. The role of the systems analyst in library management. Mr. W. Cooper (W)

Case Studies In Library Systems Analysis. (4) Three hours of lecture per week. Prerequisite: course 273 recommended. Individual case study work on selected problems of library systems analysis, and discussion of individual project efforts. Mr. Bourne (F)

Data Processing for Libraries. (4) Three hours of lecture per week. Prerequisite: course 273 recommended. An introduction to the nature and capabilities of computers and related equipment, with emphasis on applications in library processing.

Survey of Library Automation. (4) Three hours of lecture per week. A general survey of current and planned automation projects and methods in libraries and network processing centers. Particular attention will be given to specific processes such as serials, acquisitions, book catalogue and card catalogue production, and other systems. Mr. Bourne (Sp)
Undergraduate Programs

The College of Natural Resources offers a variety of academic programs which focus on renewable natural resources. For further information on the following programs write for the Announcement of the College of Natural Resources, obtainable free of charge from the Dean's Office, 101 Glannini Hall, University of California, Berkeley, CA 94720.

Undergraduate advisers serve as the principal liaison officers between students and the College. They are available for consultation throughout the year. All students are encouraged to see these representatives as early as possible for advice in the planning of their academic programs. The adviser will be fully prepared to discuss details of the curriculum of a program best suited to a student's individual needs and interests, and the careers available after graduation. The adviser should also be consulted concerning any special academic problems that may arise.

In addition, the Office of the Dean may be consulted on any special academic problems that may arise. In addition, the Office of the Dean may be similarly approved.

The major requires: 30 units of humanities and social sciences (including English 1A-1B and no more than 10 units of a foreign language); Chemistry 1A-1B, 8A-8B; Physics 6A-6B-6C; Mathematics 16A-16B; Com

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or dietetics—a professional program in nutrition management.

The Food, Nutrition, and Dietetics major gives students an excellent foundation in the biological and chemical sciences. In their program, students may choose to emphasize food science—the study of the properties and processing of food materials; nutrition—the study of the biochemistry and physiology of food utilization; or dietetics—a professional program in nutrition management.

A student with a Bachelor of Science degree in the food...
science or nutrition emphasis is well prepared to seek advanced professional study in the health sciences (medicine, dentistry, and public health), advanced graduate study in the life sciences, or technical employment in research and in the food industry. The dietetics specialty is for students planning to enter the dietetics profession as therapeutic and clinical dietitians.

The course of study in all specialties has a common core consisting of bacteriology or microbiology, 5 units; biochemistry, 5 units; Chemistry 1A–1B–1C, 8A–8B; English 1A–1B or equivalent; and social sciences, 15 units; Mathematics 12 units (including Calculus 1A-1B-1C, 8A-8B-8C); additional courses in soil science or additional calculus or statistics (4); Physics, 8 units; physiology, 5 units; and 30 units of courses in the major field.

The emphases in Food Science and Nutrition consist of additional courses in Biological and Natural Resource Sciences 12 units; a concentration in bacteriology, biology, botany, genetics, plant nutrition, physiology-anatomy, soil science, or zoology; additional units in physical sciences and mathematics (24 units), as follows: quantitative chemistry, 4 units; calculus, 4 units; calculus with laboratory, 4 units; biochemistry, 5 units; and biology, 4 units.

Requirements in the Dietetics emphasis include human societies and social sciences, 15 units as follows: economics, 4 units; Psychology, 4 units; sociology or cultural anthropology, 4 units; additional courses in psychology, sociology, or anthropology (upper division), 3 units. Biological and Natural Resource Sciences (12 units) include: upper division course in psychology or anatomy and physiology, 5 units; courses in zoology, or bioresource sciences, 9 units. Major field requirements (13 units) include: introduction to nutrition sciences laboratory, 3 units; food service organization, management and nutrition laboratory, 3 units; and therapeutic nutrition, 7 units.

For admission with junior standing see the announcement of the College of Natural Resources.

Inquiries concerning special requirements in Dietetics and the professional course of study, and requests for application materials should be directed to the Dietetics Coordinator, Department of Forestry and Resource Sciences, 119 Morgan Hall, Berkeley, CA 94720.

FORESTRY

This major is the primary vehicle for students intending to enter the profession of forestry. Its objective is the education of students to manage and protect forest-related wildlands to yield up to their full capacity of wood, water, forage, wildlife habitat, recreational opportunities, and other environmental benefits desired by mankind.

More than one-third of the upper division program may be taken as free electives. This enables the student to acquire either a highly specialized or a broad knowledge of the field of forestry. In addition, with the assistance of an advisor, the student may develop specialized programs in such areas as forest ecology, silviculture, and timber management; range ecology and management; wildlife biology and management; watershed management and hydrology; recreation and park management; and resource economics and planning.

Courses to develop these interests are offered in the College by the Department of Forestry and Resource Management. Students also select appropriate courses given by other departments on campus in order to pursue individual interests, to study basic sciences as they relate to forestry, and to become knowledgeable in the various fields of soil science. A reasonable balance between credit hour requirements is recommended for all students in this major.

Licensing. Completion of the Bachelor of Science degree with a major in forestry provides four years of credit toward meeting the requirement of seven years of qualifying education and/or professional experience for licensing as a professional forester in the state of California. Additional credit toward licensing may be earned by completion of the Master of Forestry degree. For further information concerning this see, the section on Graduate Study in Forestry.

Completion of the major, with inclusion of all upper-graduate range science courses (minimum of 16 quarter units), qualifies for state and federal Range Conservationist positions.

Preparatory Program. During the Freshman and Sophomore years the student is expected to complete biology, 12 units; chemistry, 8 units; economics, 8 units; geometry, 8 units; plane surveying, 5 units; English, 8 units; geology, 3 units; calculus, 6 units; physics, 6 units; and statistics, 4 units.

Summer Field Program. During the summer between the sophomore and junior years, the student majoring in Forestry must complete the 10-week summer field program offered in Plumas County. This field program includes three courses totaling 15 quarter units of credit which mark the beginning of the professional program. The student is introduced to the practical skills involved in land management, but the emphasis in the courses is on concepts and principles along with the development of an understanding of the whole series of related elements which constitutes a wildland environment.

The Junior and Senior Years. The program of the junior and senior years involves 60 quarter units of work, consisting of a core of 32 units of courses required of all students in the major, a group of restricted electives totaling 20 to 25 units, and 33 to 35 units of free electives.

Through appropriate planning, the student can build an area of emphasis on the foundation provided by the core requirements. Possibilities include (a) a functional emphasis, such as ecology or resource administration; (b) a resource emphasis, such as forest management, wildlife management, or recreational land management; or (c) a scientific emphasis in preparation for subsequent graduate study.

PEST MANAGEMENT

The primary objective of the major is to provide the interdisciplinary training which will permit the student to appraise and diagnose field pest and disease problems and to recommend courses of corrective or other action that are economically and ecologically sound. Attention has shifted from traditional dependence on chemical suppression of pests to pest population management through integrated control systems. Pest management specialists must have an understanding of natural control mechanisms operating in the ecosystem as well as knowledge of the economics of the crop or other commodity system, pest phenology and ecology, and the spectrum of available control methods. Plant disease and insect control situations and many other factors must be considered before the pest management specialist can make the important action decisions required. Property trained pest management specialists are in short supply today, and the outlook for employment in this important field is bright.

Both in public agencies such as the U.S. Department of Agriculture, U.S. Forest Service, National Park Service, and state and federal agencies of agriculture and forestry, and with private firms such as agricultural chemical companies, consulting firms, food processing firms, crop and range farms and ranches, and large forest product firms.

Curriculum requirements in the first two years include: economics, 5 units; English, 8 units; other social sciences, 12 units; Mathematics 1A–1B, 8A–8B–8C, biochemistry, 4 units; calculus, 4 units; and physics, 4 units. Additionally, 68 units of biological and resource sciences are needed, as well as 31 units of courses that focus on pest management.

POLITICAL ECONOMY OF NATURAL RESOURCES

Students in the Political Economy of Natural Resources major explore those aspects of human behavior, economic systems, and institutions that affect and are affected by the management of natural resources and the environment. The framework of study combines the perspectives of economics, sociology, political science, and law. The curriculum includes disciplinary approaches to natural resources and courses specifically designed to integrate the different social science approaches to the dilemmas associated with resource-based social needs. The major requirements are designed to provide opportunities for specialization in one discipline or one area of resource management. Students who complete this major have the options of professional employment in the fields of resource policy or continuing on to graduate work in professional, interdisciplinary majors, or interdisciplinary programs.

Lower division breadth requirements stipulate five quarter courses in the social sciences, of which one is principles of economics; three quarter courses in calculus and/or statistics; and two quarter courses in each of reading and composition, humanities, biological sciences, and physical sciences.

Upper division work must include a total of about 60 units in the fields of natural resource economics, history of resource use, resource and environmental law, natural resource sociology, writing, systems theory, and a senior research project.

PREVETERINARY

The preveterinary program, administered by the College of Natural Resources, offers basic training in the natural sciences and humanities in preparation for subsequent work in the School of Veterinary Medicine on the Davis campus. The two-year preprofessional program is followed by two more years of undergraduate work, completing a suitable major for the Bachelor's degree. No particular major offers special advantages for admission to the School of Veterinary Medicine. On admission to the School of Veterinary Medicine, four years of professional study leads to the degree of Doctor of Veterinary Medicine.

Enrollment in the School of Veterinary Medicine is limited, and candidates are selected upon the basis of scholarship and other criteria. Prevetenarian work should be planned in such a way that, if the student fails to enter the professional school, alternate career goals are possible.

Requests for information regarding the veterinary profession, requirements for entry in the School of Veterinary Medicine, and application forms for admission may be directed to the Office of the Dean, School of Veterinary Medicine, University of California, Davis, CA 95616.

The prevetinary program requires: 25 units of chemistry, 8 units of English, 9 units of biology (including vertebrate embryology), 3 units of genetics, and 28 units of electives in the social sciences and humanities.

SOIL RESOURCE MANAGEMENT

The primary objective of the major in soil resource management is to prepare students for professional and applied scientific work on conserving and improving the soil resources used by man. Students in the major are expected to achieve an understanding of scientific principles underlying professional techniques in such areas as soil resource classification and inventory, soil performance evaluation, and management of soils used in a variety of ways.

Students graduating from this major may expect to follow professional careers in both private firms and government agencies, including farm management firms, environmental consulting firms, tree farming firms, the Soil Conservation Service, Environmental Protection Agency, U.S. Army Corps of Engineers, U.S. Forest Service, Bureau of Land Management, California Resources Agency, and state and county planning agencies.

The outlook for employment in soil resource management is excellent owing to the growing use of specialists in this field.

The preparatory program requires: 10 units of economics; 10 units of English; 10 units of Social Science 1A–1B; 10 units of Calculus 1A–1B; 10 units of Physical Science 1A–1B; 10 units of Chemistry 1A–1B; 10 units of Biology 1A–1B; 10 units of Geography, 10 units of Computer Science, 10 units of Biology; 10 units of History, 10 units of Government, 10 units of English, and 10 units of Social Science.
WOOD SCIENCE AND TECHNOLOGY

The major in Wood Science and Technology is designed for students interested in the wise utilization of the many products obtained from trees and in obtaining an education embracing the broad field of renewable natural resources. Emphasis is placed on the management aspects of an integrated program of utilization to maximize benefits from the harvested tree. Courses provide a basic understanding of the interactions of forest management and the importance of effective utilization in the management and conservation of forests. Students may select technical elective courses that are relevant to their individual interests and career objectives.

The Wood Science and Technology major provides the academic background for many career positions in the forest products industries and related institutions, with technical specialization in such areas as resource planning, production management, operations research, wood engineering, and pulp and paper manufacture. Students who desire careers in research or teaching may also prepare themselves for graduate studies leading to the M.S. or Ph.D. degrees with specialization in areas such as wood chemistry, wood physics, forest products pathology, wood anatomy, and pulp and paper chemistry.

 Fifty-four quarter units of specified lower division subject matter are required, including: biology, 4 units; chemistry, 12 units; calculus, 6 units; physics, 12 units; statistics, 4 units; English, 8 units; and economics, 8 units. Upper division courses in Forestry, Wood Science and Technology, and restricted technical electives are required.

Graduate Programs

Academic and professional graduate degree programs are available in agricultural chemistry, agricultural economics, biophysics, comparative biochemistry, entomology, food science, forestry, genetics, nutrition, parasitology, plant pathology, plant physiology, range management, soil science, wildlife and recreation science, and wood science and technology. In addition, an ad hoc interdisciplinary doctoral program is offered.

AGRICULTURAL CHEMISTRY

This program is administered by an intercampus group and is open to students who are interested in the application of chemistry to resources and agricultural problems. For entry into the program, students should have the equivalent of the bachelor's degree in chemistry from the University of California.

Study leading to the Ph.D. degree is offered by a group of agricultural chemists who are engaged in research. Graduate research is directed by a member of the group whose activities most closely coincide with the student's interests. Courses may be taken in various departments of the College of Natural Resources, the Department of Biochemistry in the College of Letters and Science, and in the College of Chemistry.

The following special fields are represented: insecticide chemistry and insect biochemistry in the Department of Entomological Sciences; soil chemistry and plant nutrition in the Department of Soils and Plant Nutrition; forest products chemistry in the Department of Forestry and Conservation; food chemistry and animal nutrition in the Department of Nutritional Sciences. In addition to the major field of specialization, predotalor students must take courses in chemistry, biochemistry, and allied sciences as needed to qualify for the required courses. Students are encouraged to take one or more of the following courses: organic chemistry, and physics are required. Any deficiencies in these areas must be removed at the outset of graduate study.

AGRICULTURAL AND RESOURCE ECONOMICS

The Department of Agricultural and Resource Economics, one of the departments of graduate instruction and research in the College of Natural Resources, offers programs leading to the M.S. and Ph.D. degree. An applicant should hold a degree (not necessarily in agricultural economics) comparable to a bachelor's degree at the University of California and must have demonstrated strong scholarship potential. Students whose preparation is partially deficient in mathematics, statistical methods, or economic theory may remove these deficiencies after admission.

The agricultural economics program is relatively flexible; however, each program stresses economic theory, quantitative methods, and two elective fields defined in consultation with the graduate adviser. Some common elective fields include marketing and trade, agriculture in economic development, domestic rural development, and natural resource economics.

The first year of course work in the Ph.D. program is normally devoted to economic theory and quantitative methods, after which the student writes departmental preliminary examinations in each of these areas. Although there are no specific course "requirements," the level of sophistication expected in these preliminary examinations is defined with reference to a specific set of courses, and most students are advised to take these courses.

Outstanding facilities are available within the Department, including the Giannini Foundation Agriculturally Economics Library, one of the world's foremost research libraries of its type.

BIOPHYSICS

This program is administered by a faculty group from different departments which was organized to permit students interested in biophysics to obtain graduate training and advanced degrees. The program allows the student to do research on a biochemical problem and to fulfill M.A. or Ph.D. thesis requirements under the supervision of a faculty member in one of several departments, such as Cell Physiology, Entomological Sciences, Nutritional Sciences, and Soils and Plant Nutrition. Students are expected to obtain a background in physiology and biology and to specialize in some area of biochemistry.

ENTOMOLOGY

This program is administered by the Department of Entomological Sciences. Both M.S. and Ph.D. degree programs are offered. A basic educational background in the physical and biological sciences is prerequisite to the study of entomology at the graduate level. The minimum requirements are usually fulfilled by a bachelor's degree from an institution of acceptable standing. The preparatory undergraduate program should include the following subjects: general entomology, insect classification, insect anatomy and physiology, systematic entomology, insect ecology, and a year of general biology, including zoology and botany as well as cellular and organismal biology. Courses in geology and biology are strongly recommended. Chemistry, including organic chemistry, and physics are required. Any deficiencies in these areas must be removed at the outset of graduate study.

Fields of emphasis include acarology, agricultural entomology, biological control, forest entomology, pest management, insect behavior, insect ecology, toxicology, insect morphology, insect nematology, insect pathology, insect vectors, medical entomology, parasitology, and insect physiology and biochemistry.

Excellent available research facilities include an outstanding entomological museum, specialized laboratories, and an extensive library. Students also use instructional buildings, growth chambers, and greenhouses at the Oxford Tract and growth chambers, insectary buildings, growth chambers, and greenhouses at the Giff Tract.

FOOD SCIENCE

This program, leading to the M.S. degree, is administered by an interdisciplinary group composed of representatives from the Departments of Nutritional Sciences, Chemical Engineering, and Public Health. A student may do research under the direction of a faculty member in one of several departments, including Cell Physiology, Entomological Sciences, Nutritional Sciences, and Soils and Plant Nutrition.

NOTE: For key to symbols, see page 34.
ulty member in any department represented in the group. Provision is available to include selected personnel from the Western Regional Research Laboratory of the U.S. Department of Agriculture as adjunct professors and to extend research to their laboratories. Applicants must have completed the requirements for a B.A. or B.S. in the sciences or fields on which food science is based. Undergraduate preparation should include general, qualitative, analytical, organic, and physiological chemistry; physics with laboratory; bacteriology with laboratory; and courses in nutrition and/or food science or technology. Ideally, the undergraduate program will be comparable to the major in food, nutrition, and dietetics as offered on this campus.

Programs are designed to prepare students for industrial or teaching application of their education in such areas as emphasis on food chemistry, food production, food analysis, and quality control. The San Francisco Bay area is a major food processing and research center, and students are able to establish close contacts with these industries and product development groups.

FORESTRY

The Master of Forestry degree is a graduate professional degree, granted through the Department of Forestry and Conservation, and represents completion of academic preparation for a professional career in forestry. The M.F. degree consists of a combination of courses designed to provide students with a B.S. degree in forestry with a broader undergraduate education, to develop further their grasp of the principles of forestry and to relate these principles to specific professional problems.

The college includes a number of advisors and professional practice. This degree is intended to provide the student's capacity for biological, quantitative, and managerial analysis. In addition, the student is expected to organize an academic program so as to achieve technical specialization at an advanced level and to acquire an understanding of how to manage resources to meet specific economic and social goals. Excellent field study opportunities are available, and students and professionals in the forest industry work closely with the faculty. The supervising group consists of faculty members from a wide range of departments on the Berkeley campus. The program is designed to enable students with a B.S. degree in range management, forestry, or in other range management fields, or in related disciplines to obtain advanced work in this field. Graduate study leading to the Master of Science degree and serves advanced professional interests as well as those wishing to specialize in a basic aspect of range management, such as the study of brush management, forage in relation to livestock or wildlife management, or rangeland vegetation manipulation. Excellent laboratory and field facilities include several experimental range properties and large acreages of wildland ranges that are easily accessible from Berkeley. The staff is actively involved in both theoretical and practical research.

GENETICS

Administered by an interdepartmental group, this program offers graduate studies at both the M.S. and Ph.D. levels. Genetics cuts across the conventional subdivisions of the biological sciences, requiring some familiarity with botany, zoology, bacteriology, biochemistry, and physiology. In addition, genetics is an important application in such diverse disciplines as forestry and physiology for example. Genetics is also viewed as an unifying discipline; and each student, regardless of the area of specialization, must obtain a fundamental knowledge of genetics. An undergraduate major in genetics or its equivalent in the biological sciences is the standard preparation. However, students with undergraduate degrees in such fields as mathematics, psychology, and chemistry are welcome, with the understanding that subject matter deficiencies must be removed early in the graduate work.

In addition to laboratory and other facilities for research, many field stations of the University are available for students interested in natural populations; and working with the various agencies and to become involved in analyzing land management problems currently faced by these agencies.

NUTRITION

Graduate study is supervised by an interdepartmental group representing the various departments at Berkeley involved in Nutrition: Nutritional Sciences, Biochemistry, Anatomy and Physiology, Public Health, and Medical Physics. Programs are available at both the M.S. and Ph.D. levels. For admission the student should have a bachelor's degree in one of the sciences on which nutrition is based. An undergraduate major or its equivalent in any of the nutritional sciences curriculum or related fields, such as biochemistry, chemistry, biological sciences, and physiology, will provide a strong background.

Graduate study in nutrition is intellectually challenging and offers opportunities to study a range of problems encompassing human, comparative, and cellular nutrition. Fields of emphasis include biochemical, biophysical, and genetic aspects of human experimental nutrition; human nutrition; international nutrition; physiological phenomena; and therapeutic nutrition. Special facilities include a six-bed metabolic unit for the conduct of human investigations and an animal colony maintained for teaching and research purposes.

PARASITOLOGY

This program is administered by an interdepartmental group composed of staff members drawn from a wide range of departments interested in parasitology. Graduate study leading to the M.S. and Ph.D. degrees is offered. Students with a bachelor's degree in a biological science may be admitted to the program. They are expected to have training in microbiology, zoology, chemistry, biochemistry, genetics, animal physiology, and statistics. Any deficiencies must be removed at the outset of graduate study.

The varied background and interests of the supervising group offer the prospective students a broad scope of educational opportunities. A common interest of the group is in host-parasite Interrelations. Hosts of many parasites are birds in the animal kingdom. The parasites under consideration cover a broad range of invertebrate and microbial forms, and special attention is directed to parasitology of man and domestic animals. Subjects for research may be chosen in the classical areas of parasitology, but students may also choose from a wide variety of disciplines that can be brought to focus on a host-parasite relationship.

Facilities for study and research by graduate students are located in the administrative units of the faculty members of the group. These include the Department of Entomological Sciences, the Department of Zoology, and the School of Public Health on the Berkeley campus, and the Department of International Health and the G.W. Hooper Foundation for Medical Research on the San Francisco campus.

PLANT PATHOLOGY

This program is administered by the Department of Plant Pathology and offers graduate education leading to the M.S. and Ph.D. degrees. Applicants should have a bachelor's degree in plant pathology or in an equivalent field that includes a broad background in physical and biological sciences, including biochemistry, plant cell biology, and plant physiology.

The field is primarily concerned with the study of plant diseases and protection of a wide range of crop plants from disease losses. The subject area is exceptionally broad, embracing the response of the plant to the environment and to disease agents, such as bacteria, fungi, seed plants and viruses, as well as their control. This leads to research on fundamental problems such as host-parasite physiology or mode of action of fungicides. It includes applied problems such as spray control programs or soil treatments. Areas of emphasis include biological deterioration of wood; epidemiology and diagnosis of plant diseases; forest pathology; work with pathogenic fungi and viruses; and the taxonomy, ecology, and behavior of pathogenic fungi.

The Department maintains extensive research facilities, including greenhouses and a broad range of specialized research equipment. One of the largest plant pathology reprint libraries in the world and an herbarium are also maintained.

PLANT PHYSIOLOGY

This program is administered by an interdepartmental group consisting of faculty members from a wide range of departments, including Botany, Cell Physiology, Forestry and Conservation, and Soils and Plant Nutrition. Graduate study is available leading to the M.S. and Ph.D. degrees, offering students broad opportunities for work, study, and research on growth and development, hereditary potentialities, effects of environmental conditions, and other aspects of plant physiology.

The program emphasizes fundamental training. Applicants should have prior preparation in the basic physical and biological sciences, although deficiencies can be removed during the early stages of graduate study. Graduate study requirements are similar to those for the M.S. and Ph.D. degree programs are similar.

In addition to conventional chemical laboratories, specialized equipment and facilities include controlled environmental growth chambers and glasshouse space as well as field, forest, and laboratory culture areas. Equipment for the analysis of developmental and physiological processes and their biochemical or biophysical aspects include computers, electron microscopes, atomic absorption spectrometers, gas chromatographs, and other modern instrumentation.

RANGE MANAGEMENT

This program is administered by an interdepartmental group consisting of faculty members from the Department of Forestry and Conservation and related departments on the Berkeley campus. The program is designed to enable students with a B.S. degree in range management, forestry, in other range management fields, or in related disciplines to obtain advanced work in this field. Graduate study leads to the Master of Science degree and serves advanced professional interests as well as those wishing to specialize in a basic aspect of range management, such as the study of brush management, forage in relation to livestock or wildlife management, or rangeland vegetation manipulation. Excellent laboratory and field facilities include several experimental range properties and large acreages of wildland ranges that are easily accessible from Berkeley. The staff is actively involved in both theoretical and practical research.
and modern laboratories for diversified plant and soil studies. In addition to general laboratory equipment, there are instruments for x-ray diffraction, atomic absorption spectrophotometry, emission spectrometry, paper and gas chromatography, radiochemistry, electron microscopy, and soil rheology studies.

WILDLAND RESOURCE SCIENCE
This program is administered by the Department of Forestry and Conservation, with degree programs available at the M.S. and Ph.D. levels. The Ph.D. program is designed to develop the student's critical abilities and to expand the capacity to conduct research on forests, woodland, grasslands, and related renewable natural resources. It is concerned with wildland ecosystems and with the aggregates of vegetation, fauna, water, soil, climate, and social systems associated with them. It examines these ecosystems in terms of management and manipulation to achieve particular social purposes.

The master's level program is intended for the graduate in forestry, in other wildland resource fields, or in related disciplines who desires to specialize in some aspect of wildland resources such as biometrics, ecology, economics, photogrammetry, policy and planning, silviculture, soils, watershed management, or wildlife habitat management.

The Department has excellent facilities for instruction and research, including photogrammetric, physiological, and statistical laboratories as well as several forested properties where students can meet their field studies.

WOOD SCIENCE AND TECHNOLOGY
This program is administered by an interdepartmental group drawn from faculties in chemistry, engineering, forestry, and other related departments and offers programs leading to the M.S. and Ph.D. degrees. These programs are particularly to students desiring a thorough knowledge of all areas of wood science as a background to the chosen research fields or areas of specialization. To be considered for admission, students must have a bachelor's degree in a natural science, forestry, engineering, wood science, or wood technology.

Graduate study directs principal attention to an understanding of the anatomy, mechanics, physics, and chemistry of wood and the application of this knowledge to the development of wood for man's benefit. Specialization through additional study and research is possible under the program in such areas as wood structure; wood physics, including wood moisture and wood mechanics; wood biochemistry and wood engineering; gluing and glued products; wood quality; wood chemistry, including extractives, fiber utilization and pulping, pyrolysis, and other chemical processes; wood processing, including machining, drying, and treating; and product pathology.

The facilities of the Forest Products Laboratory are available for both thesis and special research projects.

AD HOC INTERDISCIPLINARY DOCTORAL PROGRAM
This program is administered directly by the Dean of the Graduate Division. There is no parallel master's level program. It is designed for students who wish to work or carry out research in areas not covered by any other existing doctoral program. Admission to the program is restricted to students who have completed some graduate study in this campus and have not been admitted to an existing departmental or group doctoral program. New applicants for admission to the Graduate Division are not eligible.

Before applying for admission to this program, the student arranges with three professors (presumably from different departments) who agree to constitute the sponsoring committee. After the student is accepted, this committee acts as the "department" up to final conferring of the degree.

The program at present is small in number of students enrolled. Several students are "housed" in departments within the College of Natural Resources, with sponsoring committee members from its faculty.

GRADUATE ADVISORS
At the request of the Dean of the Graduate Division, every department or group nominates a graduate advisor who acts as a deputy of the Dean and is the person with whom students arrange programs of study and to whom they may go for advice.

Inquiries regarding details of the various graduate programs may be directed to the appropriate graduate advisor in the chosen field. Names of advisors for the various graduate departments in the College are given in the graduate course section of this catalog.

UNDERGRADUATE COURSES

### Bioenergetics (Bio.)
**Department Office, 251 Hilgard Hall**
**Undergraduate Advisers:** Bob Buchanan, Richard Malkin

#### UPPER DIVISION COURSES

**BIO 101. Flow of Energy and Matter in the Living World.** (3) Two 1 1/2-hour lectures per week. Prerequisite: Chemistry 1A, 1B, 1C or 8A. Energy requirements and chemical elements essential for life; origin and utilization of energy in the biosphere; oxygen, carbon, nitrogen, and phosphorus cycles; cycles of other essential elements in the biosphere; biological and nonbiological future sources of energy. Mr. Aron (F)

**BIO 107. Energy Transformations in Living Cells.** (3) Three 1-hour lectures per week. Prerequisite: Chemistry 1A, 1B, 1C; 1C or 8A; Biology 1B. Nature and types of energy; energy conversion through photosynthesis, fermentation, and respiration; and energy utilization in biological work at the molecular, cellular, and organismal levels; evolutionary development of biological energy production. Mr. Malkin (W)

**BIO 117. Light and the Biosphere.** (3) Three 1-hour lectures per week. Prerequisite: Physics 8A, 8B, 8C; Chemistry 1A, 1B; Mathematics 16A, 16B. The interaction of light and living systems; the physical nature of electromagnetic radiation; mechanisms of light generation and detection; light regulation of biological systems; utilization of light energy to drive biological processes. Mr. Buchanan (Sp)

**BIO 189. Directed Group Study or Investigation.** (1-5) Prerequisite: consent of instructor. The Staff (Mr. Buchanan in charge) (F, W, Sp)

**BIO 199. Supervised Independent Study and Research.** (1-5) Enrollment is restricted by regulations listed on page 34. Must be taken on a Passed/Not Passed basis. The Staff (Mr. Malkin in charge) (F, W, Sp)

(Bioenergetics see Cell Physiology.)

### Conservation of Natural Resources (CNR)
**Department Office, 112 Giannini Hall**
**Undergraduate Adviser:** Paul L. Gersper (in charge)

#### LOWER DIVISION COURSES

**CNR 49. Introduction to Conservation of Natural Resources.** (2) One 1 1/2-hour meeting per week; three 2-day weekend field trips. Lectures and discussion will introduce students to the philosophy and educational opportunities of the major and attempt to develop the student's interests and educational goals, relative to the general field of population, environment, and resources. A paper on the student's interests, academic objectives, and plan will be required. To be taken P/IN. Intended primarily for lower division students in the CNR major. The Staff (F, Sp)

CNR 99. Supervised Independent Study and Research. (1-5) Prerequisite: Junior standing, consent of instructor. Supervised independent study or research on topics relevant to Conservation of Natural Resources and that are not covered by any other courses. Must be taken on a passed/not passed basis. The Staff (Mr. Garcia in charge) (F, W, Sp)

#### UPPER DIVISION COURSES

**CNR 109. Seminar In Conservation of Natural Resources.** (3) Three hours of discussion per week. Prerequisites: Junior standing or consent of instructor. A group project, seminars and discussion will provide students experience with topics in environmental problem solving and assist in crystallizing the students' interests and educational goals. An oral presentation, a written academic plan and written contributions to the group project will be required. Intended primarily for juniors in the Conservation of Natural Resources Major. The Staff (W, Sp)

**CNR 149. Senior Seminar In Conservation of Natural Resources.** (4) Two 2-hour discussion groups per week. Prerequisite: senior standing or consent of instructor. Information and discussion will provide students experience with topics in environmental problem solving and assist in crystallizing the students' interests and educational goals. An oral presentation, a written academic plan and written contributions to the group project will be required. Intended primarily for seniors in the CNR major. The Staff (F, W, Sp)

**CNR 197. Field Study In Conservation of Natural Resources.** (1-5) Prerequisite: consent of instructor. Supervised experience off-campus organizations relevant to specific aspects of Conservation of Natural Resources. Regular individual meetings with faculty sponsor and written reports required. The Staff (Mr. Garcia in charge) (F, W, Sp)

**CNR 198. Directed Group Study for Advanced Undergraduates.** (1-5) Prerequisite: consent of instructor. The Staff (Mr. Buchanan in charge) (F, W, Sp)

**CNR 199. Supervised Independent Study and Research.** (1-5) Enrollment is restricted by regulations listed on page 34. Must be taken on a Passed/Not Passed basis. The Staff (Mr. Buchanan in charge) (F, W, Sp)

**IDS 10A-10B-10C. Introduction to Environmental Issues—Special Projects.** (2-2-2) See Interdepartmental Studies (IDS) for description of this course.

**IDS 10L-10M-10N. Introduction to Environmental Issues—Special Projects.** (2-2-2) See Interdepartmental Studies (IDS) for description of this course.

**IDS 120. Environmental Education and Design.** (5) See Interdepartmental Studies for the complete description of this course.

### Conservation and Resource Studies (CRS)
**Department Office, 112 Giannini Hall**
**Undergraduate Major Advisers:** Conservation of Natural Resources: The Staff (Mr. Gersper in charge). Political Economy of Natural Resources: Mr. Nordgaard (in charge)

#### LOWER DIVISION COURSES

**CRS 22. World Resources for Food and Agriculture.** (3) Three hours of lecture per week. Survey of man's nutritional requirement and the production, processing, distribution, and utilization of food. Principles of agriculture including physical, biological, social, and institutional factors. The place of agriculture in national and world affairs. Mr. Day, Mr. Waldron, Mr. Stokstad (W)

**CRS 40. Environmental Chemistry.** (3-4) Three hours of lecture and optional 1 1/2-hour discussion required. Mr. Macauley (F, W, Sp)

NOTE: For key to symbols, see page 34.
NATURAL RESOURCES (Undergrad.): Entomology

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Lectures will provide an understanding of ecological concepts and techniques for managing plant and animal systems. Mr. Williams (F); Mr. Vlamin (W); Mr. Raabe (Sp)

Entomology, (4) Three hours of lecture and one and one-half hours of laboratory per week. Prerequisite: any ecology course, or one quarter of Interdepartmental Studies 10, or consent of instructor. An introduction to the study of insects with emphasis on the factors that influence their existence, population densities, and their interactions with the environment. Examination of the emergence and evolution of public efforts to regulate the use of insecticides and the development of environmental degradation from the Progressive Era, New Deal, the Great Society to the present. Mr. LeVeen (Sp)

Economics of Food and Nutrition, (3) Three hours of lecture per week. Prerequisite: one course in economics and one of natural resources (may be taken concurrently), or consent of instructor. Availability and utilization of food as affected by economic and other relevant factors in relation to current and projected world and local nutritional problems. Mr. Schmitz (W)

Entomology in Economic Development, (4) Four and one-half hours of lecture per week. Prerequisite: consent of instructor. The role of agriculture in development and the impact of development on agriculture. Food, population growth, and the transformation of traditional agriculture; policies issues in rural development. Mr. de Janvary (F)

Economic Analysis of World Agricultural Problems, (4) Three hours of lecture per week. Prerequisite: Economics 100A, or FR 100A, or equivalent. Socioeconomic factors in the organization and operation of world agricultural production. Specific attention to the problem of world hunger. Interactions between socioeconomic systems with population growth, resource scarcity, technology, international trade, economic development. Mr. Sarris (Sp)

Entomology, (4) Three hours of lecture per week. Prerequisite: one course in economics and one of natural resources (may be taken concurrently), or consent of instructor. A survey of the environmental conditions into which it has evolved. Exploration of the alteration of environments by pollutants and the mechanism by which these changes affect the functioning of organisms. Mr. Alpers (W)

Entomology, and the Media, (8) Three hours of lecture and 15 hours of labor per week. Prerequisite: IDS 10A, 10B, or 10C; consent of instructor required for second quarter. The analysis, research, and production of documentary films related to the environment. Each student becomes a member of a research team on a particular environmental issue as well as part of a production team to develop films that communicate the issue. May be repeated once for credit. To be offered 1976-77 only. Mr. Petulla (F, W, Sp)

Entomology, (4) Three hours of laboratory per week. Prerequisite: course 102 (may be taken concurrently) or consent of instructor. A course in a biological science. Biology of insects, including classification of orders, morphology, physiology, behavior, and ecology. Mr. Dally (Sp)

Insect Classification, (4) Two hours of lecture per week. Prerequisite: course 102. Classification of insects to the family level with emphasis on identification. Mr. Doven (F)

Functional Insect Anatomy, (2) Two hours of lectures per week. Prerequisite: course 100 or consent of instructor. A survey of anatomical and physiological characteristics of insect organ systems. Mr. Pipa (F)

Laboratory in Functional Insect Anatomy, (2) Six hours of laboratory per week. Prerequisite: course 102. Comparative studies of the principal organ systems of insects. Mr. Pipa (F)

Environmental Physiology of Insects, (2) Two hours of lecture per week. Prerequisite: IDS 120 or equivalent field experience. Prerequisite: course 103. An introduction to the use of linear deterministic and stochastic models in the analysis of natural resources. Mr. McEntire (W, Sp)

Entomology, (4) Three hours of laboratory per week. Prerequisite: consent of instructor. The development of environmental degradation. Students with unsure backgrounds in chemistry should enroll for 4 units in consent of instructor. Lectures will provide an understanding of ecological concepts and techniques for managing plant and animal systems.
Ent. 110. Destructive and Beneficial Arthropods. (3) Three hours of lecture and six hours of laboratory per week. Life histories and habits of destructive and beneficial insects, miles, and ticks; identification of adult and immature stages of representatives species; recognition of characteristic damage; principles involved in manipulating populations. 

Mr. Middelkauf (Sp)

Ent. 117. Pesticide Chemistry and Toxicology. (4) Lecture, 4 hours; laboratory, 3 hours per week. Pre-requisite: consent of instructor. The chemistry of active ingredients of common insecticides and other chemicals used for control of arthropod pests. To be offered in odd-numbered years. Mr. Casida, Mr. Gordon (Sp)

Ent. 117L Laboratory in Pesticide Chemistry and Toxicology. (1) Laboratory, 3 hours per week. Pre-requisite: consent of instructor. Exercises and demonstrations on chemistry, metabolism, and various biological effects of selected pesticides and related chemical. To be given in odd-numbered years. Enrollment limited. Mr. Gordon, Mr. Casida, Mr. Holmstead (Sp)

Ent. 130. Biological Control of Insect Pests and Weeds. (3) Three hours of lecture and three hours of laboratory per week. Pre-requisite: course 100 and 101. Theories and practices of biological control; population phenomena; and the biology and behavior of natural enemies of pests. Mr. van de Bosch, Mr. Calteleigne, Mr. Hagen (F)

Ent. 150. Medical and Veterinary Helminthology. (3) Two 1 1/2 hours per week. Helminthic infections of man and domestic animals; parasitic interrelationships, pathogenesis, therapy, and control. Mr. Weimann (F)

Ent. 150L. Helminthology Laboratory. (3) Six hours of laboratory and discussion per week. Pre-requisites: Ent. 150 (may be taken concurrently). Methods of handling and identifying helminths, host postmortem observations, laboratory diagnosis, helminth-carcinologic experiments, experimental manipulation of helminths. Mr. Weimann (F)

Ent. 153. Medical and Veterinary Entomology. (3 or 4) Three or 1 1/2 hours of lecture and two 1/2 hours of laboratory per week. Identification of insects and other arthropods in transmission and causation of diseases of humans and domestic animals. Mr. Silverstein (F, W, Sp), Mr. Cockreil (F), Mr. Colwell (F, W), Mr. Zinke (Sp)

Ent. 153L. Medical and Veterinary Entomology Laboratory. (1) One 1 1/2 hour laboratory session per week. Pre-requisite: course 150; may be taken concurrently. Identification of arthropods of medical and veterinary importance. Mr. Silverstein (F, W, Sp), Mr. Anderson (W)

Ent. 172. Principles and Methods of Entomological Research. (4) Four hours of lecture per week. Techniques and procedures of the scientific method in entomology with emphasis on problem selection and the collection, evaluation, and presentation of data. Mr. Silverstein (Sp, W)

Ent. 177A. Field Studies in Entomology. (1-6) Pre-requisite: consent of instructor. Supervised experience in off-campus organizations relevant to specific aspects of field entomology. Field trips with faculty sponsor and written reports required. The Staff (Mr. Messenger in charge) (F, W, Sp)

Ent. 177B. Field Study in Veterinary Medical Parasitology. (1-3) Pre-requisite: consent of instructor. For veterinary students, supervised experience at the University (Berkeley) Vet Clinic or in off-campus veterinary medical facilities in care of pets, vaccine administration, elements of animal disease control. Discussion sessions on the art and principles of veterinary medicine. Mr. Silverstein (Sp, W)

Ent. 189. Directed Group Studies for Advanced Undergraduates. (1-5)

The Staff (Mr. Messenger in charge) (F, W, Sp)

IDS 136. Biological Deterioration of Wood. (3) See Interdepartmental Studies for a complete description of this course. For additional courses in insect pests, see Pest Management. For graduate courses in Entomology, see Index.

Firestoy (For.)

Department Office, 145 Mullard Hall

Undergraduate Major Advisers: R. H. Barrett, Robert Cockrell, Robert Colwell, Don E. Erman (in charge), Robert J. McBride, John W. Menke, Dennis Teeguarden, Paul Zinke

GENERAL FORESTRY

LOWER DIVISION COURSES

For. 10. Conservation of Forest and Wildland Resources. (3) Four hours of lecture per week. Principles and management of forests and other wildlands in relation to the needs of society for wood, water, forage, and recreation; forestry and conservation policies and programs. Mr. Zinke (F)

UPPER DIVISION COURSES

For. 100A–100B–100C. Field Study of Forestry and Wildland Resources. (4–4–4) 408 hours of field instruction. Pre-requisite: 12 units of biological sciences and 3 units of plane surveying. Ten-week summer field program offered only at U. C. Forestry Camp, Meadow Valley, Plumas County. Required of all students majoring in forestry.

100A. The Resource Environment. Mr. Stone (Extrashestion)

100B. Resource Management I. Mr. Wensel (Extrashestion)

100C. Resource Management II. Mr. Teeguarden (Extrashestion)

For. 101. Resource Information Systems. (5) Four hours of lecture and three hours of laboratory per week. Pre-requisite: Statistics 20 or equivalent; Mathematics 16A–16B recommended. Development and implementation of systems for information gathering; processing and interpretation for natural resources management.

For. 102. Forest Photogrammetry and Photo Interpretation. (4) Three 1-hour lectures and one 3-hour laboratory per week. Pre-requisites: course 100; may be taken concurrently. Design and implementation of systems for information gathering: user attitudes and behavior; trends in the use of wildlands for recreation; recreation resource inventory; current problems and alternative solutions. Concepts and methods will be used to develop plans for particular recreation areas. Mr. Lee (Sp)

For. 120. Soils in the Forest Environment. (3) Two hours of lecture and three hours of laboratory per week. Development of wildland soils and their role as a factor in forest management. Mr. Zinke (F)

For. 121. Dendrology. (3) Two hours of lecture and three hours of laboratory per week. The study of trees and woody plants in the wildland environment: their identification, taxonomy, autoculture, and silvical characteristics and a review of the literature of the field. Mr. Lee (Sp)

For. 122. Forest Influences. (3) Three 1-hour lectures and one 3-hour laboratory per week. Pre-requisite: 5 units of biology or soil science. Unit processes and factors influencing ecosystems and the cycling of chemical elements as influenced by forests and associated vegetation. Principles applicable to land management, forest resource management, and planning, and environmental impact analyses. Mr. Zinke (Sp)

For. 123A–123B–123C. Ecology of Renewable Natural Resources. (8–8–8) 123A. Four 1-hour lectures per week and 20 hours of laboratory or field trips per quarter; 123B. four 1-hour lectures per week and 20 hours of laboratory or field trips per quarter; 123C. Four 1-hour lectures per week and 40 hours of laboratory including one weekend field trip per quarter. Pre-requisite: 8 units of biology. 123A is prerequisite for 123B; neither 123A nor 123B is prerequisite for 123C. Evaluation of ecological principles common to all areas and the role of man's influence upon these principles in ecosystem processes and the subsequent impact of man's role as a manager of ecosystems. 123A: Ecology of Forest Ecosystems. 123B: Physiological Ecology. 123C: Subsystems and Biomes. Mr. Feldman (F, W), Mr. Stone (charge) (F), Mr. McBride (W), Mr. Schulte (charge) (Sp)

For. 125. Principles of Silviculture. (4) Five 1-hour lectures and one 4-hour laboratory per week with up to three field trips replacing laboratory sessions. Pre-requisite: course 123A or equivalent preparation in

NOTE: For key to symbols, see page 34.
community ecology. Principles and concepts of the biological aspects of establishment, growth, competition, and succession. Study of the manipulation of forests and the development of stand structure to maximize the usefulness of forests to man. Mr. Helms (F)

RANGE SCIENCE

For. 141. Principles of Range Management. (4) Three 1-hour lectures and one discussion period per week. Prerequisite: 6 units of biology. Management and importance of ranges. Emphasis on interrelationships of grazing animals, vegetation, and soil. Effects of deforestation on plant growth and development; energy flow and nutrient cycling in range ecosystems; management of grazing animals and vegetation. Mr. Merke (F)

For. 142. Range Plants. (4) Two hours of lecture and three hours of laboratory per week. Systematic relationships of range plants. Description, identification of range grasses, forbs, and shrubs; their distribution, growth, forage, values, and response to use. Mr. S. (Sp)

For. 143. Range Animal Nutrition and Management. (3) Two 1 1/2 hour lecture per week. Principles and practices with particular reference to ruminants on wildland ranges. Mr. Majors (F)

For. 144. Range Ecology. (4) Three 1-hour lectures and one discussion period per week. Prerequisite: a course in plant community ecology. Composition, structure, vegetational changes, and grazing problems in representative range plant communities. Mr. Hveys (Sp)

For. 145. Range Ecosystems Measurements and Analysis. (4) Two 1 1/2-hour lectures and one 3-hour laboratory per week. Prerequisite: course 141 and 144; and one course in statistics. Range land vegetation sampling and inventory of range resources. Estimation of forage production, utilization, grazing capacity, range condition, and range trend. Mr. Merke (W)

For. 146. Range Ecosystem Planning. (4) Two 1 1/2-hour lectures and one 3-hour laboratory per week. Prerequisite: course 145 or consent of instructor. Range land planning based on land capabilities, estimated forage production, and livestock requirements. Plans will be developed for particular range ecosystems using linear programming techniques. Mr. Merke (W)

WILDLIFE SCIENCE

For. 170. Wildlife Biology and Management. (3) Three hours of lecture per week. Prerequisite: upper division standing. Ecological mechanisms that regulate populations of wild species. Survey of most important orders and families of wildlife in North America—status and problems of conservation. Overview of wildlife conservation in other continents. Mr. Leopold (F)

Gen. 191. Experimental Courses In Genetics. (2–5) Variable hours of individual meetings. Prerequisites: courses H180 or consent of Honors Advisor. Individual research of literature, or laboratory work, as arranged with Honors Advisor and individual faculty. Must be taken for at least two consecutive quarters to fulfill honors program requirements. For a maximum of 10 units. Mr. Kelly (Sp)


UPPER DIVISION COURSES

Gen. 100. General Genetics. (5) Four hours of lecture and one hour of section meeting per week. Prerequisite: Biology 1A–1B. The fundamentals of genetics at the molecular, organismal, and population levels. May be suitable as a terminal course for non-majors. Mr. Spieth (F, Sp)

Gen. 100L. Genetics Laboratory. (4) Two hours of lecture per week and six hours of laboratory per week. Prerequisite: course 100 or 150. Principles of genetics utilizing chiefly microorganisms and Drosophila with emphasis on both the molecular and organismal aspects of the subject. Ms. St. Lawrence (Sp)

Gen. 101. Topic In Genetics. (3) Three hours of lectures, two hours of discussion and three hours of laboratory per week. Prerequisite: a course in biology. Emphasis on advanced topics as well as 100. Primarily for majors. Selected advanced topics are treated in depth. Lectures, original literature and student participation are employed to develop appreciation of the intellectual rigor of genetics. Mr. Fogel (W)

Gen. 130. Population Genetics. (4) Four hours of lecture and one hour of discussion per week. Prerequisite: course 100 or 150. Elementary probability or consent of instructor. A theoretical foundation in population genetics. Emphasis on the use of one or two loci models for developing the mathematical theory of the behavior of gene frequencies and genetic variation under microevolutionary processes. Mr. Spieth (W)

Gen. 131. Organic Evolution. (5) Four hours of lecture and one hour of discussion per week. Prerequisite: course 100 or 150. Introduction to the evolutionary consequences of changes in chromosomal structure and function in man, human, in other mammals and in plants. Mr. Brown (F)

Gen. 140. Cytogenetics. (5) Four hours of lecture per week and one hour of demonstration per week. Prerequisite: course 100 or 150. Chromosome rearrangements (including their relationship to rearrangements in DNA and RNA) and chromosome number are discussed in regard to their stability, segregation, transmission and effect on gene action. Evolutionary implications and unusual Patmol systems are also considered. Mr. Brown (W)

Gen. 150. General Human Genetics. (5) Lectures, 4 hours per week, discussion 1 hour per week. Prerequisite: Biology 1A–1B or consent of instructor. Principles of genetics in man and other mammalian systems at the molecular, organismal and population levels. For students majoring in health sciences. Cannot be taken for credit by students who have completed Genetics 100. Ms. Palmour (F)

Gen. 196. Advanced Human Genetics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: consent of instructor (knowledge of basic genetic principles required). A detailed study of the genetics processes in man, with emphasis on chromosomal structure and function, human biochemical genetics and gene regulation, the mutation process, and human behavioral characteristics. Includes function and medical implications of human genetic dysfunctions. Ms. Palmour (W)

Gen. 196L. Human Genetics Laboratory. (3) One hour of lecture and six hours of laboratory per week. Prerequisite: course 100 or 150 or consent of instructor. An introduction to research and clinical laboratory techniques in human genetics. Contemporary methodology in karyotyping, electrophoresis, enzyme assay and culture will be emphasized; recent advances in prenatal and heterogeneous carrier diagnosis will be included. Mr. Thomson (W)

UPPER DIVISION COURSES

NS 103. Introduction to Nutritional Sciences. (5) Four hours of lecture and one hour of section meeting per week. Prerequisite: Chemistry 8B. Physiology 1. Biochemistry 102 (may be taken concurrently). Fundamentals of nutrition; dietary fiber, energy, protein, fat, vitamins, minerals and the diet, and functions of the digestive system. For premedical students, nurses, and dietitians. Mr. Thomson (W)

For. 199. Supervised Independent Study and Research for Undergraduates. (1–5) Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis.

The Staff (Mr. Graham in charge) (F, W, Sp)

Genetics (Gen.)

Department Office, 345 Mullford Hall

Undergraduate Advisor: Philip T. Spieth

LOWER DIVISION COURSE


UPPER DIVISION COURSES

Gen. 100. General Genetics. (5) Four hours of lecture and one hour of section meeting per week. Prerequisite: Biology 1A–1B. The fundamentals of genetics at the molecular, organismal, and population levels. May be suitable as a terminal course for non-majors. Mr. Spieth (F, Sp)

Gen. 100L. Genetics Laboratory. (4) Two hours of lecture per week and six hours of laboratory per week. Prerequisite: course 100 or 150. Principles of genetics utilizing chiefly microorganisms and Drosophila with emphasis on both the molecular and organismal aspects of the subject. Ms. St. Lawrence (Sp)

Gen. 101. Topic In Genetics. (3) Three hours of lectures, two hours of discussion and three hours of laboratory per week. Prerequisite: a course in biology. Emphasis on advanced topics as well as 100. Primarily for majors. Selected advanced topics are treated in depth. Lectures, original literature and student participation are employed to develop appreciation of the intellectual rigor of genetics. Mr. Fogel (W)

Gen. 130. Population Genetics. (4) Four hours of lecture and one hour of discussion per week. Prerequisite: course 100 or 150. Elementary probability or consent of instructor. A theoretical foundation in population genetics. Emphasis on the use of one or two loci models for developing the mathematical theory of the behavior of gene frequencies and genetic variation under microevolutionary processes. Mr. Spieth (W)

Gen. 131. Organic Evolution. (5) Four hours of lecture and one hour of discussion per week. Prerequisite: course 100 or 150. Introduction to the evolutionary consequences of changes in chromosomal structure and function in man, human, in other mammals and in plants. Mr. Brown (F)

Gen. 140. Cytogenetics. (5) Four hours of lecture per week and one hour of demonstration per week. Prerequisite: course 100 or 150. Chromosome rearrangements (including their relationship to rearrangements in DNA and RNA) and chromosome number are discussed in regard to their stability, segregation, transmission and effect on gene action. Evolutionary implications and unusual Patmol systems are also considered. Mr. Brown (W)

Gen. 150. General Human Genetics. (5) Lectures, 4 hours per week, discussion 1 hour per week. Prerequisite: Biology 1A–1B or consent of instructor. Principles of genetics in man and other mammalian systems at the molecular, organismal and population levels. For students majoring in health sciences. Cannot be taken for credit by students who have completed Genetics 100. Ms. Palmour (F)

Gen. 196. Advanced Human Genetics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: consent of instructor (knowledge of basic genetic principles required). A detailed study of the genetics processes in man, with emphasis on chromosomal structure and function, human biochemical genetics and gene regulation, the mutation process, and human behavioral characteristics. Includes function and medical implications of human genetic dysfunctions. Ms. Palmour (W)

Gen. 196L. Human Genetics Laboratory. (3) One hour of lecture and six hours of laboratory per week. Prerequisite: course 100 or 150 or consent of instructor. An introduction to research and clinical laboratory techniques in human genetics. Contemporary methodology in karyotyping, electrophoresis, enzyme assay and culture will be emphasized; recent advances in prenatal and heterogeneous carrier diagnosis will be included. Mr. Thomson (W)

UPPER DIVISION COURSES

NS 103. Introduction to Nutritional Sciences. (5) Four hours of lecture and one hour of section meeting per week. Prerequisite: Chemistry 8B. Physiology 1. Biochemistry 102 (may be taken concurrently). Fundamentals of nutrition; dietary fiber, energy, protein, fat, vitamins, minerals and the diet, and functions of the digestive system. For premedical students, nurses, and dietitians. Mr. Thomson (W)
NS 103L. Introductory Nutritional Science Laboratory. (3) One hour of lecture and six hours of laboratory per week. Prerequisite: course 103L. Field experiments illustrating nutritive value of foods, dietary practices, and approaches to current nutritional problems. Ms. Ostwald (W, Sp).

NS 106. Food Chemistry. (3) Two hours of lecture and 1 hour of discussion per week. Prerequisite: Biochemistry 2. Chemistry of food proteins, carbohydrates, fats, and other constituents of food. Mr. Chang (F).

NS 107. Principles of Food Preservation and Processing. (5) Five hours of lecture per week. Prerequisite: course 103 or 106 and Biochemistry 102. Control and utilization of microorganisms and enzymes in commercial preparation and preservation of food products. Development and present status of various refining, manufacturing, and processing operations. Mr. Butler (W).

NS 110. Food Toxicology. (3) Three hours of lecture per week. Prerequisite: course 103 and 106. Basic principles in toxicology, principles and evaluation of the wholesomeness and safety of foods, food components, and contaminants. Ms. Brown (Sp).

NS 111. Experimental Study of Food Properties. (6) Three hours of lecture and six hours of laboratory per week. Prerequisite: course 103 and 106. Study of selected food properties in the laboratory. Class representative foods in relation to preparatory procedures; effects of preparation and storage on sensory characteristics. Ms. Bjelajac (Sp).

NS 112. Food Chemistry and Toxicology Laboratory. (6) Two hours of lecture and nine hours of laboratory per week. Prerequisite: course 110 or equivalent. Experimental problems dealing with the chemistry and toxicology of food components and contaminants, and the changes which these undergo during storage and processing. Mr. Bjelajac (Sp).

NS 135. Institutional Food Production, Service, and Organization. (3) Three hours of lecture per week. Prerequisite: course 111; Business Administration 150 or equivalent. For majors, management principles as applied to institutional food systems. Emphasis on nutritional goals, quantitative and service; menu planning; survey of equipment. Ms. Williams (Sp).

NS 135L. Institutional Food Production, Service, and Organization Laboratory. (6) Three hours of lecture and 60 hours of laboratory per week. Prerequisite: course 135 (may be taken concurrently). For majors, practical experience in dealing with typical problems in food service. Ms. Williams (Sp).

NS 150. Experimental Nutrition. (4) Four hours of lecture and one hour of section meeting per week. Prerequisite: course 103, Biochemistry 102, and a course in physiology. Biochemical and physiological interactions among the vitamins, carbohydrates, proteins, and fats and their relation to man's nutrition. The Staff (F).

CRS 160. Economics of Food and Nutrition. (3) Formerly Nutritional sciences 100. See Conservation and Resource Studies for a complete description of this course.

NS 160. Human Nutrition. (5) Four-1/2 hours of lecture and 2 hours of discussion per week. Prerequisite: NS 103 or consent of instructor. Scientific basis of the metabolic and nutritional needs of normal individuals throughout the life cycle. Methods for assessment of nutritional status will be demonstrated. Ms. King (Sp).


NS 161L. Therapeutic Nutrition Laboratory. (2) Two hours of lecture per week. Prerequisite: course 161 (may be taken concurrently), and consent of instructor. For majors. Dietary methods of therapeutic treatment and evaluation of various conditions and diseases of man. Ms. Calloway (Sp).

NS 162. Applied Human Nutrition. (2-4) Lecture, one hour per week; laboratory, 3-9 hours per week. Prerequisites: NS 103L, 160L. Field experiences illustrating use of nutritional therapy techniques, and nutritional care of disease states. Ms. Calloway (L). Mr. Chang (Sp).

NS 163. Applied Therapeutic Nutrition. (2) One hour of lecture and three hours of laboratory per week. Prerequisite: course 161, 161L, 162. Field experiences illustrating use of nutritional therapy techniques. Ms. Alcorn (W, Sp) Mr. Chang (Sp).

NS 165. Experimental Nutrition Laboratory. (6) Two hours of lecture and nine hours of laboratory per week. Prerequisite: course 150 or 165 (may be taken concurrently); Biochemistry 102L. Basic principles and techniques used in research in human and animal nutrition. Ms. Ostwald (W).

NS 190. Introduction to Research in Nutritional Sciences. (2) Two hours of lecture per week. Prerequisite: course 103, and 103L, or Chemistry 5. Present seminar in current research. Ms. Kennedy (W, Sp).

NS 197. Field Study in Food and Nutritional Sciences. (1-5) May be repeated for credit. Supervised experience in off-campus organizations relevant to the field of nutrition and dietetics. Regular individual meetings with faculty sponsor and written reports required. The Staff (F, W, Sp).

NS 198. Directed Group Study. (1-5) Prerequisite: NS 150 or consent of instructor. Study of selected topics or problems of interest to the student. The Staff (F, W, Sp).

NS 199. Supervised Independent Study and Research. (1-5) Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis. The Staff (F, W, Sp).

NS 400. The Profession of Dietetics. (3) Thirty hours of field work and 100 hours of discussion per quarter. Prerequisite: open only to juniors in the dietetics curriculum. Field experience includes two meetings per quarter relating to professional dietetic practice. Regular individual meetings with faculty sponsor and written reports required. The Staff (F, W, Sp).

NS 401. Professional Methods and Practice in Outpatient Dietetic Therapy. (2-6) Per quarter: 2-3 hours lecture and 1-4 hours of laboratory per unit. Prerequisite: NS 163. Primarily for dietetics majors. Conferences, observation, and supervised practice in outpatient clinical settings. To be taken on a passed/not passed basis . Ms. Oce (W, Sp).

NS 402. Professional Methods and Practice in Inpatient Dietetic Therapy. (2) One hour of discussion per week and 20 hours of field work per quarter. Prerequisite: NS 163. Conferences, observation, and supervised practice in inpatient clinical settings. To be taken on a passed/not passed basis. Ms. Oce (W, Sp).

NS 403. Professional Methods and Practice in Nutritional Care of the Handicapped. (3) Two hours of discussion per week and 20 hours of field work per quarter. Prerequisite: NS 163. Conferences, observation, and supervised practice in nutritional care of various clinical settings. To be taken on a passed/not passed basis. Ms. Calloway (W, Sp).

NS 404. Professional Methods and Practice in Institutional Food Service Management. (3) Two hours of discussion per week and 20 hours of field work per quarter. Prerequisite: course 160. For majors. Conference, observation, and supervised practice in institutional service units. To be taken on a passed/not passed basis. Ms. Williams (W, Sp).

NS 405. Professional Methods and Practice in Institutional Food Service Management. (3) Two hours of discussion per week and 20 hours of field work per quarter. Prerequisite: course 160. For majors. Conferences, observation, and supervised practice in institutional service units. To be taken on a passed/not passed basis. Ms. Williams (W, Sp).

NS 406. Professional Methods and Practice in Nutritional Care of the Handicapped. (3) Two hours of discussion per week and 20 hours of field work per quarter. Prerequisite: course 160L. Public Health 140. M. Public Health 140. Publically, or consent of instructor. Chemical and physiological basis of the metabolic and nutritional needs of normal individuals throughout the life cycle. Methods for assessment of nutritional status will be demonstrated. Ms. King (Sp).

NS 407. Professional Methods and Practice in Nutritional Education. (4) Two hours of lecture per week and four hours of laboratory per week for 4 weeks. Prerequisites: course 162, Public Health 140. Primarily for dietetics majors. Conferences, observation, and supervised practice in nutrition education for the public and development of nutrition education programs and policies. To be taken on a passed/not passed basis. Mr. Briggs (W, Sp).

(For graduate courses in Nutritional Sciences, see Index.)

Pest Management (PM)

Department Office, 145 Mulford Hall
Undergraduate Adviser: Louis A. Falcon

LOWER DIVISION COURSE

PM 20. Introduction to the Philosophy, Ecology, and Economics of Pest Management. (4) Formerly Entomology 20. Four hours of lecture per week. Introduction to the systems approach to pest control, including the philosophy, goals, ecological basis, strategies and tactics of integrated control. Consideration will be given to cropping systems, natural and artificial controls, and system interactions. Ms. Smith, Mr. Day, Mr. Wilhelm (W).

UPPER DIVISION COURSES

PM 151. Weeds. (3) Two hours of lecture per week and two hours of field trips on alternate Saturdays. Prerequisite: Botany 144 or consent of instructor. Identification, life history, ecology, and principles of management of weeds of agricultural, forest, range, aquatic, urban, and industrial environments. Mr. Day (Sp).

PM 152. Insect Pest Management. (6) Lectures, 60 hours total; laboratory and field trips, 100 hours total. Prerequisite: upper division standing and at least one course in agricultural entomology or insect ecology. A four-week summer field course in insect management principles and practices. Detection and sampling for pest and beneficial species and evaluation of damage. Experiments utilizing biological, chemical, and cultural control methods. Pre-enrollment required before and of Spring Quarter. Mr. Leigh, Mr. Rico, Mr. Day, Mr. Summer (Extracurricular).

PM 153A–153B. Pathobiology. (2-3) Prerequisite: Biology 1A–1B, or consent of instructor. Nature and causes of plant and animal diseases, with comparative consideration of the roles of fungi, bacteria, actinomycetes, protozoa, and vertebrates; the rationale of disease management. To be taken on a passed/not passed basis. Mr. Pinnock (Sp).

PM 153B. Vector Relationships. (3) Three 1-hour lectures per week. Biological and ecological aspects of the pathogens of plants, invertebrates, and vertebrates to the arthropods and other agents which act as vectors in the spread of disease; arthropods as direct agents of disease. Mr. Furman, Mr. Sylvester (W).


PM 154A. Chemicals and Their Environmental Impact. (3) Prerequisite: course 20; Chemistry 8A–8B or equivalent; or consent of instructor. Chemical materials and techniques used in pest management: advantages and limitations. Ms. Allen, Mr. Casida, Mr. Day, Mr. McCann (F).

PM 154B. Biological and Microbial Agents. (3) Prerequisite: course 20 and 153A; Entomology 100; Biology 1A–1B; or consent of instructor. Discussion of biological control in pest management; techniques for use of parasites, predators, and microorganisms against pests; advantages and limitations. Ms. Collatignone, Mr. Falcon, Mr. Schroth (W).

PM 154C. Cultural and Behavioral Methods. (3) Prerequisite: course 20; Entomology 100; Biology 8A–8B; or consent of instructor. Description of different biological control methods, including the use of competitive exclusion, the use of chemical repellents, and competition of species for food, space, and mates. Ms. Collatignone, Mr. Schroth (W).

NOTE: For key to symbols, see page 34.
and utilization of materials and techniques for control of pests by organic modifications and utilization of pest behavior; advantages and limitations.

Mr. Summers (W)

PM 155A-155B-155C. Pest Management Systems. (4-4-4)

PM 155A. Management of Arthropods of Medical and Veterinary Importance. (4) Three hours of lecture and three hours of laboratory or field trip per week. Prerequisite: Ecology 100, and 101 or 110, or equivalent courses. An analysis of arthropods of medical and veterinary importance in urban, suburban, agricultural and recreational ecosystems, and of pest management systems for protection of public health and reduction of economic loss.

Mr. Anderson, Mr. Furman (Sp)

PM 155B. Forest Pest Management. (4) Two hours of lecture and six hours of laboratory per week. Prerequisite: Entomology 100 or Plant Pathology 120; and Forest Pathology 150. Introduction to forest ecosystems and the impact of man on these systems; natural roles of pests; diagnosis and evaluation of forest pest problems and methods of pest control.

Mr. Parmeter, Mr. Wood, Mr. Heims (Sp)

PM 155C. Agricultural Pest Management. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: course 20, 153A-153B, 154A-154B-154C. Decision making in pest control on representative crops and crop systems. Biological, economic, social, and political factors as they affect pest control in agricultural pest management.

Mr. Gold, Mr. van den Bosch, Mr. Weinhold, Mr. Day (Sp)

PM 198. Directed Group Study. (1-5) Prerequisite: consent of instructor. Group study or investigation of special problems.

The Staff (Mr. Grab in charge) (F, W, Sp)

PM 199. Supervised Independent Study and Research for Undergraduates. (1-5) Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis.

The Staff (Mr. Grab in charge) (F, W, Sp, SS)

UPPER DIVISION COURSES

PP 120. Plant Diseases. (4) Two hours of lecture and six hours of laboratory per week. Prerequisite: Biology 1A-1B or consent of instructor. A general course on the nature, cause, and control of plant diseases.

Mr. Raabe (F)

PP 197. Field Study in Plant Pathology. (1-5) Supervised experience in off-campus organizations relevant to specific aspects of plant pathology. Regular individual meetings with faculty sponsor and written reports required.

The Staff (Mr. Schlegel in charge) (F, W, Sp)

PP 199. Directed Group Study. (1-5) Prerequisite: consent of instructor. Special topics will be offered from time to time.

The Staff (Mr. Hancock in charge) (F, W, Sp)

PP 199. Supervised Independent Study and Research. (1-5) Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis.

The Staff (Mr. Weinhold in charge) (F, W, Sp)

IDS 138. Biological Deterioration of Wood. (3) See Interdepartmental Studies for complete description of this course.

Political Economy of Natural Resources (PENR)

Department Office, 112 Giannini Hall

Undergraduate Advisers: Richard B. Norgaard, E. Philip LeVein

LOWER DIVISION COURSE

PENR 1. Introduction to Political Economy of Natural Resources. (4) Three hours of lecture and 1 hour of discussion per week. Introduction to theories of economic, political, and administrative systems affecting environmental quality and natural resource allocation over time.

Mr. Hanemann (F)

UPPER DIVISION COURSES

PENR 100A-100B-100C. Political Economy of Natural Resources. (4-4-4) Three hours of lecture and one hour of discussion per week. Prerequisite: 100A. 100A is prerequisite to 100B; 100B is prerequisite to 100C; consent of instructor. Economic models and exploration of current issues in environmental management issues and their resolution; social and environmental implications of existing and alternative legal, political, and social frameworks in which individual and social choices are made. 100A. Neoclassical resource economics, market performance, and failure. 100B. Alternative economic models, theories of the interactions between economic and other components of social systems. 100C. Case studies.

Mr. Hanemann, Mr. de Janvry, Mr. LeVein (F, W, Sp)

PENR 195A-195B-195C. Senior Research Project. (6-5-5) Two hours of lecture and 8 hours of field work per week. Prerequisite: senior standing in Political Economy of Natural Resources or permission of instructor. 195A: Overview of issues and alternatives in project area and research methodology. 195B: Individual and small group research and seminars.

Mr. Norgaard, Mr. F. J. Sparrow (W, Sp)

PENR 197. Field Study In Political Economy of Natural Resources. (1-6) Prerequisite: consent of instructor. Supervised experience in off-campus organizations relevant to specific aspects of political economy of natural resources. Regular individual meetings with faculty sponsor and written reports required.

The Staff (Mr. Norgaard in charge) (F, W, Sp)

PENR 198. Directed Group Studies for Advanced Undergraduates. (1-6) Prerequisite: consent of instructor.

The Staff (Mr. Norgaard in charge) (F, W, Sp)

PENR 199. Supervised Independent Study and Research. (1-5) Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis.

The Staff (Mr. Norgaard in charge) (F, W, Sp)

Resource Sciences (RS)

Department Office, 101 Giannini Hall

Undergraduate Major Advisers: Biology of Natural Resources: (to be appointed); Bioenergetics Emphasis: Mr. Buchanan; Paleontology Emphasis: Mr. R. D. Day; Forestry Emphasis: Mr. Doyen; Genetics Emphasis: Mr. Spith; Plant Pathology Emphasis: Mr. M. L. Huisman; Soil and Plant Resources Emphasis: Mr. Terry; Food, Nutrition, and Dietetics: Students wishing information and counseling on this major should contact the Student Secretary, 231 Morgan Hall.

LOWER DIVISION COURSES

RS 12. Natural History of the Insects. (4) Three hours of lecture, one hour of discussion per week, and occasional field trips. Prerequisite: open to all; emphasis on insects as indicators of environmental quality and natural resource allocation over time. Designed to accompany course 23. Emphasis is placed on their biological relationships in relation to plants, animals, and man. (F)

RS 14. Heredity, Evolution and Society. (3) Three hours of lecture and two 1-hour section meetings per week. Prerequisite: primarily for students not specializing in biology. Inheritance, variation, and evolution in plants, animals, and man. Social implications of genetics and evolution. (F)

RS 16. Survey of Nutritional Sciences. (4) Four 1/2 hours of lecture and 1 hour of discussion per week. Prerequisite: primarily for nonmajors. Broad aspects of nutritional sciences and food components and their importance to life and mankind. (F)

RS 18. The Soil and Its Significance to Man. (3) Three hours of lecture per week. Prerequisite: Chemistry 1A or high school chemistry. For students who desire a general knowledge of soils. (F, W)

RS 18L. The Soil and Its Significance to Man—Laboratory. (1) One hour of laboratory, demonstrations, and field trips per week. Prerequisite: course 18 (may be taken concurrently). (W)

RS 23. Introduction to Microbiology of Natural Resources. (3) Three hours of lecture per week. Prerequisite: a course in Biology, Chemistry 8B, or consent of instructor. A general survey of the standpoint of natural resource utilization and conservation, of microorganisms, including bacteria, fungi, algae, viruses, and protozoa. Emphasis is placed on their biological activities in relation to our natural resources and human welfare. (W)

RS 23L. Introduction to Microbiology of Natural Resources—Laboratory. (3) Six hours of laboratory per week. Prerequisite: course 23 (may be taken concurrently), and consent of instructor. Experiments designed to acquaint students with techniques for handling bacteria, fungi, algae, and protozoa, and the effects of these microorganisms on foods, fiber, and human health. Designed to accompany course 23. (W)

RS 80. Introduction to Problem Solving in Natural Resource Systems. (3) Lectures, 3 hours per week. Prerequisites: Mathematics 16A, 16B, Biology 1A or 1B. Introduction to the tools and concepts which are most productive in natural resource problem solving. Emphasis will be given to the scientific methods and the problem approach with applications of simple cause and effect relationships, conceptual and mathematical models. (W)

Soil Resource Management (SRM)

Department Office, 145 Mullford Hall

Undergraduate Major Advisers: Biology of Natural Resources: (to be appointed); Bioenergetics Emphasis: Mr. Buchanan; Paleontology Emphasis: Mr. R. D. Day; Forestry Emphasis: Mr. Doyen; Genetics Emphasis: Mr. Spith; Plant Pathology Emphasis: Mr. M. L. Huisman; Soil and Plant Resources Emphasis: Mr. Terry; Food, Nutrition, and Dietetics: Students wishing information and counseling on this major should contact the Student Secretary, 231 Morgan Hall.

LOWER DIVISION COURSES

SRM 12. Natural History of the Insects. (4) Three hours of lecture, one hour of discussion per week, and occasional field trips. Prerequisite: open to all; emphasis on insects as indicators of environmental quality and natural resource allocation over time. Designed to accompany course 23. Emphasis is placed on their biological relationships in relation to plants, animals, and man. (F)

SRM 14. Heredity, Evolution and Society. (3) Three hours of lecture and two 1-hour section meetings per week. Prerequisite: primarily for students not specializing in biology. Inheritance, variation, and evolution in plants, animals, and man. Social implications of genetics and evolution. (F)

SRM 16. Survey of Nutritional Sciences. (4) Four 1/2 hours of lecture and 1 hour of discussion per week. Prerequisite: primarily for nonmajors. Broad aspects of nutritional sciences and food components and their importance to life and mankind. (F)

SRM 18. The Soil and Its Significance to Man. (3) Three hours of lecture per week. Prerequisite: Chemistry 1A or high school chemistry. For students who desire a general knowledge of soils. (F, W)

SRM 18L. The Soil and Its Significance to Man—Laboratory. (1) One hour of laboratory, demonstrations, and field trips per week. Prerequisite: course 18 (may be taken concurrently). (W)

SRM 23. Introduction to Microbiology of Natural Resources. (3) Three hours of lecture per week. Prerequisite: a course in Biology, Chemistry 8B, or consent of instructor. A general survey of the standpoint of natural resource utilization and conservation, of microorganisms, including bacteria, fungi, algae, viruses, and protozoa. Emphasis is placed on their biological activities in relation to our natural resources and human welfare. (W)

SRM 23L. Introduction to Microbiology of Natural Resources—Laboratory. (3) Six hours of laboratory per week. Prerequisite: course 23 (may be taken concurrently), and consent of instructor. Experiments designed to acquaint students with techniques for handling bacteria, fungi, algae, and protozoa, and the effects of these microorganisms on foods, fiber, and human health. Designed to accompany course 23. (W)

SRM 80. Introduction to Problem Solving in Natural Resource Systems. (3) Lectures, 3 hours per week. Prerequisites: Mathematics 16A, 16B, Biology 1A or 1B. Introduction to the tools and concepts which are most productive in natural resource problem solving. Emphasis will be given to the scientific methods and the problem approach with applications of simple cause and effect relationships, conceptual and mathematical models. (W)
Undergraduate Adviser: Rodney T.Arkley

UPPER DIVISION COURSES

SRM 160. Soil Management. (3) Three hours of lecture per week. Prerequisite: senior standing in soil resource management. Estimation of soil fertility by soil and tissue analysis and plant growth methods; use of fertilizers; soil physical properties related to management problems. (Sp)

SRM 161. Soil and Water Conservation. (3) Two hours of lecture and one hour of discussion per week. Analysis of contemporary and perennial problems; soil pollution by pesticides, heavy metals, radioactive materials; disposal and recycling of wastes on the soil; loss of agricultural land to urban use; soil erosion and nutrient depletion water yield; soil salinization. Mr. Waldron (F)

SRM 162. Use of Soil Information in Land-Use Planning. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: Geology 10. Chemistry 1A or 1B. Introduction to soil resource management. Integration of the scientific and management aspects of soil resource management. (Sp) Mr. McColl (W)

SRM 168. Senior Seminar In Soil Resource Management. (2) One 2-hour-discussion sessions per week. Prerequisite: senior standing in soil resource management. Interpretation of current soil-research data and soil survey information in making land-use decisions. The Staff (Mr. Grah in charge) (F, W, Sp)

SRM 199. Supervised Independent Study and Research for Undergraduates. (1–5) Enrollment is restricted by regulations. For additional courses in soil science, see Soil Resource Management; for graduate courses in Soil Science, see Index.)

Soil Science (SS)

Department Office, 198 Hilgard Hall

Undergraduate Adviser: Norman Terry

LOWER DIVISION COURSES

RS 18. The Soil and Its Significance to Man. (3) See Resource Sciences for a complete description of this course.

RS 20L. The Soil and Its Significance to Man. (1) See Resource Sciences for a complete description of this course.

UPPER DIVISION COURSES

SS 100. Soil Characteristics. (4) Three hours of lecture, three hours of laboratory and one field trip per week. Prerequisite: Chemistry 1A–1B. Introduction to physical, chemical, and biological properties of soil. Mr. Davy (F)

SS 101. Development and Morphology of Soils. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: Geology 10, Chemistry 1A. Recommended: course 100. Climate, vegetation, geology, topography, and their effects on development and chemistry of great world soil groups. Mr. Gersper (Sp)

SS 101F. Development and Morphology of Soils. (1) First 101. Prerequisite: SS 101 should be taken concurrently. Saturday excursions in connection with SS 101. Mr. Arkley (Sp)

SS 102. Soil Physics. (3) Three hours of lecture and six hours of laboratory per week. Prerequisite: course 100. Mathematics 16A. Analysis of important physical processes occurring in soil and of the physical properties of its components. Mr. Waldron (W)

SS 103. Soils of California and the Western United States. (4) Three hours of lecture and one hour of discussion per week, and two field trips to be arranged. Prerequisite: Geology 5A or 1C, Chemistry 1A. Characteristics and geology of agricultural, grazing, and forest soils of the western United States, with emphasis on soils of the West; their identification, classification, and use rating. Mr. Arkley (W)

SS 105. Summer Field Course. (6) Six weeks of daily field work. Prerequisite: course 100, 101, or 103 and consent of instructor. Field study of soils, with emphasis on their characteristics, morphology, and genesis. Field excursions in assaying soils, and preparation of soil survey reports. Practice in identifying and evaluating soils for agricultural, range, forest, and other use. Mr. Arkley (Extracurricular)

SS 110. The Soil as a Medium for Plant Growth. (5) Five hours of lecture per week. Prerequisite: Chemistry 1A–1B, 84 or 1C. Chemistry of plant, soil, and microbial interactions between these; alkalis, and salinity regimes; nutritional factors in productivity, reclamation, and conservation. Mr. Babcock (F)

SS 111. Soil Microbiology. (2) Two hours of lecture per week. Prerequisite: course 110. Microbiological processes affecting the availability of elements in soils to plants. Mr. Doner (W)

SS 111L. Soil Microbiology Laboratory. (2) Two 1-hour lectures and one 3-hour laboratory per week. Prerequisite: concurrent enrollment in course 111. Laboratory work to acquaint the student with soil microorganisms, their diversity, their activities in relation to soil organic material, soil properties, the microbiology, and biochemical cycling. Mr. Huismans (Sp)

SS 112. Soil Chemistry. (3) Two 1 1/2 hours of lecture per week. Prerequisite: course 112. Physicochemical principles; measuring the availability of elements in soils to plants. Mr. Doner (W)

SS 112L. Soil Chemistry Laboratory. (3) Three 3-hour laboratory meetings per week. Prerequisite: course 112. Liquid, solid, and gaseous phases of soils; cation exchange, soil solution, buffers, salinity, partition and electromigration; chemistry of macronutrients and micronutrients. Mr. Doner (W)

SS 113. Soil Physics Laboratory. (3) Three 3-hour laboratory meetings per week. Prerequisite: course 113. Physical processes, properties and their influence on physical and mechanical properties of soils. Mr. Wilcox, Mr. Arbanbright (W)

SS 115. Soil Chemistry Laboratory. (3) Three 3-hour laboratory meetings per week. Prerequisite: course 115. Physical and chemical analysis of soils; identification, classification, and uses of adhesives in bonded wood products; testing and characterization of bonded wood products. Mr. Johns (Sp)

SS 116. Directed Group Study. (1–5) Selected topics in soil science for advanced undergraduate students. The Staff (Mr. Grah in charge) (F, W, Sp)

SS 199. Supervised Independent Study and Research for Undergraduates. (1–5) Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis. The Staff (Mr. Grah in charge) (F, W, Sp)

Wood Science and Technology (WST)

Department Office, 145 Mulford Hall

Undergraduate Adviser: Arno P. Schniewind

LOWER DIVISION COURSE

WST 10. Wood as a Renewable Natural Resource: Concepts and Conflicts. (4) Three hours of lecture and one hour of discussion per week. Surveys the role of wood as a renewable, biodegradable resource in meeting needs of society for shelter and consumer products. Comparative review of renewable and nonrenewable resource systems, and the role of wood as a renewable resource in the environment. Mr. Wilcox, Mr. Arbanbright (W)

UPPER DIVISION COURSES

WST 131. Anatomy and Physical Characteristics of Wood. (4) Two 1 1/2 hours lecture and one 3-hour laboratory per week. Prerequisite: upper division students in other departments may be admitted with consent of instructor. Gross and minute characteristics of wood in relation to its properties and uses; identification of certain important commercial wood species; relation of principal physical and mechanical properties to conditions of timber growth. Mr. Crichton (F)

WST 132. Mechanical Properties of Wood. (3) Two 1-hour lectures and 1 1/2-hour discussion per week. Prerequisites: upper division graduate students from other departments accepted with consent of instructor. Production methods for converting to lumber, veneer and plywood; product requirements and the mechanical properties of wood. Mr. Dickinson (W)

WST 133. Physical Properties of Wood. (4) Three 1-hour lectures and one 3-hour laboratory per week. Prerequisite: course 131 and 12 units of general physics. Density, physical stability, and durability of wood as influenced by such factors as wood characteristics and moisture content; thermal, electrical, and acoustical properties of wood. Mr. Argabright (F)

WST 134. Mechanics of Wood. (4) Three 1-hour lectures and one 3-hour laboratory per week. Prerequisite: courses 131 and 12 units of general physics. Upper division students from other departments may be admitted with consent of instructor. Strength and stiffness of wood and structural timber: factors affecting strength; derivation of working stresses; structural elements of wood and wood composites. Mr. Schneidewind (W)

WST 135. Chemical Processes of Wood. (3) Two 1-hour lectures per week; one 3-hour laboratory per week. Prerequisite: courses 131 and 4 units of organic chemistry; upper division or graduate students from other departments accepted with consent of instructor. Chemical processes involving wood; the analysis and important reactions of their constituents, including cellulose, hemicelluloses, lignin, and associated materials in wood. Mr. Brink (Sp)

WST 137. Adhesion and Bonding of Wood. (4) One hour and 3 hours of laboratory per week. Prerequisite: consent of instructor. Introduction to nature of adhesion; structure, properties, application, and use of adhesives in bonded wood products: testing and characterization of bonded wood products. Mr. Johns (Sp)

WST 138. Chemistry of Wood and Bark. (3) Two hours of lecture per week and three hours of laboratory per week. Prerequisites: courses 131 and 4 units of organic chemistry: upper division or graduate students from other departments accepted with consent of instructor. Chemical processes of wood, the bark and the analysis of their characteristics, including cellulose, hemicelluloses, lignin, and associated materials in wood. Mr. Zavar (F)

WST 198. Directed Group Study. (1–5) Meetings to be arranged. Prerequisite: consent of instructor. Group study or investigation of special problems. The Staff (Mr. Grah in charge) (F, W, Sp)

WST 199. Supervised Independent Study and Research for Undergraduates. (1–5) Meetings to be arranged. Enrollment is restricted by regulations listed on page 34. Must be taken on a passed/not passed basis. The Staff (Mr. Grah in charge) (F, W, Sp)

IDS 138. Biological Deterioration of Wood. (3) See Interdepartmental Studies for the complete description of this course.

GRADUATE COURSES

Agricultural Chemistry

Administered By An Intercampus Group

Office, 145 Mulford Hall

Graduate Adviser: Mr. Brink

299. Research in Agricultural Chemistry. (1–12) Agricultural chemistry group. Mr. Brink (in charge) (F, W, Sp)

Agricultural & Resource Economics

Department Office, 207 Giannini Hall

Chairman: James N. Boles

Graduate Advisers: Mr. Boles, Mr. Chapin de Janny, Mr. Just, Mr. Schmitz

200A–200B–200C. General Departmental Seminar. (1–1–1) One hour of lecture per week. May be

NOTE: For key to symbols, see page 34.
218 / NATURAL RESOURCES (Grad.) : Entomological Sciences

217. Advanced Insect Physiology, Biochemistry, and Toxicology. (3) Three hours of lecture per week. Prerequisite: Entomology 102, 103, 117 or consent of instructor. Recommended: Biochemistry 101, 102. Topics may be taken twice for credit. Mr. Casida.

Mr. Gordon (W)

219. Physiological Mechanisms in Insect Behavior. (3) Three hours of lecture per week. Prerequisite: course 219 (may be taken concurrently). Laboratory in orientation, feeding-behavior, migration, rhythms, communication, hormones, and behavior. Mr. Loher (Sp)

Mr. Loher (Sp)

220. Economics of Resource Allocation. (3) For credit. To be given in odd-numbered years. Advanced calculus of instantaneous and total economic relationships. Emphasis on the theory of the firm and the evolution of economic theory. Mr. Schmitz (F)

Mr. Sarris (W, Sp)

221. Economics of Trade and Location. (4) Three hours of lecture per week. Development of analytical models for the study of economic and political factors in international and interregional trade and in the location of specific producing and processing industries; market failure, consumption and production externalities, second-best theory. Mr. Lee (F)

Mr. LeVeque, Mr. McEntire (W, Sp)

222. Uniforming Concepts of Photosynthesis. (3) Two 1 1/2-hour lectures per week. Prerequisite: consent of instructor. Carbon assimilation, structure of the photosynthetic apparatus, light and dark reactions, with special emphasis on enzyme composition, photosynthetic phosphorylation, and photosynthesis in subcellular systems. Mr. Buchanan, Mr. Arnon, Mr. Malkin (F)

Mr. Buchanan in charge (F, W, Sp)

(For undergraduate courses in bioenergetics, see Resource Sciences.)

Entomological Sciences

Department Office, 137 Giannini Hall
Chairman: Powers S. Messenger

Graduate Advisers: Entomology: Mr. Hagen, Mr. Heinrich, Mr. Sylvester, Mr. Tanada; Parasitology: Mr. Weinmann; Medical Entomology: Mr. Anderson

240. Principles of Systematic Entomology. (3-4) Three hours of lecture per week. Theory, based on phylogenetic and evolutionary relationships of insects, with emphasis on classification and identification of specific insects. Mr. Powell (F)

Mr. Powell (F)

241. Advanced Topics in Systematic Entomology. (3) Three hours of lecture per week. Prerequisite: Entomology 104 and an upper division course in genetics. Theory, philosophy, and methodologies of systematic entomology. Each offering may be taken separately for credit and in any sequence.

240A. Speciation in Insects. (3) Three hours of lecture per week. Prerequisite: Entomology 104 and an upper division course in genetics. Theory, philosophy, and methodologies of systematic entomology. Each offering may be taken separately for credit and in any sequence.

240B. Contemporary Techniques in Systematic Entomology. (3) Three hours of lecture per week. Prerequisite: Entomology 104 and course in elementary statistics. Theory, philosophy, and methodologies of systematic entomology. Mr. Delv, Mr. Daven (F)

Mr. Delv, Mr. Daven (F)

240C. Theory and Principles of Classification and Nomenclature. (3) Three hours of lecture per week. Prerequisites: Entomology 104 and an upper division course in genetics. Theory, philosophy, and methodologies of systematic entomology. Mr. Powell, Mr. Schlinger (F)

Mr. Powell, Mr. Schlinger (F)

245. Population Ecology. (3) Three hours of lecture per week. Prerequisite: Entomology 103. To be offered in even-numbered years. Population dynamics, regulation, and measurement, theory of natural control. Mr. Moss, Mr. Hulfraker (F)

Mr. Messenger, Mr. Hulfraker (F)

246. Principles and Problems in Agricultural Entomology. (3) Three hours of lecture per week. Prerequisite: Entomology 100 or 110. The principles of insect control, the side effects to plants and animals following insecticides, idiosyncratic behavior of species and methods, and policies and procedures for the control of pests. Mr. Heinitz, Mr. Allen (W)

Mr. Allen (W)

213. Insect-Crop Relationships. (4) Three hours of lecture and three 2-day field trips per week. Prerequisite: Entomology 100 or 110. Biometrics of important insects and their effects on agricultural crops; their relationship to crop and cultural practices of the different crops. Mr. Allen (Sp)

Mr. Allen (Sp)

224. Concepts and Research in Forest Entomology. (3) Three hours of guided discussions per week and one 2-day field trip per semester. Prerequisite: Entomology 100 or consent of instructor. To be given in even-numbered years. Discussions of concepts and practices in forest entomology and the past and current research from which they are derived. Mr. Wood, Mr. Dahsten (F)

Mr. Wood, Mr. Dahsten (F)

253. Advanced Medical and Veterinary Entomology. (3) Three hours of lecture per week. Prerequisite: Entomology 153, Public Health 160A-180B. To be given in even-numbered years. The parasitic and arthropod-borne diseases. Mr. Furman, Mr. Anderson (F)

Mr. Anderson (F)

254. History of Entomology. (4) Three hours of lecture per week. Prerequisite: Entomology 100. Development of influential ideas and principles in biology and their application to entomology. Mr. Hagen (W)

Mr. Hagen (W)

275. Immature Insects. (4) One hour of lecture and nine hours of laboratory per week. Prerequisite: Entomology 100, 110. To be given in even-numbered years. Role of insects and arachnids in the transmission and causation of plant diseases; the relationship of the pathogens to their vectors and the approaches to control. Mr. Sylvester (Sp)

Mr. Sylvester (Sp)

276. Insect Vectors of Plant Pathogens. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: Plant Pathology 120. To be given in odd-numbered years. Role of insects and arachnids in the transmission and causation of plant diseases; the relationship of the pathogens to their vectors and the approaches to control. Mr. Sylvester (Sp)

Mr. Sylvester (Sp)

280. Special Seminar Topics. (3) May be repeated for credit. Mr. Messenger (in charge) (F, W, Sp)
290. Seminar in Agricultural Entomology. (2) May be repeated for credit. Mr. Allen, Mr. Middkirk (F, W)

291. Seminar in Insect Biochemistry and Toxicology. (2) May be repeated for credit. Mr. Casida, Mr. Gordon, Mr. Mittler, Mr. Pipa (W, Sp)

292. Seminar in Insect Pathology. (2) May be repeated for credit. Mr. Falcon, Mr. Pinnock, Mr. Poinar, Mr. Taneda (F, Sp)

293. Seminar in Insect Ecology and Biological Control. (2) May be repeated for credit. Mr. Dahiien, Mr. Hufnaker, Mr. Messenger (W, Sp)

294. Seminar in Systematic Entomology. (2) May be repeated for credit. Mr. Divey, Mr. Doyen, Mr. Powell, Mr. Schlinger (W, Sp)

295. Seminar in Forest Entomology. (2) May be repeated for credit. Mr. Dahiien, Mr. Wood (F, Sp)

296. Directed Group Studies. (1-6) Advanced study on special topics in laboratory, field, and museum. Credit awarded according to work accomplished. The Staff (Mr. Messenger in charge) (F, W, Sp)

297. Research in Entomology and Parasitology. (1-12) Original study on special topics in laboratory, field, and museum. Credit awarded according to work accomplished. The Staff (Mr. Messenger in charge) (F, W, Sp)

601. Individual Study for Master's Students. (1-8) Original study on special topics in laboratory, quarter.

602. Individual Study for Doctoral Students. (1-8) Original study on special topics which may vary from quarter to quarter in consultation with the major field adviser.

298. Research In Entomology and Parasitology. (1-12) Original study on special topics in laboratory, field, and museum. Credit awarded according to work accomplished. The Staff (Mr. Messenger in charge) (F, W, Sp)

299. Research In Entomology and Parasitology. (1-12) Original study on special topics in laboratory, field, and museum. Credit awarded according to work accomplished. The Staff (Mr. Messenger in charge) (F, W, Sp)

205. Seminar on Fire as an Ecological Factor. (3) Three hours of lecture per week. Prerequisite: a basic course in photo interpretation and related fields. The Staff (Mr. Messenger in charge) (F, W, Sp)

206. Seminar on Fire as an Ecological Factor. (3) Three hours of lecture per week. Prerequisite: a basic course in photo interpretation and related fields. The Staff (Mr. Messenger in charge) (F, W, Sp)

211. Seminar in the Analysis of Forest Economy. (3) One 3-hour seminar per week. Prerequisite: 12 units of economic theory, resource economics, or forest economics. Mr. McElligott (F)

212. Seminar in Economics of Forestry Enterprises. (3) One 3-hour seminar per week. Prerequisite: 12 units of economics, agricultural economics, or forest economics. Mr. Tegene (F)

213. Advanced Forest Regulation. (3) Three hours of lecture per week. Prerequisites: Forestry 113 and 114. Application of mathematical programming and other optimization techniques to timber harvesting scheduling and related forest management issues.

214. Case Studies in Wildland Resource Management. (4) Two semesters per week. Prerequisite: Forest 110A-110B, 114 or equivalent. Case studies involving inventory, evaluation, decision making, and planning for wildland resource management.

215. Seminar in Natural Resource Policy. (3) Two hours of lecture per week. Prerequisite: Forestry 115 or equivalent.

217. Seminar in Sociology of Natural Resources. (3) Two 1 1/2 hour meetings per week. Prerequisite: Consent of instructor. Application of sociocultural theories to problems of managing wildland ecosystems. Students will examine topics of individual interest related to the management of wildland uses. Enrollment limited.

221. Genetics of Forest Trees. (3) Two 1 1/2 hour meetings per week. Students will tour, on a one day-long trip to Institute of Forest Genetics. Open to senior undergraduates who have completed Forest 101-104 and 205. Focuses both on applied and practice of forest tree improvement. Format combines lectures by instructor, student presentations on selected topics and general discussion. Orientation varies from academic to professional, depending on the composition of the class.

222. Seminar in Forest Influences and Watershed Management. (3) One 3-hour seminar per week. Open to qualified graduate students from other departments. Mr. Libby (F)

224. Natural Resource Ecosystems. (3) Two-and-a-half hours of lecture per week. Derivation of ecosystem management and planning principles from the physical and philosophical backgrounds; rotation of ecosystem study to the natural and social sciences; general systems analysis and synthesis; man's role as dependent factor in ecosystem planning; the ecosystem as a conceptual tool in resource management. Mr. Schultz (Sp)

225. Advanced Silviculture. (3) Two 1 1/2-hour lectures per week. Prerequisite: Forestry 125.

231. Advanced Wood Anatomy. (3) Three 1-hour lectures per week. Prerequisite: Wood Science and Technology 131 or equivalent and consent of instructor. Open to qualified graduate students from other departments. Mr. Zinke (F)

232. Advanced Wood Physics. (4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: Wood Science and Technology 133 or equivalent. Adsorption of water, nonaqueous vapors, and gases by wood. Shrinking and swelling in water, aqueous solutions, and nonaqueous liquids. Fluid flow including permeability and diffusion. Thermal properties with modes of heat transfer important in wood processing and usage. Mr. Arganbright (W)

233. Advanced Wood Mechanics. (3) Two 1 1/2-hour lectures per week. Prerequisite: Wood Science and Technology 134, Civil Engineering 130 or equivalent. Deformation and fracture of wood, mechanics of the cell wall, current topics from the literature. Mr. Schniedewind (Sp)

235. Chemistry of Polysaccharides, Lignin, and Extractives. (4) Four hours of lecture per week. Prerequisite: Wood Science and Technology 135 (may be taken concurrently) or equivalent; qualified undergraduates may elect this course. This course is designed to acquaint students with the major classes of complex organic molecules which occur in plants and to develop an appreciation of the functional roles and reactions of these molecules. Mr. Brink (W)

236. Special Topics in Wood Science and Technology. (1-4) Hours to be arranged. Prerequisite: Open to properly qualified graduate students. Prerequisite: current study in wood science and technology, primarily for advanced graduate students. Course, including all of its subdivisions, may be repeated.

238A. Wood Anatomy. Mr. Cockrell, Mr. Wilcox (F, W, Sp)

238B. Wood Chemistry. Mr. Zavatin (W, F, Sp)

238C. Chemical Processing of Wood. Mr. Bink (F, W, Sp)

238D. Wood Mechanics. Mr. Schneidewind (W, Sp)

238E. Wood Physics. Mr. Arganbright (F, W, Sp)

238F. Mechanical Processing of Wood. Mr. Dickinson (F, W, Sp)

238G. Wood Product Pathology. Mr. Wilcox (F, W, Sp)

238H. Wood Adhesion and Adhesives. Mr. Johns (F, W, Sp)

239. Seminar in Wood Science and Technology. (1) One hour of lecture per week. Prerequisite: 205, course open to qualified graduate students from other departments. Current student research and reports in wood science and technology. Course may be repeated. Passed/not passed basis.

Mr. Dickinson (W, Sp)

RANGE SCIENCE

244. Seminar in Range Ecology. (3) Three hours of lecture per week. Prerequisite: Forestry 170 and 175 or equivalent. Ecological field study and operations research techniques applied to the analysis and management of ecosystems. Mr. Manke (W)

WILDFIRE SCIENCE

270. Seminar in Wildlife Biology and Management. (3) Three hours of lecture per week. Prerequisite: Forestry 101 and 170 or equivalent. Review of wildlife management, and operations research techniques applied to wildlife management and operations. Mr. White, Mr. Leopold (W)

278. Seminar in Freshwater Ecology. (3) Three hours of lecture per week. Prerequisite: knowledge of basic limnology required. Discussion and student presentations on topics or problems related to fisheries, aquatic ecology, and water pollution. Mr. Erman (F)

SPECIAL STUDIES

296. Individual Study. (1-7) Prerequisite: Consent of instructor and graduate adviser. Individual study in consultation with a member of the faculty directed to analysis and synthesis of the literature of a specialized subject area in forestry and conservation. The Staff (Mr. Messenger in charge) (F, W, Sp)

298. Directed Group Study. (1-5) Sec. 1: passed/not passed; Sec. 2: letter grades. Reading and conferences under direction of a member of the staff for properly qualified graduate students. The Staff (Mr. Messenger in charge) (F, W, Sp)

299. Individual Research. (1-12) The Staff (Mr. Messenger in charge) (F, W, Sp)

602. Individual Study for Doctoral Students. (1-8) Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the doctoral degree. Mr. Dahiien, Mr. Wood (F, Sp)


Genetics

Department Office, 345 Mulford Hall
Chairman: Seymour Fogel
Graduate Advisors: Mr. Brown, Mr. Freling, Ms. St Lawrence

210. Developmental Genetics. (2) Two hours of lecture per week. Prerequisite: Genetics 219.

NOTE: For key to symbols, see page 34.
## Interdepartmental Studies

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Credits</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDS 205A-205B-205C</td>
<td>Clinical Correlates: Human Growth, Development, and Aging</td>
<td>(1) One 1 1/2-hour session per week. Prerequisite: consent of instructor. Various stages of the life span illustrated by clinical cases.</td>
<td>(1-1-1)</td>
<td>(F, W, Sp)</td>
</tr>
<tr>
<td>IDS 205D-205E-205F</td>
<td>Clinical Correlates: Introduction to Clinical Medicine</td>
<td>(2-2-2) Two 1 1/2- hour sessions per week. Prerequisite: consent of instructor. Patho-physiological correlates of medicine. Introduction to specific aspects of medicine (gynecology, obstetrics, pediatrics, mental surgery, psychiatry). Lectures and presentations of clinical cases.</td>
<td>(2)</td>
<td>(F, W, Sp)</td>
</tr>
<tr>
<td>IDS 206A-206B-206C</td>
<td>Clinical Correlates: Medicine and Physical Diagnosis</td>
<td>(2) Two 1 1/2-hour sessions per week. Prerequisite: consent of instructor. Correlates of normal and developmental anatomy, physiology, biochemistry and genetics with clinical material. Principles of physical diagnosis and historical taking.</td>
<td>(2)</td>
<td>(F, W, Sp)</td>
</tr>
<tr>
<td>IDS 206D-206E-206F</td>
<td>Clinical Correlates: Physical Diagnosis and History Taking</td>
<td>(2-2-2) Two 1 1/2-hour sessions per week. Prerequisite: consent of instructor. Correlates of normal and developmental anatomy, physiology, biochemistry and genetics with clinical material. Principles of physical diagnosis and historical taking.</td>
<td>(2)</td>
<td>(F, W, Sp)</td>
</tr>
<tr>
<td>IDS 240</td>
<td>Nutrition of Population Groups</td>
<td>(3) Three hours per week. Prerequisite: consent of instructor. Study of nutrition in contemporary society, aimed at developing understanding of nutrition needs of groups and programs to meet needs; nutritional status evaluation, nutrition's effect on physical and mental health, environmental factors, prevention and corrective programs.</td>
<td>(3)</td>
<td>(F, W, Sp)</td>
</tr>
</tbody>
</table>

## Nutritional Sciences

### Department Office, 119 Morgan Hall

#### Chairman: Doris H. Calloway
Graduate Adviser: Nutrition: Mr. Briggs, Ms. Osfwall; Food Science: Mr. Beldanes, Ms. Calloway

#### IDS 201A–201B–201C | Seminar in Nutrition | (1-1-1) One hour of lecture per week. Prerequisite: Intended primarily for first-year graduate students. Introduction to literature in nutritional sciences. | (1) | (F, W, Sp) |
| IDS 204 | Nutritional Aspects of the Metabolism of Carbohydrates and Lipids | (2) One hour of lecture and one hour of discussion per week. Prerequisite: Biochemistry 102 and a course in nutrition or consent of instructor. Nutrition of carbohydrates and lipids emphasizing dietary and hormonal controls of metabolic pathways. | (2) | (F, W, Sp) |
| IDS 205 | Biochemical Aspects of Protein Nutrition | Two hours of lecture per week. Prerequisite: Biochemistry 100A–100B–100C, or 102, or consent of instructor. Nutrition of proteins relative to their structure and chemical properties. | (2) | (F, W, Sp) |
| IDS 206 | Innovations in Food Processing | Two hours of lecture per week. Prerequisite: Nutritional Sciences 106 and 107. Current and new methods of efficiently researching requirements for improved nutrition. Emphasis on non-nutritional, sensorial and fresher tasting foods; pressures of competitive cost reduction; and increasing sanitary and wholesomeness regulations. | (2) | (F, W, Sp) |
| IDS 211 | Research Methods in Nutritional Sciences | (5) One hour of lecture and twelve hours of laboratory per week. Prerequisite: graduate standing and consent of instructor. Advanced physical and chemical techniques in food science and nutrition; application of chromatography, radioisotopes, ultracentrifugation, electrophoresis to individual problems. | (5) | (F, W, Sp) |
| IDS 212 | Research Methods in Nutritional Sciences | (5) One hour of lecture and twelve hours of laboratory per week. Prerequisite: graduate standing and consent of instructor. Effect of nutrition on bodily chemistry and the functioning of various biological systems. Advanced techniques for metabolic experiments and their application to individual problems of nutritional research. | (5) | (F, W, Sp) |
| IDS 250 | Advanced Human Nutrition | (3) Three hours of lecture per week. Prerequisite: Nutritional Sciences 160 or equivalent. An advanced course in human nutrition designed to continue the study of nutrition in various areas of interest, research, and controversy. Emphasis on the nutrition of normal individuals. | (3) | (F, W, Sp) |

## Plant Pathology

### Department Office, 147 Hilgard Hall

#### Chairman: David E. Schlegel
Graduate Adviser: Mr. Huismann

#### IDS 201 | Seminar in Plant Pathology | (1) One hour of lecture per week. Must be taken with IDS 202. | (1) | (F, W, Sp) |
| IDS 202 | Biology of Plant Pathogenic Fungi | (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: Plant Pathology 201. Advanced study in various aspects of the biology of plant pathogens, with an emphasis on a course in introductory mycology. To be offered in even-numbered years. | (4) | (F, W, Sp) |
| IDS 206 | Viruses In Relation to Plant Diseases | (4) Two hours of lecture and six hours of laboratory per week. Prerequisite: Plant Pathology 120; Biochemistry 102; Bacteriology 102 and 106, or consent of instructor. Biology and pathogenesis of bacterial disease; environmental factors relating to incidence and field spread of virus infections; approaches to control. | (4) | (F, W, Sp) |
| IDS 208A–208B | Research Methods in Plant Pathology | (4–4) Formerly 180A–180B. Two 1-hour lectures and two 3-hour laboratories per week. Prerequisite: Plant Pathology 120 (or equivalent). Microbiological procedures; techniques used in research on disease and pathogen physiology; experimental design and data analysis; and scientific writing. | (4) | (F, W, Sp) |

### 210 | Plant Disease Control | (4) Two hours of lecture and six hours of laboratory per week. Prerequisite: Plant Pathology 120. Dose response relations; graphic methods; control by exclusion, eradication, protection, immunization, and therapy. | (4) | (F, W, Sp) |
212. Advanced Plant Pathology. (3) Three hours of lecture per week. Prerequisite: Plant Pathology 120. Principles broadly applicable to fungus, bacterial, viral, and nutritional diseases of plants.

Mr. Wilhelm (Sp)

216. Physiology of Plant Diseases. (3) Three hours of lecture per week. Prerequisite: Chemistry 5 and 6A-6B, or equivalent. Recommended: Botany 40. Biochemistry 102. Physiology and biochemistry of host-parasite relations.

Mr. Weinhold (W)

222. Epidemiology and Diagnosis of Plant Diseases. (4) Two hours of lecture and six hours of laboratory per week. Prerequisite: consent of instructor. Experience in field and laboratory diagnosis of plant diseases.

Mr. Weinhold (Sp)

296. Special Study for Graduate Students. (1-6)

The Staff (F, W, Sp)

298. Special Study for Graduate Students. (1-12)

Prerequisite: graduate standing and consent of instructor

The Staff (W, Sp)

299. Research in Plant Science. (1-12) Prerequisite: graduate standing and consent of instructor

The Staff (F, W, Sp)

601. Individual Study for Master’s Students. (1-8)

Individual study for the comprehensive or language requirements in consultation with the field adviser. Units may not be used to meet either unit or residence requirements for a Master’s degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (F, W, Sp)

602. Individual Study for Doctoral Students. (1-8)

Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (F, W, Sp)

Soils and Plant Nutrition

Department Office, 108 Hilgard Hall

Chairman: Louis Jacobson

Graduate Advisers: Soil Science: Mr. Waldron; Plant Physiology: Mr. Gold

SOIL SCIENCE

203. Soil Resource Evaluation. (3) One 2-hour lecture per week and field work. 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.

Mr. Arkley (W)

211. Advanced Soil Biochemistry and Soil Biology. (2) Two 1-hour lectures and discussions per week. Prerequisite: Soil Science 111 or equivalent. Offered in odd-numbered years. 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.

Mr. McLaren (F)

212. Advanced Soil Chemistry. (4) Two 1-hour and one 2-hour lectures per week. Prerequisite: Soil Science 110; Chemistry 109. Applications of thermodynamics to soil systems.

Mr. Babcock (W)

213. Pedochemistry and Mineralogy of Soils. (3) Three 1-hour lectures per week. Prerequisite: graduate standing in soil science or consent of instructor. Crystal structure and colloidal chemistry of soil clay minerals; application of principles of mineralogy and chemistry to a quantitative evaluation of soil formation.

Mr. Barshad (W)

213L. Pedochemistry and Mineralogy of Soils. (2–5) Six to fifteen hours of laboratory per week. Prerequisite: consent to 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.

Mr. Barshad (W)

220. Soil Physics. (3) Three hours of lecture and two hours of group discussion per week. Prerequisite: consent of department. Statics and dynamics of soil water, with development of general principles, applicable to saturated and unsaturated soils, both isotropic and anisotropic, with examples from hydrology, irrigation practice, and drainage.

Mr. Dav (Sp)

235. Seminar. (2) One 1/2-hour meeting per week. Prerequisite: graduate standing in soil science, plant physiology, and related subjects.

The Staff (W)

296. Special Study for Graduate Students. (1-6)

The Staff (F, W, Sp)

297. Student Seminar in Plant Nutrition. (No credit)

The Staff (F, W, Sp)

298. Special Study for Graduate Students. (1-12)

Prerequisite: graduate standing and consent of instructor

The Staff (F, W, Sp)

299. Research in Plant Science. (1-12) Prerequisite: graduate standing and consent of instructor

The Staff (F, W, Sp)

601. Individual Study for Master’s Students. (1-8)

Individual study for the comprehensive or language requirements in consultation with the field adviser. Units may not be used to meet either unit or residence requirements for a Master’s degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (F, W, Sp)

602. Individual Study for Doctoral Students. (1-8)

Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (W, Waldron) (F, W, Sp)

Staff Seminar in Plant Science. (No credit)

The Staff (F, W, Sp)

PLANT NUTRITION

206. Seminar in Plant Physiology. (2) One 1/2-hour meeting per week. Prerequisite: qualified graduate students with consent of staff member in charge. Problems of plant physiology in the field of botany, food science, forestry, plant nutrition, and soil science.

Mr. Babcock, Mr. Gold, Mr. Jacobson, Mr. Stone, Mr. Williams (W, Sp)

296. Special Study for Graduate Students. (1-6)

The Staff (F, W, Sp)

297. Student Seminar in Plant Nutrition. (No credit)

The Staff (F, W, Sp)

298. Special Study for Graduate Students. (1-12)

Prerequisite: graduate standing and consent of instructor

The Staff (F, W, Sp)

299. Research in Plant Nutrition. (1-12) Prerequisite: graduate standing and consent of instructor

The Staff (F, W, Sp)

601. Individual Study for Master’s Students. (1-8)

Individual study for the comprehensive or language requirements in consultation with the field adviser. Units may not be used to meet either unit or residence requirements for a Master’s degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (F, W, Sp)

602. Individual Study for Doctoral Students. (1-8)

Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.
Optometry

UPPER DIVISION COURSES

100. History of Optometry. (2) Two 1-hour lectures per week. Prerequisite: junior standing. The profession of optometry, its history and present status.

104. Ophthalmic Optics. (3) Two 1-hour lectures and one 3-hour laboratory per week. Prerequisite: Physics 105A. History of the development of lenses and spectacles; optical properties of lens materials; the theory and design of spectacle lenses. Laboratory exercises in lens-cutting, grinding, mounting, neutralization, and frame-fitting and adjusting.

105. Ophthalmic Optics. (3) Two 1-hour lectures and one 3-hour laboratory per week. Prerequisite: course 104. Continuation of Optometry 104. Mr. Kors (F).

109A–109B–109C. Introduction to Optometric Patient Care. (2–2–2) One hour of seminar and four hours of clinic per week. Prerequisite: registration stated in the first year of the optometry program. Discussions on the role of the optometrist in the overall health care delivery system in the United States and on clinical optometric practice. Observation and clerkship in the Optometry Clinics. To be offered on a passed/not passed basis. Mr. Hirsch, Mr. Wiley, Mr. Polse, Mr. Carter, Mr. Harris, Mr. Grisman, and Clinic Faculty (F, W, Sp).

127. Refraction of the Eye. (6) Three 1-hour lectures, two 2-hour laboratories per week. Prerequisite: Physiological Optics 102 or approval by instructor. Calculational variables determining the refractive state of the eye. Lectures and laboratory assignments on subjective and objective techniques of refraction and methods of correcting refractive anomalies: skiatometry, keratometry, ophthalmoscopy, visual acuity, subjective refraction, amplitude of accommodation.

128. Introduction to Pathology. (3) Two 1 1/2-hour lectures per week. Prerequisite: Anatomy 108/108L & Physiology 107/108L. Basic pathological processes in human development and function. Mr. Harris (F).

130. Optometric Analysis. (5) Three 1-hour lectures and two 2-hour laboratories per week. Prerequisite: course 127. Routine examination and care analysis: interpretation and case history, motility, phorometry,versions, vergences, relative accommodation and the various techniques for the analysis of optometric data. Introduction to clinical assessment. Mr. Kerr (W).

131A. General and Ocular Pharmacology. (3) Three hours of lecture per week. Prerequisite: course 128. The role of modern drugs on therapy and side effects of drug use, especially as they relate to vision and eye. Ms. Jose (W).

131B. Clinical Manifestations of Disease. (3) Three hours of lecture per week. Prerequisite: course 128. A survey of ocular disease and its causative factors, with special reference to ocular implications and manifestations. Mr. Stamper, Mr. Metz, Mr. Cavender (Sp).

133. Anomalies of Binocular Vision. (5) Four 1-hour lectures and one 2-hour laboratory. Prerequisites: courses 127, 130. Detection, measurement, classification, etiology, symptomatology, signs and prognosis of the latent and manifest disorders of binocular fixation, both comitant and noncomitant; orthoptics and visual training. Clinical observations.

139. Ocular Disease Instrumentation. (3) Two hours of lecture and one 4-hour laboratory per week. Prerequisites: Optometry 131A and 131B and simultaneous enrollment in Summer Session Clinic. Clinical examination procedures for the detection and diagnosis of ocular disease. Patient interrogation, direct and indirect ophthalmoscopy, biomicroscopy, tonometry, and visual field testing.

Mr. Polse and Staff (Summer).

150A. Ocular Disease. (5) Four hours of lecture or recitation and one 1/2-hour laboratory per week. Prerequisites: Optometry 131A, 131B, and 139. The role of the optometrist in detection of ocular and systemic disease. The nature of ocular disease—etiology, detection, diagnosis, and referral criteria and management. Topical drugs used in ocular examination. Disease processes: fids, scera, conjunctivitis, iritis, and the glaucomas.

Mr. Carter, Mr. Tamler (F).

150B. Ocular Disease. (5) Four hours of lecture or recitation and one 1 1/2-hour laboratory per week.

150C. Ocular Disease. (5) Four hours of lecture or recitation and one 1 1/2-hour practical per week. Prerequisite: Optometry 150A. Continuation of 150A. Diseases of the crystalline lens, iris, ciliary body, choroid, retina, and optic nerve.

Mr. Carter, Mr. Tamler (W).

150D. Ocular Disease. (5) Four hours of lecture or recitation and one 1 1/2-hour practical per week. Prerequisite: Optometry 150B. Continuation of 150B. Neuro-ophthalmological disorders affecting vision. Ocular manifestations of systemic disease. Headaches. Psychological factors in the causation of visual symptoms. Interaction among the optometrist, the physician, and other physicians in the detection, evaluation and management of ocular and systemic disease.

Mr. Carter, Mr. Tamler (Sp).

152. Advanced Geometric Optics. (5) One 2-hour and two 1 1/2-hour lectures. Prerequisite: Physics 106A. Gaussian optics. Aberration and dispersion, oblique astigmatism, "corrective curve" lenses, design and characteristics of optical instruments.

Mr. Mandell (F).

158A–158B. Vision Rehabilitation. (4–4) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisites: courses 127 and 453. Amnesia, low vision and geriatric optometry. Orthoptics, pleoptics and pedi- atric optometry.

Sequence Beginning (W), Mr. Mandell (W), Mr. Grisman (Sp).

161. Contact Lenses. (6) Three 1-hour lectures and two 3-hour laboratories per week. Prerequisites: courses 105 and 454. Historical development, physical and chemical properties of contact lenses, and the adaptation of the human eye, with emphasis on the anatomical and physiological implications.

Mr. Sarver (Sp).

177. Public Health Optometry. (4) Two 1 1/2-hour lectures and field trips. Prerequisite: consent of instructor. Vision performance: screening methods, establishment and evaluation of standards, importance of public health optometry, programs: methods of supplying vision care by means of government assistance, in the armed forces, in health clinics and hospitals, group practices and prepaid insurance programs. Mr. Neumaier (W).

178. Applied Psychology for Optometrists. (2) Two 1-hour lectures per week. Prerequisite: senior standing in Optometry. Patient management and psychopharmacology, oral and written: suggestion and hypnosis.

Mr. Harris (Sp).

185. Practice Management. (4) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: senior standing in Optometry. Patient management and psychopharmacology, oral and written: suggestion and hypnosis.

Mr. Harris (Sp).

190A–190B–190C. Final Year Optometry Project. (3–3–3) Lecture or recitation and/or laboratory combined to make 3 units of class work. Prerequisite: four year standing in optometry. Fundamentals of scientific inquiry; problems in vision research; laboratory techniques of design and analysis of data organization and presentation of research results; completion of a project. To be offered on a passed/not passed basis. Credit and grade to be awarded upon completion of sequence.

Mr. Cohn, and Staff (F, W, Sp).

Sequence beginning Fall

Professional Courses

410. Introduction to Clinical Optometry. (6) One hour, lecture, two hours of seminar, and fifteen hours of clinic per week. Prerequisite: consent of instructor. Clinical lectures, seminars, and clinical practice in the techniques and interpretation of clinical data. Mr. Sarver and Staff (Su).

412. Contact Lens Clinic. (2) One hour of lecture and three hours of laboratory per week. Prerequisite: consent of instructor. Clinical practice and the techniques of fitting contact lenses. Offered only on a passed/not passed basis. Mr. Harris (Su).

453A–453B–453C. Optometry Clinic. (4–4–4) Four 453A, 454, 455. One hour of lecture, one hour of seminar, and two hours of group or individual patient care per week. Prerequisites: completion of the Group in Physiological Optics as early as possible. Admission to this program requires a bachelor’s degree in physics, physiology, psychological optics, psychology or optometry, or a doctor’s degree in medicine or optometry.

For further details on the requirements for the B.S., M.S., and Ph.D., please consult the adviser of the Group in Physiological Optics, School of Optometry.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.
Physiological Optics

UPPER DIVISION COURSES

104. Anatomy of Eye and Orbit. (5) Three 1 1/2-hour lectures and one 2-hour laboratory per week. Pre-requisite: Ophthalmology 105. The ophthalmic and microscopic anatomy of the orbit, its content and adjacent structures, including the cranial nerves associated with vision and their cortical projections. The blood supply to the eye and orbit. The embryology of the eye.

Mr. Cohn (W)

105. Optics of the Eye. (4) Four 1-hour lectures and one 2-hour laboratory per week. Pre-requisite: Physics 106A. The eye as an optical instrument; image formation properties, optical defects, and image quality; dimensions, optical constants, schematic eyes, cardinal points, ametropia, accommodation, retinal image size, blur circles, defraction, aberrations, scatter, and absorption.

Mr. Freeman (Sp)

128. Visual Functions of the Eye. (3) Three 1-hour lectures per week. Pre-requisite: course 102. Consideration of the physiology of the cornea and lids: formation and function of lacrimal fluid, formation, function, and drainage of the aqueous humor; intraocular pressure; metabolism and circulation in the eye; physiology of the eyes. Light to twinkling pupil; accommodation; photochemistry. Mr. Miller (F)

284. Laboratory in Visual Functions of the Eye. (3) One hour of laboratory lecture and three lab hours per week. Pre-requisite: course 102 and 128 (may be concurrent). Laboratory experiments in visual functions of the eye. Mr. Miller (F)

329. Optic Motion of the Eyelids. (5) Three 1 1/2-hour lectures and one 2-hour laboratory per week. Pre-requisite: course 102 and 129. Detailed consideration of ocular movements: specification of direction of regard, time, velocity, and distance of rotation; primary position; kinetics of the eye. Listing's Law; action of the extraocular muscles; types of movements, rotax, saccadic, pursuit, version, vergence; accommodation and accommodative convergence; convergence accommodation. Mr. Stark (W)

332. Visual Stimulation. (5) Three 1 1/2-hour lectures and one 2-hour laboratory per week. Pre-requisite: consent of instructor. Study of visual stimuli, their nature and specification; radiometry; photometry; colorometry; illumination; retinal image; effects of atmospheric scintillation; effects of ambient light; color vision. Mr. Adams (Sp)


160. Binocular Vision and Space Perception. (5) Three 1 1/2-hour lectures and one 2-hour laboratory per week. Pre-requisite: consent of instructor. Binocular vision: horizontal, vertical, figure-ground relations, perception of size, shape, direction, distance, motion, time, and complex patterns; information theory.

Mr. Flom (W)

175. Recent Advances in Psychological Optics. (1) One-hour class per week. Pre-requisite: consent of instructor. Recent advances in psychological optics and their relation to current problems. Mr. Freeman (in charge) (F, W, Sp)

188. Group Studies for Advanced Undergraduates. (1-8) Group studies of selected topics. Mr. Freeman, Mr. Cohn (F, W, Sp)

198. Group Studies for Advanced Students. (1-8) Group studies of selected topics. Mr. Freeman, Mr. Cohn (F, W, Sp)

199. Supervised Independent Study and Research. (1-8) Enrollment is restricted by regulations and must be approved by student advisors (under supervision of the advisor and 260) up to 6 units of 489 may be substituted for course 459 towards the O.D. degree. Must be taken on a passed/not passed basis.

Mr. Flom and Staff (Su)

401. Applications of Electronics and Computers in Psychological Optics and Optometry. (5) Formerly numbered 491. Two hours of lecture and two hours of laboratory per week, with discussion in physiological optics, optometry student, or consent of instructor. The study of vision requires the application of electronic and computer techniques. Topics will cover the recording of bio-electric phenomena, transducers, signal averaging and computer processing and displays, and computer systems used in physiological optics and optometry.

Mr. Marg (Sp)

601. Individual Study for Master's Students. (1-6) Prerequisite: consent of instructor. Study for the comprehensive requirements in consultation with the adviser in physiological optics. Units may not be used to meet either unit or residence requirements for the master's degree. Must be taken on a satisfactory/unsatisfactory basis.

Mr. Adams (F, W, Sp)

602. Individual Study for Doctoral Students. (1-6) Individual study in consultation with the adviser in physiological optics, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required for the Ph.D., may not be used for unit or residence requirements. Must be taken on a satisfactory/unsatisfactory basis.

Mr. Adams (F, W, Sp)

250. Vegetative Physiology of the Eye. (4) Four hours of lecture per week. Pre-requisite: graduate standing and a course in calculus. Detailed analysis of the vegetative functions of the eye: kinetics of visual and auditory receptor cells; visual and auditory transduction; the formation of aqueous humor and the relation of intraocular pressure to the rates of formation and drainage. Mr. Miller (Sp)

260. Laboratory in Vegetative Functions of the Eye. (5) Four 1-hour lectures and two 2-hour laboratories per week. Pre-requisite: consent of instructor. Laboratory study of the vegetative functions of the eye and the sensory and central processes of visual perception. Mr. Marg (Sp)

Office of the Dean, 19 Earl Warren Hall
Dean: Warren Winkelstein, Jr.
Steward H. Martin, D.V.M., M.D., M.P.H.
Ph.D.(Acting)

Associate Deans: Nicholas Parlette, M.P.H.
Frances Saunders, M.P.H.

Graduate curricula in the School of Public Health provide preparation for positions of leadership in health agencies, and for research and teaching in the health sciences.

NOTE: For key to symbols, see page 34.
The professional degrees Master of Public Health (M.P.H.) and Doctor of Public Health (Dr.P.H.) are offered in the area of biomedical and environmental health sciences, including epidemiology and biostatistics, and in the area of social and administrative health sciences, including family public health education, health behavior sciences, and public health nutrition. Particular attention also may be given to special areas of concern such as population, environmental pollution, control, health and medical care delivery, community mental health, and forensic science.

Programs of study leading to the following academic degrees are administered by groups of faculty from the School of Public Health and other departments:

- Biostatistics, M.A., Ph.D.
- Comparative Pathology, M.S., Ph.D.
- Environmental Health Sciences, M.S., Ph.D., M.P.H.
- Epidemiology, M.S., Ph.D.

Students are encouraged, and in most programs are required, to begin studies in the fall quarter because of the order in which courses are scheduled. Separate applications for admission must be submitted to the Graduate Division of the University and to the School of Public Health no later than February 1 for admission the following fall quarter.

For further information consult the Announcement, School of Public Health, University of California, Berkeley, CA 94720.

**BIOMEDICAL AND ENVIRONMENTAL HEALTH SCIENCES**

**Department Office, 307 Earl Warren Hall**

**Professors:**
- Chin Long Chiang, Ph.D.
- Robert C. Cooper, Ph.D.
- Sanford B. Werner, M.D.
- Senford S. Elberg, Ph.D.
- Stewart H. Maddin, D.V.M.
- A. Harry Bliss, M.S., M.P.H.
- Robert C. Spear, Ph.D.
- George F. Sensabaugh, Ph.D.

**Associate Professors:**
- Margaret Beattie, M.A., Ph.D.
- Alex K. Smith, M.D., M.P.H.
- Carol D'Onofrio, M.P.H.
- Octavio I. Romano-V., Ph.D.
- Don C. Hoiloway, Jr., Ph.D.
- Dorothy Bird Nyswander, M.D., M.P.H.

**Assistant Professors:**
- Albert P. Krueger, M.D.
- Walter S. Mangel, B.S.
- Annette Fuller, M.S.W.

**Graduate Program CoDirector:**
- Frederick M. Ozonoff, Ph.D.

**Graduate Program Staff:**
- Helen A. Glidden, M.S.
- Frances Saunders, M.P.H.

**Lecturers:**
- Joseph V. Bruce, M.D., M.P.H.
- Albert Chang, M.D., M.P.H.
- Joan R. Bloom, Ph.D.
- David A. McKay, Ph.D.
- Richard W. Levey, M.B.B.C.L., M.P.H.
- David B. Starkweather, M.S., M.P.H.
- Octavio I. Romano-V., Ph.D.

**Schoolwide Public Health Courses**

The following interdisciplinary courses involve faculty from both Departments of the School of Public Health.

**5A-B-D-SC. Individual and Community Health. (3-3-2)** Three 1-semester lectures per week for 5A and 5B, two 1-hour sessions per week for SC. Prerequisite: 9A is prerequisite for 5B.

**120-129. Public Health Administration. (4-3-5) Three 3-hour laboratory per week for each course; 4 units for 120, 3 units for 129.** Prerequisite: 120; 129 is prerequisite for 129 and 129 is prerequisite for 129.

**149A. Occupational Health and Industrial Hygiene. (F-Sp) Three 1-semester laboratory per week. Prerequisite: 249A or consent of instructor. Analysis of current topics and techniques as they apply to the analysis and interpretation of workplace and environmental exposures.**

**294T. Interdisciplinary Seminar for Dr.P.H. Students. (1-4) Three 1-hour seminars per week for two units, field work, etc., to be arranged.** Prerequisite: consent of instructor. Discussion of current topics such as prevention of drug abuse and alcoholism; community health care delivery, etc. May not be offered each quarter. Enrollment limited.

**290C. Area of Concern Seminar: Mental Health. (1-4) Two hours of seminar per week, and individual projects, field work, etc., to be arranged.** Prerequisite: consent of instructor. Discussion of current topics such as prevention of drug abuse and alcoholism; community care of the mentally ill; mental health services in educational, penal, industrial, and religious institutions; etc. May be offered each quarter. Enrollment limited.

**290D. Area of Concern Seminar: Organization of Medical Care. (1-4) Two 2-hour seminar per week, and individual projects, field work, etc., to be arranged.** Prerequisite: consent of instructor. Discussion of current topics such as prevention of drug abuse and alcoholism; community care of the mentally ill; mental health services in educational, penal, industrial, and religious institutions; etc. May not be offered each quarter. Enrollment limited.

**290E. Area of Concern Seminar: Population. (1-4) One 2-hour seminar per week, and individual projects, field work, etc., to be arranged.** Prerequisite: consent of instructor. Discussion of current topics related to population, family planning, demography, etc. May not be offered each quarter. Enrollment limited.

**294T. Interdisciplinary Seminar for Dr.P.H. Students. (1-4) Three 1-hour seminars per week for two units, field work, etc., to be arranged.** Prerequisite: consent of instructor. Discussion of current topics such as prevention of drug abuse and alcoholism; community care of the mentally ill; mental health services in educational, penal, industrial, and religious institutions; etc. May not be offered each quarter. Enrollment limited.

**Biomedical and Environmental Health Sciences**

The Department of Biomedical and Environmental Health Sciences in the School of Public Health is concerned with the impact of environmental factors on the health of human populations. Areas of special interest include the study of arthropod-borne viral diseases, air and water pollution in the etiology of cancer and other diseases, social-psychological factors in the chronic diseases, host-parasite relationships in infectious diseases, immunologic unresponsiveness in host susceptibility to disease, the toxicology of chemicals in the environment, the human health aspects of the work place, and forensic science.

The common theme of these activities is to better understand the causes of the major disease problems affecting human society in order that effective prevention programs can be developed. Since these problem areas require interdisciplinary approaches, students are encouraged to develop broad programs of study both within the School and on the campus.

A variety of degree programs are offered with specialization in biostatistics, environmental health sciences, epidemiology, medical microbiology, immunology, parasitology, and comparative pathology.

**UPPER DIVISION COURSES**

149A. Occupational Health and Industrial Hygiene. (3) Three 1-semester lectures per week. Prerequisite: 120A. Examination of current topics and techniques as they apply to the analysis and interpretation of occupational exposures.

149B. Occupational Health and Industrial Hygiene: Sanitary Air Analysis. (2-3) Two 3-hour laboratory per week. Prerequisite: 149A or consent of instructor. Analysis of air quality and other environmental factors affecting the health of people at work.

150. Environmental Health Sciences. (3) Three 1-semester lectures per week. The elements of public health sanitation and occupational control of the environment. Survey of water, air, food, and other factors affecting man's environment.

151. Introductory Forensic Science Laboratory. (2) One 3-hour laboratory per week. Prerequisite: 151. Introduction to the nature of proof as it applies to the analysis and interpretation of physical evidence.
Three 1-hour lectures and one 3-hour laboratory per week. Prerequisite: upper division standing in a natural or physical science. A systematic approach to the microanalysis of materials using chemical and physical techniques. Emphasis is on materials of forensic and environmental significance. Mr. Thornton (Sp)

153. Instrumentation and Trace Analysis. (5) Formerly Crim. 153. Three 1-hour lectures, one 1-hour lecture-discussion, and two 3-hour laboratories per week. Prerequisite: chemistry 1A-B-C, 5, 8 A-B, or equivalent. Instrumental analysis as applied to the identification and characterization of materials. Emphasis is on materials of forensic and environmental significance. Mr. Sensabaugh (F)

154L. Forensic Toxicology Laboratory. (3) Formerly Crim. 154L. One 1-hour lecture-discussion per week and two 3-hour laboratories per week. Prerequisite: upper division standing in a natural or physical science. Course 154L designed for students majoring in microbiology or closely related biological sciences. Basic principles of the host-parasite relationship, the role of toxicology, epidemiology, immunology and control of infectious disease of man. Mrs. Buehring, Mr. Vedros (W, Sp)

156L. Microbiology of Water and Waste Water. (3) Two 1-hour lectures and one 1-hour discussion per week. Prerequisite: consent of instructor. Principles of microbiology applicable to the aquatic environment and to waste water. Mr. R. Cooper (W)

156L. Water and Waste Water Microbiology Laboratory. (3) Two 3-hour laboratories per week. Prerequisite: chemistry 1A-B-C, 5, 8 A-B, or equivalent. A laboratory course in water microbiology with emphasis on the effect of microorganisms on water quality. Mr. R. Cooper (W)

160A. Introduction to Probability and Statistics in Biology and Public Health. (4) Three 1-hour lectures, one 3-hour laboratory per week. Prerequisite: two years of high school algebra or math. Introduction to probability, probability distributions, point and interval estimation, hypothesis testing, applications. Mr. Selyin, Miss Langhauser (F)

160B. Introduction to Probability and Statistics in Biology and Public Health. (4) Three 1-hour lectures, one 3-hour laboratory per week. Prerequisite: course 160A. The observation of nature, bivariate normal distributions, regression, and correlation, with biomedical applications. Mr. Selvin (W)

160C. Introduction to Probability and Statistics in Biology and Public Health. (4) Three 1-hour lectures, one 3-hour laboratory per week. Prerequisite: course 160A. The observation of nature, bivariate normal distributions, regression, and correlation, with biomedical applications. Mr. Selvin (W)

168L. Introduction to Biostatistics: Vital Statistics. (4) Two 1.5-hour lectures and one 3-hour laboratory per week. Statistical methods in study of human mortality and morbidity; life tables, death rates, vital statistical critical appraisal of census and vital data, measurement of risk and introduction to life tables. Record survival, life tables, life expectancy, and other measures of mortality. Mr. Brand, Miss Langhauser (F, Sp)

168B. Introduction to Biostatistics: Vital Statistics. (4) Two 1.5-hour lectures and one 3-hour laboratory per week. Statistical methods in study of human mortality and morbidity; life tables, death rates, vital statistical critical appraisal of census and vital data, measurement of risk and introduction to life tables, descriptive statistics, statistical inference. Mr. Selyin, Miss Langhauser (F, Sp)

169. Introduction to Public Health Statistics. (4) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: course 168 and consent of instructor. Statistical methods for biology, public health, and social sciences. Emphasis on nonparametric procedures and their application to medical data. Mr. Selvin (Sp)

175. Introduction to Epidemiology. (3) Three 1-hour lectures per week. Prerequisite: prior background in biological sciences is desirable. An introduction to the uses of epidemiology in public health practice, using selected diseases to illustrate the principles of the subject. Evaluation of rates and application of such knowledge to disease control. Mr. Winkelstein, Mr. Reeves, Mr. Syme, Mr. Cooper, Mr. Tempelis, Mr. Vedros (F)

200A—1608. Medical Microbiology, (3—3) Two 1/2—1/2 hour lectures per week. Prerequisite: Chemistry 8A—8B or 12A—12B; Biology 1A—1B; Bacteriology 102 or equivalent. Emphasis on the development of the field, with emphasis in both courses designed for students majoring in microbiology or closely related biological sciences. Basic principles of the host-parasite relationship, the role of toxicology, epidemiology, immunology and control of infectious disease of man. Mrs. Buehring, Mr. Vedros (W, Sp)

200L. Medical Microbiology Laboratory. (2) Two 3-hour laboratories per week. Prerequisite: course 160A (may be taken concurrently). Mr. Vedros, Mrs. Buehring (W)

200M. Medical Microbiology, Laboratory. (2) Two 1-hour laboratories per week. Prerequisite: course 160A (may be taken concurrently) and course 180L. Mr. Vedros, Mrs. Buehring (Sp)

218. Introduction to Medical Virology. (3) Three 1-hour lectures per week. Prerequisite: elementary courses in biology and chemistry, including biochemistry. The observation of nature and principles of virology, replication, pathogenesis and immunity in viral infections of man and animals. Mr. Hardy (F)

218L. Laboratory in M. d. e. c. I. (3) Two 3-hour laboratory periods per week. Prerequisite: course 160 (may be taken concurrently). A basic laboratory course in animal virology with emphasis on studies of the biological activities of animal viruses. Mr. Hardy (F)

133. Survey of General Pathology. (3) Three 1-hour lectures per week. Designed for students who have no background in the biological sciences. General principles of disease response of higher mammals to infectious and noninfectious agents. Mr. Madin (Sp)

134. Introduction to Hematology. (4) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: course 133 or consent of instructor. Basic principles of blood formation, disease production. Mr. Hardy, Mrs. Bushing, Mr. Tempelis, Mr. Vedros (Sp)

155. Principles of Optics and Microscopy. (3) Formerly Crim. 155. Two 1-hour lectures and one 2-hour laboratory per week. Principles of optics as applied to biological science, with emphasis on techniques in microscopy and optical techniques for the investigation of the structure of materials. Mr. Thornton (F)

156. Biochemical Individuality. (3) Formerly Crim. 156. Three 1-hour lectures and one 1-hour laboratory lecture-discussion per week. Prerequisite: undergraduate biology course, upper division students, Mrs. Burns (Sp)

158. Biochemical Individuality Laboratory. (3) Formerly Crim. 154L. One 1-hour lecture-discussion and two 3-hour laboratory periods per week. Prerequisite: course 158 or consent of instructor. Principles and techniques applied to the analysis of biochemical individuality. Mr. Sensabaugh (W)

177. Field Study in Public Health. (1—5) Supervised experience relevant to specific aspects of Public Health in off-campus organizations. Regular individual meetings with faculty sponsor and written report required. The Staff (F, W, Sp)

198. Directed Group Study. (1—5) The Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1—6) Emphasis is on the techniques listed on page 34. Must be taken on a passed/not passed basis. The Staff (W, Sp)

GRADUATE COURSES

249. Occupational Health Practices. (3) Formerly Course 249A. One 3-hour lecture-discussion per week. Prerequisite: consent of instructor. Advanced concepts in occupational diseases, occupational disease control and administration of occupational health. Mr. Milby (W)

249L. Occupational Health Laboratory. (3) Two 3-hour laboratory periods per week. Prerequisite: two 1-hour laboratory periods and two 1-hour discussions per week. Principles of occupational health including controls of chemical hazards in air, food, and water. Mr. R. Cooper, Mr. Spear (Sp)

250. Environmental Health Sciences. (3) Three 1-hour lectures per week. Prerequisite: students who have taken course 251 or 283 may not take 250 for credit. Survey of the interactions of biological, chemical, and physical agents in the environment on human health including means of measurement and control. Mr. R. Cooper, Mr. Spear (Sp)

251. Environmental Health Sciences: Biological Determinants of Health. (3) Two 1 1/2-hour lectures per week. Prerequisite: consent of instructor. A survey of the health hazards in the environment that affect man’s health, including means of monitoring, monitoring and control. Mr. R. Cooper (F)

252. Mathematical Models in Environmental Health. (3) Two 1 1/2-hour lectures per week. Prerequisite: consent of instructor. Use of mathematical models in environmental health. Presentation and analysis of a class of mathematical models useful in the study of time varying phenomenon of concern in the environmental health sciences. Applications to problems in toxicology, microbiology, environmental engineering, and industrial hygiene. Mr. Speare (Sp)

253. Environmental Toxicology. (3) Two hours of lecture and two hours of discussion per week. Prerequisite: graduate standing or consent of instructor. Measurement, evaluation and control of chemical hazards in air, food, and water. Mr. R. Cooper, Mr. Spear (Sp)

254. Noise in the Occupational Environment. (2) Two 1-hour lectures per week. Prerequisite: consent of instructor. Noise as an occupational hazard. Review of acoustics; discussion of auditory mechanism, noise measurement, and damage-risk criteria. Mr. Speare (W)

255. Industrial Safety. (2) One 2-hour lecture-discussion per week. Prerequisite: consent of instructor. Occupational accident research and its implications for accident prevention programs in industry and government. Mr. Winkelstein, Mr. Reeves (Sp)

256. Air Pollution and Human Disease. (2) Formerly Course 191 L. One 2-hour lecture per week. Prerequisite: course 253 and Engineering 150, the latter of which must be taken concurrently with the instructor. Analysis and discussion of the relationship between community air pollution and human disease from an epidemiological perspective, including both faculty and student developed presentations. Mr. Winkelstein, Mr. Speak (Sp)

257. Biological Control Systems. (3) Three 3-hour lectures and one 2-hour laboratory period per week. Prerequisite: consent of instructor. Systems of biological organisms for environmental control. Fundamental aspects of energy flow and production, waste control, water and waste disposal in microbiological systems and their relationship to environmental control problems in a natural and biochemical context. Mr. Winkelstein, Mr. Speare (Sp)

258. Industrial Toxicology Laboratory. (3) Two hours of lecture and three hours of laboratory per week. Prerequisite: course 253 and graduate standing or consent of instructor. Systems of biological organisms for environmental control. Fundamental aspects of energy flow and production, waste control, water and waste disposal in microbiological systems and their relationship to environmental control problems in a natural and biochemical context.
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288. Advanced Medical Virology. (3) Two 2-hour lecture-discussions per week. Prerequisite: course 180A or equivalent and consent of instructor. Analyzing and understanding interactions of microorganisms that contribute to the production of and recovery from viral diseases of medical importance. Mr. Hardy, Miss Schmidt, Mr. Cramer, Miss Smith (W).

**223. Medical Mycology.** (3) Two 1-hour lectures and one 3-hour laboratory per week. Prerequisite: course 180A-180B, 180C-180D, or equivalent and consent of instructor. Theory and practice of current methods and techniques applicable to medical mycology. Experiments will be conducted in fluorescent antibody techniques, preparative and analytical centrifugation, disc electrophoresis and immunoelectrophoresis. Mr. Tempels, Mr. Heckley (W).

255A. Advanced Forensic Science: Criminalistics. (4) Formerly Crim. 270. Two 1-hour discussion and three 3-hour laboratories per week. Prerequisite: courses 151, 152, 185 or equivalent. A detailed analysis of advanced procedural and interpretational problems in forensic science. Mr. Thornton (F).

**255B. ADVANCED FORENSIC SCIENCE:** Forensic Biology. (4) Formerly Crim. 273. One 2-hour discussion and three 3-hour laboratories per week. Prerequisite: course 188 or equivalent. A detailed analysis of advanced procedural and interpretational problems in forensic science. Mr. Sensabaugh, Mr. Loquan (W).

256. Seminars. (1–4) The Staff (W), (Sp).

258. Special Study. (1–8) Design to permit any qualified graduate student to pursue special study under the direction of a faculty member. The Staff (W), (Sp).


601. Individual Study for Master's Students. (1–8) Individual study for the comprehensive or language requirements in consultation with the field adviser. Units may not be used to meet either unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (W).

602. Individual Study for Doctorial Students. (1–8) Individual study in consultation with the major field adviser, intended to provide a qualified graduate student to prepare themselves for the various examinations required of candidates for the Ph.D. (and other doctoral degrees). May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (W).

Note: The following sections have been established for courses 197, 198, 199, 295 through 299, 601 and 602. The courses may be repeated for credit, but some sections may not be given every quarter:

K. Environmental Health Sciences

L. Biostatistics

N. Epidemiology

P. Advanced Laboratory Sciences

S. Forensic Science

IDS 238. Environmental Design, Stress and Health. (3) See interdepartmental Studies for the complete description of this course.

**IDS 245. Social and Cultural Perspectives on Illness and Health.** See interdepartmental Studies for the complete description of this course.
Social and Administrative Health Sciences

The Department of Social and Administrative Health Sciences in the School of Public Health is concerned with understanding and utilizing the forces influencing the delivery of effective health services. The scope of faculty and student interests in health research and practice is broad. Numerous aspects of health problems and issues are studied: administrative, behavioral, educational, political and economic.

Faculty and graduate students usually identify with one of the following program areas: behavioral sciences, community mental health, health administration and planning, hospital administration, maternal and child health, public health education, public health nutrition, or public health social work. However, students are urged to study health problems or concerns which can be considered most effectively through an interdisciplinary approach. Encouraged are departmental and interdepartmental seminars on important public health topics involving two or more different disciplines.

Because of the breadth of health subject interests, graduate students are expected to make extensive use of related departments on the Berkeley campus such as: anthropology, business administration, city and regional planning, economics, education, genetics, nutritional sciences, political science, public policy, psychology, social welfare. Opportunities for supervised field experience are offered by many health agencies in nearby communities, the state and the nation. For physicians, certain clinical programs are devised to meet certification requirements for medical board specialties such as preventive medicine, pediatrics, and obstetrics and gynecology. Both the Master of Public Health and the Doctor of Public Health degree programs are offered.

**UPPER DIVISION COURSES**

102. Administrative Behavior and Processes in Health Care. (3) Two 2-hour lecture-discussions per week. Prerequisite: upper division or graduate standing. Presentation of current issues and problems in the administration of health services in the U.S. Oriented to students with interest in health administration. (F, W)

103. Introduction to Medical Care Administration. (3) Two 1-hour lectures, one 2-hour group discussion per week. Prerequisite: lower division or graduate standing. Introduction to communications and administrative skills as member of interdisciplinary team. Small group discussions and field studies are designed and conducted with faculty members. (F, W)

125A. Maternal Health. (3) Two 1-hour lecture per week. Prerequisite: consent of instructor or public health program. Maternal health care and its social, legal, and psychological determinants. Use of cases, games, and psychological techniques. (F)

125B. Principles of Maternal and Child Health. (2) One 2-hour lecture per week. Health and social problems of mothers and children. (F, W)

127. Health Programs for the School Age Child. (3) One 2-hour lecture per week. A general introduction to organization of service programs for preschool and school age children. (F, W)

128. Health Problems of Adolescence. (2) One 2-hour lecture-discussion per week. Prerequisite: consent of instructor or public health program. Issues and problems in the physical and mental development of the adolescent and critical factors of current problems for this age group. (W)

130A-130B. Selected Topics in Health Education. (2-2) One 2-hour lecture per week; field observations with scheduled conferences. Topics and field demonstrations and field experiences will vary from year to year. The Staff (F, W, Sp)

*131. Introduction to Communications Research Applicable to Educational Aspects of Public Health. (2) One 1-hour lecture, one 2-hour laboratory per week. Prerequisite: consent of instructor or public health program. Principles of human growth and development. (F, Sp)

132. Planning Health Experiences for the School Age Child. (3) One 2-hour lecture, one 1-hour discussion per week; scheduled conferences. Exploration of health problems and program requirements related to the school-age child. (F, W)

133A. Alcohol and Other Drugs: Behavioral Problems. (2-2) One 2-hour lecture-discussion per week. Prerequisite: upper division or graduate standing. Alcoholism and drug addiction. (F, W)

133B. Alcohol and Other Drugs: Treatment Approaches. (3) Two 2-hour lectures and group discussions per week. Prerequisite: upper division or graduate standing. Treatment of alcoholics and drug addicts. (F)

133C. Alcohol and Other Drugs: Prevention and Social Policy Issues. (3) One 2-hour lecture per week; cultural determinants of drug use visits per quarter. Prerequisite: upper division or graduate standing. A critical study of past and present preventive and treatment programs on local, state, and federal levels. Training in assessment of effectiveness of programs. (F, W)

134A. Research Methods in the Behavioral Sciences. (3) Two 2-hour lectures and group discussions per week. The study of theory, logic, concepts, methods, and techniques of the behavioral sciences as they are applied to public health. (F, W)

134B. Research Methods in the Behavioral Sciences. (3) One 2-hour seminar and one 2-hour laboratory per week. Prerequisite: course 134A. Provides field experience in applying research methods as member of interdisciplinary team. Small group discussions and field projects conducted with faculty guidance. (Sp)

140. Introduction to Community Nutrition. (4) Two 2-hour laboratory per week. Prerequisite: consent of instructor or public health program. Nutrition of infants and children. (W)

144. Nutrition for the Individual and the Community. (3) Two 1 1/2-hour lecture-discussions per week. Prerequisite: consent of instructor. Basic nutrition concepts and their implications for community health. (Sp)

149W. Introduction to Voluntary Health Agencies. (3) Two 1-hour lecture-discussion per week and field visits to voluntary health agencies. Prerequisite: consent of public health agencies to determine their nature, extent, philosophy, and functions. Specific review and study of ongoing voluntary health agency programs. (F, W)

197. Field Study in Public Health. (1-5) Supervised experience relevant to specific aspects of Public Health in an ongoing organizational setting. Research responsibilities, meetings with faculty sponsor and written reports required. The Staff (F, W, Sp)

198. Directed Group Study. (1-5)

**GRADUATE COURSES**

200A. Introduction to the Organization and Administration of the Health Services Systems. (3) Two 1-hour lectures and one 2-hour discussion per week. Prerequisite: graduate standing in Public Health. (F, W)

207A. Introduction to Voluntary Health Agencies. (3) Two 1-hour lecture-discussion per week. Prerequisite: consent of instructor. The Staff (F, W, Sp)

208. Health Planning Laboratory. (4) One 3-hour lecture-discussion per week and a field project. Prerequisite: course 123 or consent of instructor. The Staff (F, W).

NOTE: For key to symbols, see page 34.
220. Contemporary Social Analysis for Community Mental Health, (3) One 2-hour lecture and one 1-hour laboratory per week. Prerequisite: major in hospital administration or consent of instructor. Development of the hospital as a social institution, its role and functions in health care delivery; analysis of hospital structure, operation, education, technology, interorganizational relationships, and public health. Mrs. Stimson (Sp)

211. Advanced Study in Hospital Administration, (2) One 2-hour lecture-discussion plus conference periods per week. Prerequisite: major in hospital administration or consent of instructor. Special study on hospital-related topics with emphasis on current concerns from quarter to quarter. May be repeated for credit. The Staff (F, W, Sp)

212A. The Hospital as a Social Institution, (4) Two 2-hour lecture-discussions per week. Prerequisite: major in hospital administration or consent of instructor. Organization of the hospital for patient care; an examination of the institution's role and functions in health care delivery; analysis of professional relationships in the hospital setting. Mr. Piliar (F, W, Sp)

221. Community Mental Health: The Nexus Between Public Health and Mental Health, (2) One 2-hour lecture-discussion plus conference periods per week. Prerequisite: prior experience. An examination of the social and psychological concepts and theories basic to the practice of public health and mental health in the community.

222. Community Mental Health: The Nexus Between Public Health and Mental Health, (2) One 2-hour lecture-discussion per week. Prerequisite: major in public health education or consent of instructor. Focus on social conflict theory, social policy, and current programs in health education. Mrs. Whissell-Buechy, Mr. Brazie (W)

223. Health Education: The Experience of Childhood and Adolescence, (3) One 2-hour lecture-discussion per week. Prerequisite: consent of instructor. Socialization and administering health and medical care in the life spans of children. Programs for meeting these needs. Mr. Goldstein (Sp)

224. Community Mental Health: The Nexus Between Public Health and Mental Health, (3) One 2-hour lecture-discussion per week. Prerequisite: consent of instructor. Analysis and application of educational practices in health education. Mrs. D'Onofrio (W, Sp)

225. Community Mental Health: The Nexus Between Public Health and Mental Health, (3) One 2-hour lecture-discussion per week. Prerequisite: major in public health education or consent of instructor. Focus on the role of the health professional as change agent; consequences of change in society as it affects present and future populations; social control functions of mental health care. Mr. Fisher (W, Sp)

226. Application of Genetics to Public Health, (2) Two 2-hour lectures per week. Prerequisite: consent of instructor. Basic principles of genetics and recent advances with their implications for public health programs. Mrs. Whissell-Buechy, Mr. Brazie (W)

227. International Maternal and Child Health, (2) One 2-hour lecture-discussion per week. Prerequisite: major in public health education or consent of instructor. Review of principles and practice of evaluation of programs and projects in the international and children's health care. Mr. Goldstein (Sp)

228. Programs and Services for Handicapped Children and Youth, (2) One 2-hour lecture per week. Organization, scope, funding, implementation, and evaluation of services for children and families within local and national levels. Miss Kohn, Miss Fraser (W)

229. Biochemical and Metabolic Aspects of Current Nutrition Problems, (2) Two 1-hour lectures per week. Prerequisite: major in public health education or consent of instructor. Development of nutrition surveys. Mr. Huenemann, Miss Peck, Mrs. Altman (F)

230. Community Health Care for Community and Children, (3) Formerly 229. One 2-hour lecture-discussion per week. Prerequisite: consent of instructor. Review of principles and practice of evaluation of programs and projects in the public and private sectors designed to provide health care for mothers and children. Miss Huenemann, Mr. Margen (W)

231. Communication Research Applicable to Educational Aspects of Public Health, (3) One 2-hour lecture-discussion per week. Prerequisite: major in public health education or consent of instructor. Communication theory and research and their implication for public health. Mrs. D'Onofrio (W), Miss Kohn (Sp)

232. Community Organization and Concepts Basic to the Change Process, (3) One 3-hour seminar per week. Prerequisite: major in public health education or consent of instructor. Exploration of social-psychological concepts and theories basic to the practice of public health; introduction to analysis of community organization process, theory, and research. Mrs. D'Onofrio (W), Miss Kohn (Sp)

233. Group Work Procedures in Health Education, (3) One 1-hour lecture, one 2-hour laboratory per week. Prerequisite: major in public health education or consent of instructor. Social and psychological factors which determine the effectiveness of group work in promoting public health activities. Mr. Holloway (W)

234A. Public Health Education: Programs, Planning and Evaluation, (2) One 2-hour seminar per week. Prerequisite: major in public health education or consent of instructor. Introduction to literature, theory, and current programs in health education. Mr. Grifiths (F, W, Sp)

234B. Public Health Education: Programs, Planning and Evaluation, (2) One 2-hour seminar plus one-half day of field visits per week. Prerequisite: major in public health education or consent of instructor. Planning of educational approaches to public health problems with emphasis on the formulation of objectives, methods, and evaluation techniques. Mr. Fisher (W, Sp)

234C. Selected Topics in Health Education, (2) One 1-hour lecture and one 1-hour discussion per week. Prerequisite: major in public health education or consent of instructor. Analysis and application of educational approaches in selected areas of public health. Miss Minkler (F), Mrs. D'Onofrio (W, Sp)

235. Advanced Study in Behavioral Sciences in Public Health, (3) One 2-hour lecture-discussion plus conference periods per week. Prerequisite: doctoral candidates in public health or related discipline, or consent of instructor. Analysis of theoretical, methodological, and techniques of behavioral science research, with special reference to public health. Mrs. Krutson, Mr. Brudov, Mr. Seiden, Mr. McEwan (F, W, Sp)

236. Current Developments in Public Health Nutrition, (3) Two 1 1/2-hour lecture-discussions per week. Either A or B may be taken independently. Current developments in the behavioral sciences as they relate to the solution of public health problems. Mrs. Huenemann, Mr. Seiden, 230A (W); 230B (Sp)

241. Current Developments in Public Health Nutrition, (3) Two 1 1/2-hour lecture-discussions per week. Either A or B may be taken independently. Current developments in the behavioral sciences as they relate to the solution of public health problems. Mrs. Huenemann, Mr. Seiden, 230A (W); 230B (Sp)

245. Biochemical Evaluation of Nutritional Status, (2) Two 1-hour lectures per week. Prerequisite: Nutrition 160A and B or equivalent, or consent of instructor. Evaluation of the biochemical methods presently used to assess the nutritional status of individuals and groups. Mr. Pesce (F, W, Sp)

249F. Quantitative Analysis for Health Facility Planning, (4) Two 2-hour lectures per week. Prerequisite: Bio Env 160A or equivalent. Application of statistical techniques to the problems of planning health service systems and facilities; introduction of selected quantitative techniques. Mr. Grifiths (F, W, Sp)

249G. The Patient as Consumer and Advocate, (3) One 2-hour lecture-discussion per week. Sociology of lay knowledge, substantive knowledge, compliance control and treatment modification; social relationships and the consultation; knowledge conflict; bargaining strategies and tactics; classification typologies; sick
role theory, health-based social movements, consumerism and institutional response. To be offered 1977 by Mr. Hayes-Baukemeier (Sp)

*294A. Interdisciplinary Study of Current Health Problems. (3) One 2-hour lecture per week plus conferences and individual study outside class (minimum of nine hours per week). Enrollment is limited to 15 graduate students in public health or related fields. Two-quarter sequence recommended. A study of the application of basic principles and processes of problem solving to current heart health issues with concurrent analysis of subjects appearing in the literature by small interdisciplinary student groups. 

Mr. H. Blum (W)

294B. Interdisciplinary Study of Current Health Problems—group Study. (3) Nine hours of group meetings per week. Prerequisite: course 294A or consent of instructor. Interdisciplinary student groups will apply problem solving methodology in a study of current health problems selected by each group under the guidance of resource faculty and the instructors. Oral and written reports are required. 

Mr. H. Blum (Sp)

294U. Dynamics of Health Teams. (2) One 2-hour lecture-discussion per week. Prerequisite: consent of instructor. The course examines the roles and education of various health professionals and their function on health teams. The process of team functioning and the implications of team functioning for the delivery of health services and utilization of health manpower are analyzed. 

Miss Morton, Miss Peck, Mr. Chang, Miss Fraser, Mrs. Adler (W, Sp)

294V. Health Behavior: Individual and Community. (3) Two 1-hour lectures and one 2-hour discussion per week. An introduction to man, culture and society, with implications for public health: the individual, family, group, communities. Life, dimensions of society and community, social behavior, process of and approaches to behavioral change. Mr. Knutson, Mr. Fisher (F); Mr. Romano-V (Sp)

*294W. Voluntary Health Agency Programs. (2) One 2-hour lecture, one 4-hour field observation per week. A study of administrative structure and functions of voluntary health agencies. Special emphasis on review and analysis of major programs. 

Mr. Weddle (Sp)

*294X. Issues in the School Health Program. (3) Two 1-hour lectures and two 1-hour seminars-discussions per week. Prerequisite: graduate standing in the School of Public Health or the School of Education and consent of instructor. Course may be repeated for credit. This course focuses on in-depth investigation of problems, trends, and issues in school health programs and health of the school age child. It covers the major areas of administration, research, instruction, services, and ecology in school health.

Miss Peck, Mr. Weddle (W, Sp)

294Y. Family Planning. (2) One 2-hour lecture per week plus conference periods. Analysis of selected world programs and research in family planning. 

Mr. Fisher, Mr. Minkler, Mr. Knutson (F)

Biological aspects of family planning and physiology of conception. Mr. Minkler (W)

Community approach and analysis of educational aspects of family planning programs. Miss Minkler (Sp)

294Z. Problems and Programs in Mental Health. (3) One 3-hour lecture-discussion per week. Consideration of the nature and extent of mental illness and current concepts of prevention and treatment through community programs. 

295. Seminars. (1-4) The Staff (F, W, Sp)

296. Special Study. (1-8) Designed to permit any qualified graduate student to pursue special study under the direction of a faculty member.

The Staff (F, W, Sp)

298. Group Study. (1-8) The Staff (F, W, Sp)

299. Individual Research. (1-8) The Staff (F, W, Sp)

601. Individual Study for Master's Students. (1-8) Individual study for the comprehensive or language requirements in consultation with the field advisor. Units may not be used to meet either unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (F, W, Sp)

602. Individual Study for Doctoral Students. (1-8) Individual study in consultation with the major field advisor. Provides an opportunity for doctoral students to prepare themselves for the various examinations required of candidates for the Ph.D. (and other doctoral degrees). May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (F, W, Sp)

603. Individual Study for Master's Students. (1-8) Individual study for the comprehensive or language requirements in consultation with the field advisor. Units may not be used to meet either unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis. 

The Staff (F, W, Sp)

604. Individual Study for Doctoral Students. (1-8) Individual study in consultation with the major field advisor. Provides an opportunity for doctoral students to prepare themselves for the various examinations required of candidates for the Ph.D. (and other doctoral degrees). May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. 

The Staff (F, W, Sp)

605. Individual Study for Master's Students. (1-8) Individual study for the comprehensive or language requirements in consultation with the field advisor. Units may not be used to meet either unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis. 

The Staff (F, W, Sp)

606. Individual Study for Doctoral Students. (1-8) Individual study in consultation with the major field advisor. Provides an opportunity for doctoral students to prepare themselves for the various examinations required of candidates for the Ph.D. (and other doctoral degrees). May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. 

The Staff (F, W, Sp)

607. Individual Study for Master's Students. (1-8) Individual study for the comprehensive or language requirements in consultation with the field advisor. Units may not be used to meet either unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis. 

The Staff (F, W, Sp)

608. Individual Study for Doctoral Students. (1-8) Individual study in consultation with the major field advisor. Provides an opportunity for doctoral students to prepare themselves for the various examinations required of candidates for the Ph.D. (and other doctoral degrees). May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. 

The Staff (F, W, Sp)

609. Individual Study for Master's Students. (1-8) Individual study for the comprehensive or language requirements in consultation with the field advisor. Units may not be used to meet either unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis. 

The Staff (F, W, Sp)

610. Individual Study for Master's Students. (1-8) Individual study for the comprehensive or language requirements in consultation with the field advisor. Units may not be used to meet either unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis. 

The Staff (F, W, Sp)

611. Individual Study for Doctoral Students. (1-8) Individual study in consultation with the major field advisor. Provides an opportunity for doctoral students to prepare themselves for the various examinations required of candidates for the Ph.D. (and other doctoral degrees). May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. 

The Staff (F, W, Sp)

612. Individual Study for Doctoral Students. (1-8) Individual study in consultation with the major field advisor. Provides an opportunity for doctoral students to prepare themselves for the various examinations required of candidates for the Ph.D. (and other doctoral degrees). May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. 

The Staff (F, W, Sp)
185. An Introduction to the Politics of Policy Ad- 
vancing. (6) Four hours of lecture per week. Starting 
with an overview of policy-making processes in the United 
States, this lecture introduces the types of analyses, 
procedures, participants, and decisions that occur at the 
locally, state, and national levels. Emphasis is provided 
to whom, the conditions under which it is accepted 
or rejected and the political and bureaucratic environ-
ments in which it is conducted. Mr. Bartsch (F).

186. Population and Public Policy. (5) Two 2-hour 
sessions per week. A general introduction to current 
population analysis: population growth, "over-
population", and the effects of population changes 
including increasing life expectancy, decreasing 
carbon footprints, and increased productivity. Emphasis 
will be placed on understanding how demographic 
changes affect the economic, social, and political 
environments and the policy decisions made. Mr. Bartsch 
(F).

187. Legal Processes and Public Policy. Two 2-hour 
sessions per week. Prerequisite: consent of instructor. 
May be taken as first quarter of a sequence with course 271. 
Open to both graduates and undergraduates. This course 
examines the interactions, the decisions between judge-
made law and law made by legislatures, administrative agen-
cies, and other courts, and the implications of this 
mode of decision-making. Stresses analytical skills 
appropriate for policy analysis and law. Mr. Kirp (F).

188. Poverty and Welfare Reform. (6) Three hours 
of lecture per week. This course deals with poverty 
and the politics of poverty in America from the 
19th Century to the present. Emphasis is placed on 
the dynamics of poverty, welfare, and the political 
processes involved in addressing these issues. Mr. 
Bursik (F, W, Sp).

189. Policy Issues in Communication. (5) Four 
hours of lecture per week. An examination of 
communication, the role of the mass media, and the 
impact of the human species on communication. 
Focusing on information processing capacity, 
interpersonal and mass media behavior, and their 
implications for communication policy decisions. 
Current policy issues, especially relating to new tech-
nologies, will be examined. Mr. Tannenbaum (W).

190. Directed Group Study. (1-6) Meetings to be 
arranged with the instructor. Group study of a selected 
topic or topics in Public Policy. The Staff (F, W, Sp).

191. Supervised Independent Study and Re-
search. (1-5) Prerequisite: upper division standing. 
Open to qualified upper division students wishing to 
pursue special study and research under the direction 
of a member of the faculty. May be taken as a component 
of a Directed Group Study. This course explores the 
limits and potential of the independent study option. 
Prerequisites listed on page 34. Must be taken on a 
pass/not pass basis. The Staff (F, W, Sp).

GRADUATE COURSES

The following courses are open only to students en-
rolled in the Graduate School of Public Policy.

200A-200B-200C. Introduction to Policy Analy-
sis. (4-4-4) Two hours of lecture and three hours of 
sectional study per week. Prerequisite: consent of in-
structor. This introductory course will present the 
social science discipline and apply these perspec-
tives to problems of public policy. Throughout the 
course, students will develop knowledge of economics, 
social sciences, and quantitative methods in the 
analysis of complex problems. Credit and grade will 
be assigned on completion of the course. Mr. Levy, Mr. 
Bartsch (F, W, Sp).

205A-205B-205C. Advanced Policy Analysis. (4-
4-4) Three hours of lecture per week. Prerequisite: 
open only to members of the Graduate Program in 
Public Affairs. This course will present the core 
concepts and approaches, and perspectives studied in 
the Core Curriculum. Credit and grade will be assigned on 
completion of the course. The Staff (F, W, Sp).

210A-210B. The Economics of Public Policy 
Analysis. (4-4) Three hours of lecture per week. 
Credit and grade will be assigned upon completion 
of the sequence. The course will discuss the 
behavior of economists, producers, consumers, and 
bureaucrats and applied to specific policy areas. Students 
will develop an understanding of the implications of 
economic policies including market failures, market 
structure, and the role of government in the economy.

220. Law and Public Policy. (4) Two 1 1/2-hour 

sessions per week. Prerequisite: open only to students 
enrolled in the Graduate School of Public Policy. Fo-
cuses on legal aspects of public policy by exposing 
students to cases and concepts in constitutional, 
administrative and regulatory law. Emphasis is given 
to understanding how legal principles shape the 
decisions and legislative and administrative regulations. 
Skills of interpretation and legal draftingmanship are 
developed. Emphasis is placed on understanding 
how agencies, both administrative and judicial, 
and between law and policy are explored through case-
centered studies. Mr. Kirp (F).

230A-230B-230C. Political and Organizational 
Institutions. Three 2-hour sessions per week. 
Prerequisite: consent of instructor. This course will 
examine the political and economic institutions 
that govern the design and implementation of new 
policies, choosing among alternatives, gaining accept-
ance, assuring implementation, and coping with unan-
ticipated consequences. Through case studies, 
topical, empirical, and interpretive works 
are studied. Credit and grade will be assigned 
upon completion of the full sequence. Mr. McQuraire (F, W, Sp).

240A-240B. Decision Analysis, Modeling and 
Quantitative Methods in Policy Analysis. (4-4) 
Two 2-hour sessions per week. Prerequisite: consent of 
instructor. An integrated course on the use of modeling 
in policy analysis. Policy studies employ linear and 
on-linear, static and sequential, and deterministic and 
non-deterministic models. Increasingly complex 
approaches are emphasized. Credit and grade will be 
awarded upon completion of the full sequence.

244A-244B. Research Methods in Public Policy 
Analysis. (4) Three hours of lecture per week. 
Prerequisite: permission of instructor. Examination of 
various methodologies in designing, con- 
ducting, and interpreting public policy studies; 
emphasis on techniques for program evaluation, including 
methodologies for analyzing qualitative data 
and (or quasi-experimental designs) and non-quantitative 
procedures (e.g., legalistic analysis); uses and abuses 
of social research in policy formation. Ms. Blake (F).

251. Approaches to Policy Design. (4) Two 
hours of lecture per week. Successful policy design 
depends on the quality of models we use to interpret 
the origins and dynamics of social pathologies. This 
course surveys analytical and historical approaches 
to producing such models and suggests ways to 
prove the process. Mr. Bartsch (W).

252. The Politics of Policy Advancing. (5) Four 
hours of lecture per week. An examination of the political 
environment surrounding policy advising and the appli-
cation of various tools for policy making. By 
exploring the interactions of clients and advisors, engi-
neers, planners, policy analysts, and other profession-
als it will be easier for students to use the political 
lictiveness of their advice. Mr. McQuraire (W).

253A-253B. Methods of Policy Evaluation. (4-
4) Three hours of seminar and one hour of conference per 
week. Prerequisite: consent of instructor. This 
course will consider a range of available and potential models 
for evaluation of alternative policies for dealing with 
temporary and permanent issues. Open to graduate students 
with a specific policy interest. The Staff (F, W, Sp).

255A-255B. Advanced Quantitative Models in 
Policy Analysis. (4) Three hours of lecture per week. 
Prerequisite: Economics 100A and Statistics 2 or equiva-
tent. Open to students who have received credit for 
courses 188 prior to fall 1975. Summarizes the dimen-
sions of uncertainty and change. Open to graduate 
students with a specific policy interest. Mr. Friedman (F, W).

265A-265B. Seminar in Human Fertility and 
Family Planning. (4) Three hours of seminar per week. 
Prerequisite: consent of instructor. A series of courses 
open to qualified graduate students wishing to pursue 
their interests in fertility and family planning. Mr. 
Bartsch (F, W).

266A-266B. Seminar in Human Fertility and 
Public Policy. (4) Three hours of lecture per week. 
Prerequisite: consent of instructor. 266A is not pre-
 requisite to 266B. Measurement techniques applied to 
the determination of levels, trends, and differences in 
fertility. Implicit and explicit policy influences on fertility. 
Effects of fertility changes on population growth and 
structure. Fertility programs here and abroad, voluntari-
ism versus coercion. Ms. Blake (W).

271. Law and Social Change. (4) Formerly 271A-
271B. Three hours of lecture per week. Prerequisite: 
law. 271A is prerequisite to 271B and 271B prerequisite 
to 271C. A study of the role of the law in social change 
and its implications for the law in the future. Mr. 
Bartsch (W).

271D-271E. Seminar in Public Policy and the 
Law. (4-4) Three hours of lecture per week. Prerequisite: 
consent of instructor. 271D is prerequisite to 271E and 271E 
 prerequisite to 271F. Credit and grade will be awarded 
for course completion. Mr. McQuraire (W).

280A-280B-280C. Strategies for Emerging Pub-
lic Policy Issues. (4-4-4) Three hours of lecture per week. 
Prerequisite: consent of instructor. A series of courses 
will examine different policy issues. Origins of the issues, 
alternative policy strategies, and feasibility estimates will 
be analyzed. Critical aspects of implementing the 
chosen policy strategies will be covered. Mr. Bartsch (W).

292. Directed Advanced Study. (1-12) 
Prerequisite: consent of instructor and graduate advisor. 
Open to qualified graduate students wishing to pursue
School of Social Welfare Office, 120 Haviland Hall

Professors:
- Milton Chenin, Ph.D. (Dean)
- Ralph M. Kramer, D.S.W.
- David McEntire, Ph.D.
- Henry Miller, D.S.W.
- Harry Smith, Ph.D.
- Kermit T. Wiltsie, D.S.W.
- Martin Welins, D.S.W.
- Ruth White, D.S.W.
- Walter Friedlander, Ph.D. (Emeritus)

Assistant Professors:
- Andrew Curry, M.S.S.A.
- Charlotte Hinn, M.S.W.
- Barbara Weiss, M.S.W.

Lecturers:
- Robert C. Jackson, M.S.W.
- Mary Jelfress, M.S.W.
- David Averbuck, J.D.

Field Work Consultants:
- Robert D. Jackson, M.S.W.
- Doris Britt, M.S.W.
- Dorothy Turner, M.S.W.
- Mary Jeffress, M.S.W.

Graduate Program

The School of Social Welfare is a graduate professional school which offers:

1. A program of study which leads to the degree of Doctor of Social Welfare and which prepares students for careers in teaching, research, policy development and administration in the field of social welfare and in the profession of social work. It is open to applicants who already have completed the master's degree in an accredited school of social work and who give evidence of intellectual and other qualifications essential to successful doctoral study.

Also offered is a combined program of master's-doctoral studies which begins in the first graduate year, leads to both Master of Social Welfare and Doctor of Social Welfare degrees, and prepares for the same careers. Applicants must possess the ability to successfully complete doctoral study and must have undergone preparatory training as outlined below.

2. A two-year program of studies for the Master of Social Welfare degree in preparation for the professional practice of social workers. Applicants must have completed the group major in social welfare in the College of Letters and Science, or an equivalent major, or undergraduate study in other social and behavioral sciences judged by the faculty as adequate preparation for graduate study in the School.

3. An advanced post-master's School Social Work Internship program which allows a limited number of graduate social workers to qualify for the California Pupil Personnel Services Credential. This program may be completed in two quarters of full-time attendance or in three quarters of part-time attendance by special arrangement.

A program offered jointly by the School of Public Health and the School of Social Welfare provides persons with a master's degree in social work with a base for practice in administrative, research, and consultative positions in community health and medical care settings. Additional information about this program may be obtained by writing to the Public Health Social Work Program, School of Public Health.

Applications for admission to any of these programs is on a first-come/first-served basis. Number of units and prerequisite courses completed are considered for admission.

Major Requirements

Lower Division. Psychology 1, Sociology 1A, and Statistics 2. Recommended: Anthropology 3, Economics 5-5-4. See Interdepartmental Studies for the complete description of this course.

*Law 237. Education Policy and Law. See Law for the complete description of this course.

*Political Science 265A-265B. Budgeting in Historical and Comparative Perspective. See Political Science for complete description of this course.

Graduate Program

The School of Social Welfare offers a program of study in social welfare leading to the degree of Bachelor of Arts in the College of Letters and Science, offers a social welfare sequence of general interest to liberal arts students. It provides students with an opportunity to test their career interest in social work prior to pursuing graduate professional education and prepares them for community service positions beginning directly upon graduation with the bachelor's degree. Applications are considered in Fall only, on a first-come-first served basis. Number of units and prerequisite courses completed are considered for admission.

Student Internship and Practicum Program

The Department of Social Welfare administers an undergraduate group major in social welfare in the College of Letters and Science.

For further information, consult the Announcement of the School of Social Welfare, available from the School Office, 120 Haviland Hall.
231. Law and Social Welfare. (2) One 1 1/2-hour session per week. Legal information for social workers with emphasis on family law. Mr. Averbuck (W).

222A–222B. Social Welfare Policy in Community Mental Health. (2-2-2) One 1 1/2-hour session per week. Prerequisite: graduate standing.

222B. Issues in Mental Health and Social Policy. Major factors influencing the provision of mental health services to individuals, families and communities. Implications of different help oriented models for mental health intervention programs; reciprocal relationships between mental health policy and social work practice.

226. Designing Solutions to Mental Health Problems. How mental health problems are defined; how optimum solutions to such problems are achieved; new directions in the roles of community mental health social workers. Mr. Segal (F).

230. Social Welfare Programs and Policies. (2) One 1 1/2-hour seminar per week. Graduate standing. Intensive study of particular program areas such as child welfare, corrections, family welfare, housing, higher education, mental retardation, rehabilitation, school social work, etc. Topics will be announced annually.

231. Poverty as a Social Welfare Problem. (2) One 1 1/2-hour session per week. Prerequisite: graduate standing. The distribution and changing map of poverty in the United States; alternative ways to influence the definition of poverty; analysis of various welfare programs that reflect one or more of these alternative definitions.

232. Comparative Welfare Institutions and Social Welfare Practice. (2 or 3) One 2- or 3-hour session per week. Comparative analysis of welfare policies and provisions in selected countries relative to ideological context. Countries or regions of the world will be determined in advance each term; the course is offered.

234. The "Benevolent Asylum" and Social Welfare. (2) One 1 1/2-hour session per week and one consultation hour per week. Theory and data on asylums in the U.S., England, Austria, Poland, Israel, Yugoslavia, and other countries. Primarily directed toward research, but clinical and administrative implications will also be discussed.

235. The Voluntary Agency and the Human Services Professional. (2) One 1 1/2-hour session per week. Analysis of organizational characteristics of different types of voluntary social welfare agencies. Possibilities and constraints on their effectiveness in terms of social change and citizen participation. Professional training in planning, research, development and administration.

239A–239B–239C. Seminars in Social Welfare Administration and Policy. (3-3-3) Two seminar hours and one consultation hour per week. For social work students at the doctoral level. Mr. Wollins (F).

243. Theory of Organization and Administration. (3-3) Two seminar hours and one consultation hour per week. Social welfare theory; organization and planning in selected fields of social work. Mr. Wollins (F).

249A–249B–249C. Theory and Practice of Social Welfare. (3-3) Two seminar hours and one consultation hour per week. Prerequisite: admission to the predoctoral program or consent of instructor. Analysis of the historical, philosophical and methodological foundations of social work practice with individuals, groups, organizations, and communities.

250. Advanced Social Casework. (2) One 1 1/2-hour session per week. Prerequisite: course 240A–240B–240C or consent of instructor. Specific and generic components of social casework in different fields of practice, including corrections, family and child welfare, medical, psychiatric, public welfare, and school social work.

251. Specialized Methods of Social Work Practice. (2) One 1 1/2-hour session per week. Prerequisite: course 240A–240B–240C or consent of instructor. Advanced study of the concepts and theory underlying social work practice; application in a variety of settings.

252A–252B. Advanced Social Group Work. (2–2) One 1 1/2-hour session per week. Prerequisite: course 241A–241B–241C or consent of instructor. Advanced analysis of social group work theory and practice; application in a variety of settings.

254A–254B. Social Welfare Administration. (2) One 1 1/2-hour session per week. Prerequisite: course 242A–242B–242C or consent of instructor. Analysis of the conceptual and administrative bases of public assistance, social insurance, and community mental health programs.

255A–255B–255C. Advanced Social Organization and Policy. (2–2–2) Two 1 1/2-hour sessions per week. Prerequisite: admission to the predoctoral program or consent of instructor. Advanced study of the concepts and theory underlying social work policy and administration, with particular emphasis on social welfare agencies as social change agents; contributions to public health and medical care programs. Analysis of the issues affecting the design and implementation of social welfare services in selected settings. Emphasis is given to skills in training, consultation, program planning and evaluation.

256A–256B. Social Casework and Community Organizations. (2–2) Two 1 1/2-hour sessions per week. Prerequisite: admission to the predoctoral program or consent of instructor. Analysis of the conceptual and administrative bases of public assistance, social insurance, and community mental health programs.

257. The Good Bureaucrat. (2) One 1 1/2-hour session per week. Prerequisite: graduate standing. Analysis of the problems and opportunities facing the professional service giver in a bureaucracy. The main question is, "How can the professional manager design and implement services of the bureaucracy that are better than the professional service giver in a bureaucracy?"

260. Methods of Supervision in Social Work. (2) One 1 1/2-hour session per week. Prerequisite: consent of instructor. Theories and concepts of supervision. Mrs. Jackson (F).

261. Seminar. (2) Two 1 1/2-hour sessions per week. Analysis of selected issues in social work.
practice; 258B, analysis of selected social problems in the light of theory in social work and the social and behavioral sciences; 259C, theories of change and their implications for social work practice.

289. An Introduction to the Profession of Social Work. (2) One and 1/2 hours of lecture per week. Study of the material relating to the origins, values, achievements, and problems of the profession of social work. The focus is on the profession of social work rather than the institution of social welfare.

Mr. Miller (F)

278A—278B—278C. Seminars in History and Philosophy of Social Welfare. (3—3—3) Two seminar hours and one consultation hour per week. Primarily for doctoral students. Sequence 278A-278B-278C, survey of historical thinking about the development of the social services; 278B, selected problems in historical research; 278C, study of political and ethical theories that bear on the development of the social services. Credit and grade for the A and B portion of the sequence will be assigned upon completion of the B portion.

Mr. Leiby (W, Sp)

262A—282B—282C. Social Welfare Research Theory and Practice. (2—2—2) At least one 1/2-hour session per week in lecture and/or laboratory. Primarily for graduate students. A three-quarter research sequence designed to introduce students to the logic, methods, and techniques of research in social welfare and give them some experience in their application to research problems. Credit and grade will be assigned upon completion of the sequence in even-numbered sections or completion of each quarter's work in odd-numbered sections. The Staff (F, W, Sp)

286. Policy Analysis and Research in Social Welfare. (3) Two seminar hours and individual meetings with faculty. Primarily for M.S.W. students. A three-quarter research sequence designed to introduce students to the logic, methods, and techniques of research in social welfare and give them some experience in their application to research problems. The course provides an overview of the policy making process in social welfare. Research requirements and the utilization of existing knowledge for policy formation. The role of methodology and research in policy making.


Mr. Leiby (F)

288. Report Writing and Editing. (1—2) One or two seminar hours per week, depending upon units, and individual meetings with faculty. Primarily for doctoral students. Supervised practical experience in planning, writing, editing, and revising reports, articles, or student papers. Attention to formal organization, style, selection of media of publication, and preparation of manuscripts. Graded on a Satisfactory/Unsatisfactory basis.

Mr. Leiby (W)

289A—289B—289C. Research Methods and Techniques in Social Welfare. (3—4—4) 289A—289B—289C, three hours of lecture and one and one-half hours of laboratory per week. 289D, two hours of lecture and three hours of discussion. Primarily for doctoral students.

289A. Introduction to probability theory, the logic of social research, and basic statistics. Mr. Boyd (F)

289B. Continuation and expansion of the logic of social research. Topics include rationale and procedure of research design, hypothesis testing, measurement and data analysis. Mr. Boyd (W)

289C. Introduction to the general linear model and its application to social research problems.

Miss Gambrell, Mr. Segal (Sp)

289D. Workshop in applied research and statistics with special reference to social welfare. Mr. Boyd (F)

289E. Individual Study for Graduate Students. (1—9) Designated to permit any qualified graduate student, with the permission of the faculty, to pursue special study in a subject of his own choosing under the direction of a faculty member.

The Staff (Mr. Chernin in charge) (F, W, Sp)

289F. Group Study for Graduate Students. (1—9) Mr. Chernin in charge (F, W, Sp)

289G. Individual Research for Graduate Students. (1—8) Designated to permit any qualified graduate student to pursue research in a subject of his own choosing under the direction of a faculty member.

The Staff (Mr. Chernin in charge) (F, W, Sp)

PROFESSIONAL COURSES

401. Field instruction. (2—14) Four units of credit per quarter for two days in the field; variable units for block placement. First-year requirement: 12 units spread over three quarters. Second year: 14 to 18 units spread over one, two or three quarters. Supervised practice in social agencies. Graded on a passed/not passed basis.

The Staff (F, W, Sp)

402. Laboratory in Social Work Practice and Social Welfare Agencies. (1—2) One-half or full day per week. Introduces the student to the range of professional roles and services in social service through a series of visits, interviews, observations, and participation in meetings. Designed to correspond to student's program concentration. Graded on a passed/not passed basis.

Mrs. Brit, Mrs. O'Day, Ms. Weiss (F, W, Sp)

602. Individual Study for Doctoral Students. (1—8) Individual study in consultation with the major field advisor. Selected to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the D.S.W. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (Mr. Chernin in charge) (F, W, Sp)

IDS 175. A Nontechnical Introduction to Operations Research. (4) See Interdepartmental Studies for the complete description of this course.

IDS 190A—190B—190C. Principles and Applications of Psychoanalysis. (3—3—3) See Interdepartmental Studies for the complete description of this course.

IDS 220. Ethical Perspectives on Health Issues: Bioethics. (3) See Interdepartmental Studies for the complete description of this course.

IDS 232A—232B—232C. Interdisciplinary Courses for Key Personnel in Day Care. (2—2—2) See Interdepartmental Studies for the complete description of this course.

IDS 232L—232M—232N. Laboratory in Day Care. (1—3, 1—3, 1—3) See Interdepartmental Studies for the complete description of this course.

SPECIAL PROGRAMS

College Seminar Program

College Seminar Program Office, Building T-9

Lecturers:

Gloria L. Bowles, Ph.D.
Robert P. Starm, Ph.D.
Mary Luckey, Ph.D.

The College Seminar Program is an experimental, limited-enrollment program administered by the Council for Educational Development. It has many aspects of a lower-division "collegue," with its own students and faculty. The curriculum is based on small seminars of the problem-oriented, inter-disciplinary type, with heavy emphasis on individual and group investigation. Students follow one seminar for two quarters intensively (at least 2:3 time). Using both curricular and extra-curricular means, the program attempts, over a two-year period, to introduce the student to a broad variety of major disciplines and cultural resources of the University. It is housed in an on-campus non-residential center providing a collegial atmosphere. For seminars offered by the program, consult the listings under "Interdepartmental Studies." For information on curriculum and admission, apply to the Program Office, Building T-9, Room 116.

Energy and Resources Program

(Interdisciplinary Advisory Program and Graduate Group)

Office and Reading Room: Room 100, Bldg. T-4, ext. 2-1840

Administered by the Campus Energy and Resources Committee, Professor A. J. Lichtenberg, Chairman; Professor R. Buxbaum, Associate Chairman; Associate Professor: Dr. R. H. Holder, Ph.D.

This campus-wide program offers graduate degrees in Energy and Resources, undergraduate and graduate interdisciplinary courses in the broad area of energy and resources and the uses, impacts, and information about other energy-related degrees, course programs, and research activities throughout the Berkeley campus. The Energy and Resources Committee which coordinates these efforts, consists of some forty faculty members from many departments, one faculty member attached full-time to the Program, and representatives of the Lawrence Berkeley and Livermore Laboratories.

The degrees of M.S. and M.A. in Energy and Resources require 60 units of study, to include 24 units in a single energy-related discipline, 18 units in a complementary field, and a 6 unit research project. For details about the Ph.D. degree, consult the Energy and Resources Program office.

LOWER DIVISION INTERDISCIPLINARY COURSE

Energy and Society (IDS 60). (3) Three hours of lecture per week. Prerequisite: none; not acceptable as a technical elective in engineering. Energy sources, uses, and impacts: an introduction to the technology, politics, economics and environmental effects of energy in contemporary society. Energy and well-being, energy in international perspective, origins and character of the energy crisis.

Energy and Resources: Mr. Holdren (W)

UPPER DIVISION INTERDISCIPLINARY COURSES

Quantitative Aspects of Global Environmental Problems (Environmental Studies 102). (4) Three hours of lecture and one hour of discussion per week. Prerequisite: Physics 4D or 5D; or Physics 6C plus Biology 150: consent of instructor. Translation and fate of terrestrial pollutants, and the pollution sources and fate of petroleum in the oceans, impact of human activities on climate, measures of complexity and stability in lightly exploited and intensively exploited ecological systems. Energy and Resources: Mr. Harte (F)

Energy and Power (Engineering 160). (4) Four hours of lecture per week. Prerequisite: upper division status in Engineering or Letters and Science: Physics 5B: Mathematics 1A–1B. Sources, conversion, transmission, and requirements for energy in human society.

NOTE: For key to symbols, see page 34.
Group Major in Ethnic Studies

The Group Major in Ethnic Studies, leading to a Bachelor of Arts degree, represents the joint commitment of the Asian American Studies Program, the Chicano Studies Program, and the American Indian Studies Program to provide a core curriculum whose educational objectives are as follows:

1. Development of a sensitivity and commitment in students to the understanding of the situations affecting Asian American, Chicano, and Native American people and their communities.
2. Development of a methodology emphasizing comparative analysis of the historical and contemporary positions of Third World peoples.
3. Development of research capabilities in students that will allow them to compile information and analyze it from a Third World perspective.
4. Development of expertise in areas that will allow students to pursue professional training so that they may provide services to Third World communities and effect positive social change.

COURSES IN ETHNIC STUDIES

20. Introduction to Ethnic Studies. (5) Five hours of lecture per week. Prerequisite: none. The University, its relationship to corporate structures, legislative bodies, community people, and specifically Third World people will be analyzed. The University's values will be critically examined. Ethnic Studies programs in this country, their development and struggles will be discussed. Ethnic Studies as a legitimate field for scholarly endeavor will be studied. To be offered 1976-77 only. The Staff (Chairperson in Charge) (F)

21. A Comparative Survey of Third World Experiences in the United States: An Introduction. (5) Three and one-half hours of lecture and one and one-half hours of discussion per week. Prerequisite: none. A comparative analysis of the political, social, economic, and cultural status of Third World people in the United States. Terry Wilson (W)

100. Third World Literature. (5) Prerequisite: none. A comparative analysis of the political, social, economic, and cultural status of Third World people in the United States. Terry Wilson (W)

141. Third World Politics. (5) Prerequisites: Ethnic Studies 130 or 131. Chicano Studies 60, 100, 165, 186, or 187: any Social Science Introductory course on political, social change and political action. The political groups in the United States and American political institutions. Focus on the effects of political institutions at federal, state and local levels on Third World people. Understanding of political ideologies, values, and structures of political institutions. Carlos Munoz (F)

146. The Effects of Racism on Child Development. (6) Three and one-half hours of seminar of Traditional indigenous peoples. Prerequisite: consent of instructor. This course will explore the effects of racism on Third World Children. Included will be direct effects of racism on individual growth and personality development. Also considered will be the indirect effects via institutional racism in schools and government agencies. Ann Metcalf (Sp)

147. Third World Women. (5) Prerequisite: consent of instructor. An examination of the contributions of Third World women in various fields: literature, art, politics, history, philosophy, and economics. An analysis of the roles of Third World women within the Familia as an institution will also be made. To be offered 1976-77 only. Clara Sue Kidwell (Sp)

152. Analysis and Assessment of Bilingual-Bicultural Education Programs in the United States, California. (5) Four and one-half hours of seminar per week. Prerequisite: consent of instructor. Analysis and assessment of bilingual-bicultural education programs from a Third World perspective. Topic will vary from quarter to quarter. May be repeated for credit. To be offered 1977-78 only. The Staff (Chairperson in Charge) (F)

*190. Advanced Seminar in Third World Studies. (5) Four hours of seminar per week. Prerequisite: Ethnic Studies 141 or consent of the instructor. Advanced seminar in Third World Studies with topics to be announced at the beginning of each quarter. May be repeated for credit. The Staff (Chairperson in Charge) (F, W, Sp)

197. Field Work in Third World Communities. (1-5) Individual conferences to be arranged. Prerequisite: upper division standing and consent of instructor. Supervised experiences relevant to specific aspects of Third World Communities in off-campus settings. Regular individual meetings with faculty sponsor and written report required. The Staff (Chairperson in Charge) (F, W, Sp)

198. Supervised Group Study. (1-5) Individual conferences to be arranged. Prerequisite: upper division standing and consent of instructor. Advanced seminar in Third World Communities with topics to be arranged at the beginning of each quarter. May be repeated for credit. The Staff (Chairperson in Charge) (F, W, Sp)

199. Supervised Individual Study and Research. (1-5) Individual conferences to be arranged. Prerequisite: upper division standing and consent of instructor. The individual student with consent and guidance of an instructor seeks research interests not covered in courses offered by Ethnic Studies. Must be taken Pass/Not Pass only. The Staff (Chairperson in Charge) (F, W, Sp)

Asian American Studies Program

Program Office, 3407 Dwinelle Hall

Associate Professor: Ronald Takaki (Chairperson)

Assistant Professors: Sucheng Chan

E. H. Kim

Assistant Professor: Patricia Agnes Chan (Acting)

Lecturers:Glass Sung

Ling-chi Wang (Coordinator)

Majhyn Wong

234 / SPECIAL PROGRAMS: Ethnic Studies
UNDERGRADUATE PROGRAM

The Asian American Studies Program offers a unified and comprehensive undergraduate curriculum which seeks to make at least three major contributions. First, it prepares students for positions of service and leadership in American society by offering courses in which students learn to analyze the experiences of the Chinese-American community and its influence on the Chinese Americans. To be offered 1976-77 (5-5) Formerly 51A-51B-51C. Community Filipino. (5-5) Three hours of lecture and two hours of language lab per week. Emphasis on the study of the political, social, and economic structure, regulations of Federal Communication Commission will limit the literature most commonly used in Filipino and Filipino American communities. The course will attempt to analyze the roles and institutional structures of education, health, law, social welfare, and community relations of Bay Area television and radio stations. Prerequisite: consent of the instructor. A survey of the various legal institutions as they affect Asian American communities. May be taken concurrently with 197. S. Chan

138. Twentieth Century Asian Political Thought. (5) Three hours of lecture and two hours of discussion. Prerequisite: consent of the instructor. A comparison of the influence of historical political ideologies and figures in Asia. How these ideologies affect the political attitudes and behavior in Asian Americans in the United States. To be offered 1976-77 (5-5) Formerly 132A-132B-132C. Community Piliplno. (5-5) Formerly 132A-132B-132C. Community Piliplno. (5-5) Three hours of lecture and two hours of discussion per week. Prerequisite: course 20 or consent of instructor. A comparison of the influence of historical political ideologies and figures in Asia. How these ideologies affect the political attitudes and behavior in Asian Americans in the United States. To be offered 1976-77. S. Chan

140A. Analysis and Research in the Asian American Community. (5) Formerly 131 and 137. Four and one-half hours of lecture per week. Prerequisite: course 20 or consent of instructor. Emphasis on the study of various legal institutions as they affect Asian American communities. May be taken concurrently with 197. S. Chan

140B: analysis of Asian American communities to its relationship in the development of American society and culture. May be taken with 197. S. Chan

141A. Social Institutions in the Asian American Communities. Three hours of lecture and one hour of discussion per week. Prerequisite: course 20 or consent of instructor. A comparison of the influence of historical political ideologies and figures in Asia. How these ideologies affect the political attitudes and behavior in Asian Americans in the United States. To be offered 1976-77. S. Chan

144. Comparative Historical Analysis. Undergraduate requirement in Reading and Composition, (2) proficiency in an Asian American language, such as Cantonese, Japanese, or Tagalog: and (3) American Studies 20.

For more detailed information about the Asian American Studies Program major, consult the Program Adviser in the Program Office, 3407 Dwainite Hall.

LOWER DIVISION COURSES

6A. Basic Reading and Composition. (5) Formerly 3A. Four hours of lecture and 1 hour of discussion per week. A reading and composition course examining the selected literary, socio-political, and historical works related to the Asian American experience. Students will read, discuss, and write about such topics as Asian American culture and values, racism, the form and function of the American ethnic community. The course will be offered 1976-77. E.H. Kim in charge

6B. Ethnic American Reading and Composition. (5) Four hours of lecture and 1 hour of discussion per week. Prerequisite: Completion of Subject A or its equivalent. An introductory course in the selected third world literary works. Readings from every genre will be examined as an art and as a cultural, political, and historical, political statement. The significance of the Third World writings to Asian American and other Third World minorities will be discussed, and the special problems and challenges facing Third World writers will be examined in depth and detail. E.H. Kim in charge

12A-12B-12C. Community Cantonese. (5-5-5) Formerly 12A-12B-12C. Community Cantonese. (5-5-5) Three hours of lecture and two hours of discussion per week. Prerequisite: Consent of instructor. Emphasis on the development of conversational and written skills in the language most commonly used in Japanese American communities. Includes an examination of historical, social and cultural aspects of the Japanese American community, as well as the influence of this community on the Japanese Americans. To be offered 1976-77 (5-5) Formerly 52A-52B-52C. Five hours of recitation and 2 hours of language lab per week. Emphasis on the development of conversational and written skills in the language most commonly used in Piliplno and Piliplno American communities. Includes an examination of the historical, social and cultural aspects of the Piliplno and Piliplno American communities and their influence on the Piliplno and Piliplno Americans. To be offered 1976-77. C. Rebenno

20A-20B. Introduction to the Asian American Experience. (5-5) Formerly 20 and 40. Three hours of lecture and 2 hours of discussion per week. 20A: Satisfies the Asian American requirement in the General Education Program. The comparative analysis of the Asian American experience from 1848 to present. Topics include an analysis of the Asian American experience; the social, cultural, and political aspects of the Asian American experience; the development of the Asian American communities and their relationship to the larger American society. Course employs race and class analysis.

L. Wang (F)

121A-121B. Chinese American. History. (5-5) Three hours of lecture and two hours of discussion per week. Each course satisfies the American History requirement. Prerequisite: course 20. A comprehensive course covering Chinese American history, 1848 to present. Topics include influence of traditional values, social and political structures, the influence of immigration and settlement; labor history; the history of public policy, foreign and domestic; on the Chinese individual and community.

122. Japanese American History. (5) Three hours of lecture and two hours of discussion per week. Satisfies American History requirement. Prerequisite: course 20 is recommended. The course will be presented as a seminar with selected topics in order to give students an opportunity to participate in the study of the subject. Topics will include immigration, anti-Japanese racism, labor, concentration camps, agriculture, art and literature, and personalities.

S. Chan

124A-124B-124C. Piliplno American History. (5-5-5) Formerly 123A-123B-123C. Three hours of lecture and 2 hours of discussion per week. Prerequisite: AsAmSt 20A. A three-quarter sequence to study the political, social, and economic history of the Philippines under colonialism, the subsequent effects in the political and cultural structure, the presence of imperialism and the influence of Piliplno immigration to America, the history of Piliplno labor in America and the current struggle of Piliplnos.

C. Maglaya (F, W, Sp)

130. Colonialism and "Internal and Colonialism." (5) Formerly 133A-133B. Three hours of lecture and 2 hours of discussion per week. Prerequisite: AsAmSt 6A or 6B or 6C or 20A or consent of instructor. A comparative historical survey of the effects of colonialism on Third World people in the United States and internationally. Special focus will be on the relationship between American neo-colonialism in Asia and the "internal colonial" status of Asian Americans today.

S. Chan

134A-134B. The Chinese Revolution and the Asian American Experience. (5-5) Three hours of lecture and one hour of discussion per week. A two-quarter interdisciplinary course on the consequences of the Chinese revolution in the Chinese American communities and individuals. 134A is an examination of the nature and meaning of the Chinese revolutionary experience and how it affected Asian America. 134B is a comparative analysis of how social, economic and political influences on the Chinese and United States today affect the quality of life in each country. It is strongly recommended that students take both quarters of the course.

S. Chan

NOTE: For key to symbols, see page 34.
Chicano Studies Program

Program Office, 3408 Dwinelle Hall

Assistant Professors:
-Lila Gonzalez, Ph.D.
-Larry Trujillo (acting; Acting Coordinator)

Lecturers:
-Vele Garcia-Hancock, M.S.W.
-Juan Martinez, Ph.D.

The primary goal of the Chicano Studies Program is to prepare undergraduate and graduate students to enter the fields of the human services, the arts, and communications. Chicano Studies offers courses to Chicano, Third World students, and all other Berkeley campus students. Since the foundation of the Chicano culture is still outside the dominant culture, its contributions to society are made from its own perspective by stressing openness and inquiry with as much student and faculty interaction as possible. Our approach is designed to implement the following objectives:

1. To provide an interdisciplinary B.A. Program focusing on several areas of emphasis including the Social Sciences, the Arts, and Bilingualism.

2. To create a strong sense of self awareness and identity in the student in a supportive environment through courses designed to foster a self-concept of Chicano identity and spirit, national and cultural, and historical heritage with emphasis on the bilingual/bicultural aspects of the Chicano experience.

3. To clarify the students' relationship as Chicano people to this country's institutions.

4. To enable students to value their experience as a legitimate body of knowledge, thus encouraging Chicano students to become scholars, professionals, and artists who are able to speak to and for their people.

5. To provide undergraduate electives for all students.

6. To provide a center for research, discussion, and the exchange of ideas to promote the development of experimental and innovative programs in all areas of concern to Chicano.

Chicano Studies Major

The Bachelor of Arts degree in Chicano Studies will be awarded upon fulfillment of the following requirements:

1. Completion of 180 units, at least 60 units of which must be in upper division courses.

2. Maintenance of at least a C average in all courses undertaken at the University and a grade C in all courses in the major program.

3. Completion of the general University requirements regarding senior residence, Subject A, American History, and upper division units in Ethnic Studies, of which at least 20 must be in upper division courses.

4. Demonstrated proficiency in the use of the English language: two courses in a reading and composition sequence approved by the Chicano Studies faculty.

5. Demonstrated proficiency in Spanish or the third course in the advanced sequence of Chicano Spanish (282C). This requirement may be met in part, or in total, by an examination approved by the Chicano Studies faculty.

6. Completion of the major in Chicano studies as follows:

- 60, Introduction to Chicano Studies: 100, Theoretical Issues for Research in Chicano Studies; 182, The Chicano Community; and an additional 30 upper division units in Ethnic Studies, of which at least 20 must be in Chicano Studies (the remaining units may be elected from anywhere in the other Ethnic Studies programs subject to the approval of the faculty). For further information, please consult with the Chicano Studies Major Advisor, 160 Dwinelle Hall, 642-2180.

Note: for additional course offerings, consult the Chicano Studies Divisional Office, 3408 Dwinelle Hall.

LOWER DIVISION COURSES

1A-1B. English Reading and Composition for Native Speakers of Spanish, (5-5) Four and one-half hours of lecture per week. Prerequisite: Subject A and consent of instructor. Designed specifically to meet the needs of the Spanish/English, bilingual, bicultural students. Composition skills developed through expository writing and practical writing experience. Readings include works by Chicano authors and provide relevant content. To be offered 1976-77 only.


28A-28B. Spanish for Chicanos, Advanced Course, (5-5) Four and one-half hours of lecture per week. Prerequisite: Spanish Placement Examination or course 28C. For students who comprehend well and are fluent in Spanish. Systematic presentation and practice of the fundamentals of Spanish grammar. Emphasis on formal and standard Spanish. Classes to be conducted in Spanish.

28C. Spanish for Chicanos—Introduction to Literature, (6) Four and one-half hours of lecture per week. Prerequisite: Spanish Placement Examination or course 28B. Offered to students who have had 28C prior to Spring 1974. To acquaint the students with contemporary literature written in Spanish. Mexican, Mexican American, and Spanish emphasis on reading. Discussions and classes to be conducted in Spanish.

Staff (Sp)

60. Introduction to Chicano Studies. (6) Five hours of lecture per week. Prerequisite: course 2A. Major perspectives of race relations and their use in the study of the Chicano experience. Paradoxes to be examined: the assimilation, the ethnic minority model, the Mexican revolutionary model, and the marxian theory of race relations. To be offered 1976-77 only.

Mr. Almaguer (Sp)

105. Introduction to Chicano Literature. (5) Five hours of lecture per week. Prerequisite: upper division standing. Study of Chicano texts which elucidate the development of Chicano cultural currents. To be offered 1976-77 only.

107. Chicano and Latin American Literature. (5) Five hours of lecture per week. Prerequisite: upper division standing or consent of instructor. Major works of selected Chicano and Latin American literature, emphasis on parallel effects. To be offered 1976-77 only.

*119. Printmaking Workshop. (3) Six to nine hours of lecture per week with three open studio classes per week. Prerequisite: upper division standing or consent of instructor. Printmaking workshop to be run by a professional printmaker. Emphasis on the expression of pre- and post-Columbian artistic heritage of Chicano and contemporary Chicano artistic expression. Students may elect one credit for the above courses. To be offered 1976-77 only.

Ms. Garcia-Hancock (F)

119A-119B-119C. Mural Painting. (3-3-3) Six hours of lecture and two open studio classes per week. Prerequisite: upper division standing or consent of instructor. 119A is not prerequisite to 119B: 119B is not prerequisite to 119C. Basic technical skills in contemporary mural painting, selection and preparation of ground contemporary media and techniques. Emphasis on modern Mexican and Chicano mural painting. Study of traditional 20th-century Mexican mural painting, its relationship to Meso-American Indian and Chicano mural painting. To be offered 1976-77 only.

Mr. Patlan; Rodriguez (F, W, Sp)

125. Chicano Creative Writing Workshop. (4) Four and one-half hours of lecture per week. Prerequisite: upper division standing. Development of skills in writing for the Chicano community. Involves reading and presentation of Chicano Spanish. Exploration of the short story, drama, poetry, expository, and critical writing as well as translation as a creative medium. Students must be proficient in the above categories. To be offered 1976-77 only.

(L, W)

131. Social Institutions in the Chicano Experience. (6) Four hours of lecture and two hours of discussion per week. A survey of social institutions and analysis of institutional racism in the United States; a demographic introduction to Chicano culture as an ethnic group; the impact of institutional racism on the Chicano life experience; social, psychological, and cultural factors. To be offered 1976-77 only.

Ms. Garcia-Hancock (F)

134. Law, Justice and the Chicano People. (5) Four hours of lecture and one hour of discussion per week. Prerequisite: course 121 Sociology of San Francisco. The relationship between the legal system and the political economy, impact of the criminal justice system on Chicano people. To be offered 1976-77 only.

Mr. Trujillo (Sp)

137. Chicano Perspectives on Crime and Corrections. (5) Four hours of lecture and one hour of discussion per week. Prerequisite: course 121 Sociology of San Francisco. A sociological examination of the relationship of the Chicano to the criminal justice system. To be offered 1976-77 only.

Mr. Trujillo (Sp)

145A. Chicano Health Problems and the Structure of Health Care. (5) Five hours of lecture per week. Prerequisite: course 100 and upper division standing or consent of instructor. Relationships of the health system in the United States to the Chicano community. Impact of historical development and institutional dynamics of health
**144B. Chicano Health Problem Solving and Research.** (6) Five hours of lecture per week. Prerequisite: course 145A and upper division standing or consent of the Instructor. Analysis of the health problems of the Chicano community; planning, patient-doctor relationship, alternative treatments, health care delivery on Chicanos. (W)

147. Changing Family Roles in the Chicano Community. (4) Four and one-half hours of lecture per week. Prerequisite: course 100. Review of concepts of community mental health. Analysis of applicability of those concepts to the Chicano experience. Examination of the role of cultural factors in Chicano mental health. Survey of emerging Chicano perspectives on treatment modalities and preventive mental health program. To be offered 1976—77 only. Staff (Sp)

148. The Psychology of La Raza. (5) Five hours of lecture per week. Prerequisite: Upper Division standing or consent of Instructor. Analysis of the psychological and emotional psyche and character of the Indian, Mexican and Chicano; the role of existing mental health institutions in relation to the Chicano community and cultural values. To be offered 1976—77 only.

151. Chicano History. (6) Three hours of lecture and one hour of discussion per week. Survey of the history, culture, and mestizization of the Mexican Americans. A historical analysis from the Christianization to the present history of the Chicano. Analysis of problems of assimilation and acculturation. To be offered 1976—77 only. Staff (F, W, Sp)

153. Contemporary Chicano Issues. (5) Four hours of lecture and one hour of discussion per week. Prerequisite: consent of instructor. Analysis of conditions resulting from a shift in the Spanish-speaking population from agricultural and rural to urban and industrial areas since World War II. To be offered 1976—77 only. Staff (F, W, Sp)

155. Chicanos of California. (8) Four hours of lecture and one hour of discussion per week. Includes Spanish and Mexican background and the relations of the Spanish-speaking people of California from 1848 to present. To be offered 1976—77 only. Mr. Martinez (Sp)

156. Analysis of the Precursors of Chicano Thought and Values. (5) Five hours of lecture per week. Prerequisite: course 126. Contemporary synthetic Latín American philosophy (including Mexican philosophy) and the historical and philosophical developments on the dynamics of Chicano philosophy. To be offered 1976—77 only. Mr. Trujillo (W)

157. Political Form and Content of the Chicano Movement. (6) Five hours of lecture per week. Prerequisite: course 151. The political implications of the Chicano movement. Its study as a civil rights movement, a struggle for sovereignty, a separate movement, a land control movement, and a revolutionary movement. The development of ideology as engendered by Chicano history and life process. To be offered 1976—77 only. (W)

158. Chicano Schooling: A Chicano Perspective. (5) Five hours of lecture per week. Prerequisite: Chicano Studies 60. Historical examination of social factors leading to development of alternative educational programs and schools by Chicano communities in the Southwest. Social and political strategies used by Chicanos in alternative education. To be offered 1976—77 only. Staff (Sp)


160. Social Dynamics of Domination. (5) Five hours of lecture per week. Prerequisite: upper division standing. Social-political relationships between the Chicano community and the American political system. Structure and processes of domination affecting the Chicano responses, including cultural solidarity and nationalism. To be offered 1976—77 only. Mr. Almeida (S)

161. Analysis of the Precursors of Chicano Thought and Values. (6) Five hours of lecture per week. Prerequisite: course 156. Historical and theoretical grounding in the disciplines of community or cultural values. To be offered 1976—77 only. Staff (Sp)

162. Economic Politics of the Southwest. (5) Five hours of lecture per week. Prerequisite: course 151. Historical and theoretical grounding for the role of Chicano in Southwest. Survey of capitais development of the area and political and social implications for Chicanos. To be offered 1976—77 only. Staff (W)

163. Political Economy of the Southwest. (5) Five hours of lecture per week. Prerequisite: course 151. Analysis of the historical economy of the Southwest into the 19th century American economy. Survey of capitais development of the area and political and social implications for Chicanos. To be offered 1976—77 only. Staff (W)

164. The Chicano Corrido: The Ballad as Oral Literature. (3) Two 1/2 hour lectures per week. Prerequisite: Chicano Studies 105. Work focusing on the knowledge of Chicano folk ballads. Comparison of Chicano and Anglo-based corridos. To be offered 1976—77 only. Staff (W)

165. Field Work in Chicano Studies. (1—5) Meetings to be arranged. Prerequisite: upper division standing and consent of instructor. Supervised independent field experience in the community relevant to specific aspects of Chicano Studies. Regular meetings with faculty sponsor and written reports required. Ms. Garcia-Hancock, Mr. Trujillo (W, Sp)

166. Directed Group Study. (1—5) Meetings to be arranged. Prerequisite: upper division standing and consent of instructor. Directed group study in Chicano Studies for advanced students. Regular meetings with faculty sponsor and written reports. Mr. Martinez, (F, W, Sp)

167. Supervised Independent Study and Research. (1-5) Meetings to be arranged. Prerequisite: upper division standing and consent of instructor. Directed independent work for advanced students in Chicano Studies. Regular individual meetings with faculty sponsor and written reports. Mr. Martinez, (F, W, Sp)

168. Native American Studies Program

Program Office, 3415 Dwain Hall

Associate Professor: Clara Sue Kidwai (Chippewa-Chickasaw), Ph.D.

Assistant Professors: J. Youngblood Henderson, Ph.D.

Research Methods (10). Mr. Martin (F, W, Sp)

The Native American Studies Program exists to provide students interested in the history, culture, and contemporary social-political relationship between the Native American cultures and contemporary legal and social consequences for Chicanos. To be offered 1976—77 only. (Sp)

The major program in Native American Studies leads to a B.A. degree. Admission to the program requires prior successful completion of Native American Studies 50 and an interview with the Academic Adviser who will help guide an appropriate program of study (all study lists are subject to the approval of the Academic Adviser). The interview should be held no later than the first quarter of the junior year. Students will be required to outline their academic and professional goals.

The degree of Bachelor of Arts in Native American Studies will be granted on the following conditions:

1. Completion of 180 units, at least 40 of which must be in upper division courses.
2. Maintenance of at least a C average in all courses undertaken at the University and in all courses in the major program.
3. Completion of general University requirements as to senior residence, Subject A, and American History and Institutions.
4. Completion of 25 core units—at least 20 upper division, which involve the following:
   A. Native American Studies 50—The Native American in Contemporary Society (5).
   B. Native American Studies 110—Introduction to Research Problems of Native American Communities (5).
   C. Native American Studies 103—American Indian Government (5).
   D. Research Methods (10). The
5. Completion of an additional 25 units in Native American Studies, at least 20 of which must be in upper division courses.
6. Completion of at least 12 units in courses that have significant Native American content but are offered by divisions or departments other than Native American Studies.

Note. Changes, effective Fall Quarter 1976, are expected regarding prerequisites to the major and major requirements. Inquiries should be directed to the Academic Adviser, 3415 Dwain Hall.

Honors Program. Native American Studies provides a program leading to the B.A. degree with honors. Students will be recommended for honors if they have completed at least one and a half units in which they have an average of at least B for all work undertaken in Native American Studies and have been approved specially for inclusion in honors by the Committee on Honors either upon recommendation by the Native American Studies faculty or upon other basis or criterion as the Committee may determine. Students will be required to complete an additional 15 units in Native American Studies—senior honors seminar, research, and thesis. In order to graduate with a B.A. degree with honors, a student must obtain at least a B average.

Courses and Seminars. Courses and seminars are listed below. Instructor listings, quarterly offerings, and schedule changes are available in 3415 Dwain Hall. Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSES

1A. Native American Studies Reading and Composition (10) Four and one-half hours of lecture per week. Prerequisite: satisfaction of Subject A requirements. The ten units of research methods may be taken within Native American Studies (N.A.S. 198) or within a division or department that offers units that would be better suited to the goal of the students program of study.

NOTE: For key to symbols, see page 34.
238 / SPECIAL PROGRAMS: Ethnic Studies {Native American}

18. Native American Studies Reading and Composition. (Sp) Five and one-half hours of lecture per week. Prerequisite: Subject A requirement and course 1A or equivalent. Continued emphasis on the development of proficiency in expository composition, with special attention being geared to the Native American literary tradition. (Sp)

10. Ideology of Native American Studies. (2) Two hours of seminar per week. Prerequisite: consent of instructor. A study of the historical development of American Indian education and proposed solutions to sustained problems of education in the various types of schools. During the term, emphasis will be given to the contemporary period. (F)

50. The Native American in Contemporary Society. (6) Four and one-half hours of lecture per week. Satisfies American History requirement. Prerequisite: course 71A or consent of instructor. An examination of the conflict of political issues and problems of Native Americans on reservations and in urban areas. Major topics to be discussed include the federal and state governments, the relocation of the reservation system, discrimination, urban life, Indian organizations, stereotypes, the New Indian. Mr. Henderson (F, W, Sp)

71A. History of Native Americans in North America. (5) Formerly 171. Four and one-half hours of lecture per week. Prerequisite: course 71A or 7IB or consent of instructor. A study of the historical development of American Indian education and introduction to the needs of the student. (W)

71B. History of Native Americans in North America. (5) Formerly 171. Four and one-half hours of lecture per week. Satisfies American History requirement. Prerequisite: course 71A or consent of instructor. The course is designed as a survey-lecture course. It will deal with the political, cultural, legal, and military relationships between the various American Indians and the United States Government from 1776 to the present. (W)

UPPER DIVISION COURSES

100. Introduction to Federal Indian Law. (5) Three hours of lecture and one and one-half hours of discussion per week. Prerequisite: course 71A or consent of instructor. The course is designed as a survey-lecture course. It will deal with the political, cultural, legal, and military relationships between the various American Indians and the United States Government from 1776 to the present. (W)

101. Survey of Native American Tribal Government and Policy. (6) Three hours of lecture and one and one-half hours of discussion per week. Prerequisite: course 100 or consent of instructor. An analysis of the relationship between Native American and federal government policies through examination of various American Indian nations. Topics to be considered will include an analysis of political organization, tribal and federal government policies, and the effect of European contact on tribal policies. Mr. Henderson (W)

102. Native American Community Development. (6) Formerly 111. Three hours of lecture and one and one-half hours of discussion per week. Prerequisite: course 71A or consent of instructor. Instruction and analysis of the development of Native American Community organizations. Emphasis will be placed on the role of the Indian in the American political system. Mr. Henderson (W)

103. Native American Sovereignty. (5) Formerly 130. Three hours of lecture and one and one-half hours of discussion per week. Satisfies American History requirement. Prerequisite: course 71A or consent of instructor. An examination of the rights of Native Americans as a product of the history of Anglo-American economic, political, social, and intellectual thought. The course will examine property rights, political choices, and cultural integrity through theoretical and historical phases from the colonial period to the present. Mr. Henderson (W)

104.A. Introduction to Research Problems of Native American Communities. (5) Formerly 110. Four and one-half hours of lecture per week. Prerequisite: course 71A or consent of instructor. This course is designed to establish a familiarity with the methods and logic of scientific inquiry through a research proposal on a given topic. Emphasis will be placed on problem solving and underlying assumptions in research. Ms. Metcalf (W)

108. Introduction to Research Problems of Native American Communities. (5) Formerly 110. Four and one-half hours of lecture per week. Prerequisite: course 71A or consent of instructor. The course is designed to establish a familiarity with the methods and logic of scientific inquiry through a research proposal on a given topic. Emphasis will be placed on problem solving and underlying assumptions in research. Ms. Metcalf (W)

122. Contemporary Native American Education. (5) Four and one-half hours of seminar per week. Prerequisite: course 50, 71B, 85, or consent of instructor. Advanced study of contemporary Native American education, focusing on selected topics covered in course 85, but leaving room for attention to other topics of special interest to the student. The specific topics will be announced at the beginning of the quarter. (W)

123. Innovations in Native American Education: Case Studies and Seminars. (5) Four and one-half hours of seminar per week. Prerequisite: course 50, 71B, 85, or consent of instructor. Advanced study of recent innovations in Native American education. Ms. Metcalf (W)

141. The Native American and the Reservation. (5) Four and one-half hours of seminar per week. Prerequisite: consent of instructor. A study of the historical development of the Reservation system and an analysis of what it means to be a "Reservation Indian" in modern American. (W)

142. The Native American in Urban America. (5) Four hours of seminar per week. Prerequisite: 71A or consent of instructor. A study of the historical development of Native American communities within urban structures. During the latter part of the quarter, emphasis will be given to the contemporary period. Prerequisite: although not required, course 151 is desirable. An analysis of the written and oral tradition developed by Native Americans. Emphasis will be given to the Indian arts and its development. Mr. Henderson (F, W, Sp)

151. Native American Philosophy. (5) Four hours of lecture per week. Prerequisite: although not required, course 151 is desirable. An analysis of the philosophical and metaphysical aspects of Native American philosophy, with emphasis on systems of knowledge, explanations of natural phenomena, and the role of the individual in traditional Indian societies and in the modern world. (W)

155. Medical Theories and Practices of Native American Cultures. (5) Four hours of lecture per week. Prerequisite: although not required, course 151 is desirable. An analysis of the medical practices that derive from these theories; how contact conditions with Europeans and how these changes have altered sex role definitions will be examined. Ms. Kidweli (F, W, Sp)

180. Native Americans and the United States Public Health Services. (5) Four and one-half hours of seminar per week. Prerequisite: consent of instructor. An analysis of the historical development of the United States Public Health and the Indian Health Service and an investigation of the current relations with the Native American communities. (W)

185. Seminar in Child Development in Native American Communities. (6) Four hours of seminar per week. Prerequisite: course 71A or consent of instructor. An analysis of the development of Native American children in Native American communities by investigating traditional childrearing patterns and the impact of childrearing practices, analysis of the effects of Western society on those developmental patterns. Ms. Metcalf (W)

187. History of Native Americans in California. (5) Three hours of lecture and two hours of discussion per week. Prerequisite: course 71A-71B or consent of instructor. The course will examine the history of Native American in California with emphasis on the role of the Native American in California with emphasis on the historical development of the native people. (Sp)

190. History of Native Americans in the Southwest. (3) Three hours of lecture and two hours of discussion per week. Prerequisite: course 71A-71B or consent of instructor. An analytical study of the Native American people of the southwestern United States Public Health and the Indian Health Service and an investigation of the current relations with the United States Government. (W)

191. Native American Arts and Contemporary Development. (5) Four and one-half hours of lecture per week. Prerequisite: course 111 or consent of instructor. Emphasis will be given to the Indian arts and its development. The course will cover the traditional and contemporary crafts—traditional and contemporary—with emphasis given to the Indian arts and its development. The course will cover the traditional and contemporary crafts—traditional and contemporary—with emphasis given to the Indian arts and its development. Mr. Henderson (F, W, Sp)

195A. Native American Studio Art: Introductory Techniques. (3) Two 3-hour studio classes per week. Prerequisite: consent of instructor. Designed for beginning art students; instruction in drawing, with main emphasis on one-line drawing. Focus will be on the development of children in Native American communities. (Sp)

196. Native American Studio Art: Intermediate. (3) Two 3-hour studio classes per week. Prerequisite: course 184A or consent of instructor. This course is designed to teach students the basics of painting and maintenance of tools and materials. We will study techniques and media, as well as an analysis of composition in illustrations from traditional and modern paintings. Mr. Henderson (F, W, Sp)

199. Supervised Independent Study. (1-5) Individual conferences to be arranged. Prerequisite: consent of instructor. Designed (or be arranged) by the student for independent study. Prerequisite: consent of instructor. An analysis of composition in illustrations from traditional and modern paintings. Ms. Kidweli (F, W, Sp)

198. Supervised Group Study. (1-5) Individual conferences to be arranged. Prerequisite: consent of instructor. Advanced seminar in Native American Studies with topics to be announced at the beginning of each quarter. May be repeated for credit. (F, W, Sp)

191A. Seminar Series. (4) Three hours of seminar per week. Prerequisite: course 10 or consent of instructor. Designed for selected scholars from various fields in Native American Studies. Topics will be announced at the beginning of each quarter. May be repeated for credit. (F, W, Sp)

197. Field Work in the Native American Community. (1-5) Individual conferences to be arranged. Prerequisite: consent of instructor and upper division standing preferred. Supervised experiences relevant to the student's interests and experiences. Regular off-campus settings. Regular individual meetings with the Coordinator in charge. Faculty sponsor and written reports required. (F, W, Sp)

198. Supervised Group Study. (1-5) Individual conferences to be arranged. Prerequisite: consent of instructor and upper division standing preferred. Group discussion, research, and reporting on topics by students. The Staff (the Coordinator in charge) (F, W, Sp)

199. Supervised Independent Study and Re-
Field Studies Program

Field Studies courses involve up to twenty students per course in a coordinated program of internships in community agencies and weekly small-group seminars directly related to a topical area.

Courses currently offered are: Child Care, Practices, Policies, and Theories, Community Mental Health, Urban Dilemmas, Consumer Protection, Criminal Justice, Public Advocacy, The Economic Crisis, and Women as a Force for Change.

Students are placed as staff members of such service-oriented enterprises as ASUC Child Care Centers, Alameda County Legal Aid, and Contra Costa Social Services.

Field Studies courses require a two-quarter commitment of ten hours of field work plus a two-hour seminar weekly, for five units per quarter or ten units per course. All are approved for College of Letters and Science credit.

Emphasis in both class and field is on responsible individual and peer-group involvement in the educational experience, designed to help students make more realistic career choices, test their personal competencies and aptitudes in practice situations, and find in their academic learning.

See Interdepartmental Studies for the complete description of these courses.

The Program

Field Studies courses are designed to provide curricular and experiential opportunities for students interested in the field of Social Sciences. The courses are offered in conjunction with a variety of community agencies and organizations.

The courses are designed to provide students with opportunities to apply theoretical knowledge to practical situations, and to develop skills in research and problem-solving.

The courses are structured to allow students to engage in hands-on experience, to work in small groups, and to develop critical thinking skills.

The courses are designed to provide students with opportunities to experience the diversity of social issues and to develop an understanding of the complexity of social problems.

The courses are designed to provide students with opportunities to develop skills in research and problem-solving, and to apply these skills to real-world situations.

The courses are designed to provide students with opportunities to engage in hands-on experience, to work in small groups, and to develop critical thinking skills.

The courses are designed to provide students with opportunities to experience the diversity of social issues and to develop an understanding of the complexity of social problems.

The courses are designed to provide students with opportunities to develop skills in research and problem-solving, and to apply these skills to real-world situations.

The courses are designed to provide students with opportunities to engage in hands-on experience, to work in small groups, and to develop critical thinking skills.

The courses are designed to provide students with opportunities to experience the diversity of social issues and to develop an understanding of the complexity of social problems.

The courses are designed to provide students with opportunities to develop skills in research and problem-solving, and to apply these skills to real-world situations.

The courses are designed to provide students with opportunities to engage in hands-on experience, to work in small groups, and to develop critical thinking skills.
in mental health care; problems of definition of mental health; interface of mental health systems.

Mr. Diamond (Sp)

184. Cross Disciplinary Seminar In Health Topics. (2) Two hours of lecture per week. Prerequisite: consent of instructor. Topics to be announced at the beginning of each semester, e.g. Industrial Pollution and Cancer, National Health Insurance.

The Staff (F, W, Sp)

185. Disciplinary Seminar In Health Topics. (2) Two hours of lecture per week. Prerequisite: permission of instructor. Seminar in topics in health which are germane to a specific area. Disciplinary area and topic to be announced at the beginning of each quarter, e.g. Evolution of Medicine in America.

The Staff (F, W, Sp)

191. Industrial Pollution and Cancer, (2) Three hours of lecture per week. Prerequisite: consent of instructor. Seminar in the principle theme common to the courses comprising the major.

Adviser in charge of the student's major (F, W, Sp)

196A–196B. Senior Thesis. (4–4) Individual conferences with the advisor to be arranged. Prerequisites: Open only to students in the Health Arts and Sciences. Major. Completion of all lower division prerequisites for the major and consent of advisor. Must be taken pass/ not pass. The senior thesis will be written while a student is enrolled in this course. Credit and grades assigned only upon completion of the full sequence. The Staff (F, W, Sp)

197. Field Study In Health Arts and Sciences. (1–5) Individual conferences to be arranged. Prerequisites: Course 112A and consent of instructor. Students must declare an undergraduate major in Health Arts and Sciences. Supervised experience in application of Health Arts and Sciences to off-campus organizations. Requires individual arrangements with faculty sponsor and written reports required.

The Staff (F, W, Sp)

198. Directed Group Study For Undergraduates. (1–5) May be repeated. Prerequisites: Open only to students in the Health Arts and Sciences Major. Completion of all lower division prerequisites for the major. Overall GPA of 3.0 and 3.3 in the courses required for the major and consent of advisor. The senior honors thesis will be written while a student is enrolled in this course. Credit and grades assigned only upon completion of the full sequence. The Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1–5) Prerequisite: consent of instructor. Must be taken as a group. Enrollment limited by regulations listed on page 54.

The Staff (F, W, Sp)

Health and Medical Sciences, Graduate Program

Program Office, Room 106, Building 7-7

The Graduate Program in Health and Medical Sciences is built upon the following foundation: activities in the health departments, professional schools, faculty, and administrative units and, in the community, with physicians, hospitals, and other health facilities—all combining their efforts to develop an experimental program for health career education and training not previously available on this campus. For options are offered in the Program for which different sets of prerequisites and recommendations exist, leading to the Master of Science in Health and Medical Sciences degree. The Dual Degree option is for students currently enrolled (or who have been accepted) in a department of the Graduate Division of the University, but who wish to integrate their major disciplinary work with health concerns that cannot be satisfied by existing mechanisms. The General Advising option offers the student preparation in human genetics and genetic counseling. The joint program, a joint UCSF/UCSF undertaking, is currently being re-structured. The joint program plans to coordinate the pre-medical and pre-clinical curriculum and to strongly encourage students to obtain a Master's degree in a related area to their health career. The Mental Health option is a collaborative effort by the University of California, and the Department of Psychiatry, Mt. Zion Hospital, San Francisco. For more specific description of the Program, as well as the options of specialization, contact the Program Office, Room 106, Building 7-7, University of California, Berkeley, CA 94720.

See Interdepartmental Studies for the complete description of these courses.

Interdepartmental Studies

LOWER DIVISION COURSES

1. Technology and Society. (4) Three hours of lecture per week and an occasional field trip. Prerequisite: open without prerequisite to all students. Role of technology in the society: a historical introduction to the development of modern technology. Examples of technological systems such as communications, data processing, automation, city planning, issues of societal control, technology assessment, public policy related to technological developments. Electrical Engineering and Computer Science: Mr. Suskinclude.

Political Science: Mr. LaPorte (W, Sp)

10A–10B–10C. Introduction to Environmental Science. (5–5–5) Three and one-half hours of discussion per week. 10A is not prerequisite to 10B. 10B is not prerequisite to 10C.

10A. Ecosystems. Their Maintenance and Disruption. Man's relationship to the natural environment; case studies of ecosystem maintenance and disruption. Biochemistry: Mr. Nellands (F)

10B. Global Problems and Alternate Systems. Issues of economic development, population, energy, resource, technology and alternative systems. Nutritional Sciences: Mrs. Little (Sp)

10C. The San Francisco Bay Ecosystem. Physical, biological, sociological aspects of the San Francisco Bay area. Major emphasis on projects and field work. Entomology: Mr. Dahlsten (W)

10L–10M–10N. Introduction to Environmental Science. Three and one-half hours of discussion per week. Prerequisite: concurrent enrollment in course 10A or 10B or 10C. Individual or group projects related to the environmental issues discussed in the corresponding IDS 10 lecture series. College of Natural Resources: The Staff (F, W, Sp)


50A–50B–50C. The Entrepreneurial Way of Life In the United States. (10–15; 10–15; 10–15) Eight to twelve hours of seminar and study group meetings per week. Prerequisite: open to freshmen and sophomores enrolled in the Collegiate Seminar Program. A historical inquiry into the relationship between environment, social structure, and social change, the changing major structures of American society. To be offered 1976–77 only.

History: Mr. Seligers (W, Sp)


English: Mr. Muscaline (F, W, Sp)

52A–52B–52C. Problems and Documents of Modern Society. (10–15; 10–15; 10–15) Eight to twelve hours of seminar and study group meetings per week. Prerequisite: open to freshmen and sophomores enrolled in the Collegiate Seminar Program. Study of contemporary social, economic and political dilemmas, many of which cannot be satisfied by existing mechanisms. The Staff (F, W, Sp)

56A–56B–56C. The Limits of Scientific Decision-Making. (5–10; 5–10; 5–10) One to three hours of discussion per week. Prerequisite: consent of instructor. Open to freshmen and sophomores enrolled in the Collegiate Seminar Program, and to a limited number of other students with the consent of the instructor. Prerequisites for 56C: at least 5 units each of 56A and 56B, or consent of the instructors. To be offered 1976–77 only.

56A. Readings in classical and modern Philosophy relating to the validity of scientific thought as applied to human problems, philosophical study of research on robots and on computer applications.

Philosophy: Mr. H. Dreyfus (F)

56B. Study of basic models and optimization methods used in operations research: construction and analysis of models for solving typical technical, industrial and social problems; experiments with existing computer programs doing optimization or system simulation. Knowledge of High School Algebra is sufficient. The Staff (F, W, Sp)

56C. Philosophical critique of recent applications of mathematical modeling to public problems. Each student will be expected to develop, articulate, and defend his own position on the usefulness and dangers of the mathematical modeling approach. Philosophy: Mr. H. Dreyfus; Industrial Engineering and Operations Research: Mr. S. Dreyfus (Sp)

60. Energy and Society. (3) Three hours of lecture per week. Prerequisite: not acceptable to students in the major. Energy in international perspective, origins and character of the energy crisis. "Energy and Resource Conservation" Mr. Holdren (F)

63. Culture and Personality. (10–15) Eight to twelve hours of seminar and study group meetings per week. Prerequisite: Open to freshmen and sophomores enrolled in the Collegiate Seminar Program. Study of living mangers of poetry, essay and short fiction, with particular emphasis on the interplay of personal and social values and themes. Creative writing by students in poetry, essay and short fiction. To be offered 1976–77 only.

English: Mr. Muscaline (F)

65. Energy and Society. (3) Three hours of lecture per week. Prerequisite: not acceptable to students in the major. Energy in international perspective, origins and character of the energy crisis. "Energy and Resource Conservation" Mr. Holdren (F)

70. Utopias. (10–15) Eight to twelve hours of seminar and study group meetings per week. Prerequisite: Open to freshmen and sophomores enrolled in the Collegiate Seminar Program. A study of Utopian and dystopian thought and movements and their social implications. History: Mr. Seligers (W, Sp)

75. Personality and its Applications to Contemporary American Society. (10–15) Eight to twelve hours of seminar and study group meetings per week. Prerequisite: Open to freshmen and sophomores enrolled in the Collegiate Seminar Program. Study of personality and its effects on personality and social character (Weber, Tawney, Parsons, Durkheim, Potter, Riesman, Mills). To be offered 1976–77 only.

History: Mr. Seligers (W, Sp)

UPPER DIVISION COURSES

100. Problems in Marine Biology. (15) Full-time study at the Bodega Marine Laboratory. Prerequisite: consent of student and one or two courses in marine biology, laboratory, field work, and directed study on selected topics, stressing experience in original research.

Biological Science: Mr. S. Dreyfus (Sp)

103. Introduction to Modern Art (for Non-Majors). (8) Two hours of lecture and two hours of discussion per week. No specific prerequisites; designed for stu-
neering 102 or Chemistry 123. Experimental illus-
trations of the inter-relation between chemical and
uclear processes; characteristics of fission frag-
ments; chemical effects of nuclear
transformations; application of radioactivity to study of
chemical problems; neutron activation.

Mr. Circin: Mr. Prussin: Mr. Markowitz (Sp)

131. Systems, Graphs, and Combinatorics in De-
sign. (4) Two 1/2-hour lectures and one 2-hour labora-
tory period per week. Mr. Distefano (F) and Mr. Moore (W). Em-
phasis on the use of the computer for the solution of
complex systems. Architecture, Civil Engineering,
Electrical Engineering and Computer Sciences.

Mr. Circin: Mr. Prussin: Mr. Markowitz (Sp)

132. Biological Deterioration of Wood. (3) Three-
hour tutorial per week with guided reading. Pre-
requisite: consent of instructor. Enrollment limited.
Study of the deterioration of wood in use by fungi,
bacteria, and insects, and its control or prevention.
To be offered 1976-’77 only. Forestry and Conservation.

Mr. Wilcox: Entomology: Mr. Moore (Sp)

137. The High Renaissance under Pope Julius II
(1503-1513). (6) Three lectures of one and one-
half hours of discussion per week. An in-depth
study of the work of Michelangelo (Sistine Chapel, east
paintings), Michelangelo (Sistine ceiling, Julius tomb),
and Bramante (St. Peters, Cortile del Belvedere. Palace
of Justice, Via Giulia) and the historical and cultural
context within which they were produced. To be offered
1976-’77 only. History of Art: Mr. Partridge;
Mr. Distefano (F) and Mr. Moore (W).

138. Michelangelo and His Age, 1475-1564. (3)
Three hours of lecture and 1 hour of discussion per
week. An in-depth analysis of the works of Mi-
elangelo, in architecture, painting, and sculpture,
poetry, and the historical and cultural context within
which they were produced. History: Mr. Starn; History of art:
Mr. Distefano (F) and Mr. Moore (W).

145. Physical Problems about the Earth. (4) Three-
hour lectures and one discussion period per week.
Prerequisite: Physics 105A-105B. A treatment of some central
problems on the evolution and structure of the
Earth from a physical viewpoint. An analysis of the
dynamics and deformation of the Earth will be based
on analytical mechanics, wave theory, thermodynam-
is, and nuclear physics. Problems may vary from year
to year.

Physics: Mr. Judd (Sp)

150. Man’s Earliest Ancestors. (3) One 1-hour lec-
ture and one 2-hour seminar per week. Prerequisite:
consent of instructor. Discussion of the origin, char-
acteristics, and affinities of ancient primates and their
bearing on the phytogeny of Man. Evaluation of appli-
cations on early primates are based on the better specimens of the
proposed taxa.

Anthropology: Mr. Howell; Palaeontology:
Mr. Savage.

155. Philosophies of India. (4) Three hours of lec-
ture per week. The philosophy of India, Hindu and Bud-
hist, beginning with the Vedic period and concen-
drating on the philosophical systems of the ancient
philosophers. Philosophy, South and Southeast Asian Studies.

Mr. Staal; History of Art: Mr. de Caso;
Mr. French; Mr. Guy (W)

159. Introduction to Marxian. (5) Two hours of lec-
ture and two hours of discussion per week. An intro-
duction to Marxist theory and politics. The first half
presents an integrated view of Marx’s own theory of
history, economics and philosophy. The second half
explores aspects of ideas in the social movement.

Mr. Tu (F)

170. Lexical Semantics. (4) Three hours of lecture
per week. Prerequisites: At least four relevant courses
in English, French or German, Psychology, Psychol-
of Computer Science, or consent of instructor. Prob-
lems in the analysis of word meaning in relation to
formal reference to particular vocabulary
domains; the formal representation of word
meanings; and issues concerning the relationship
between (1) linguistic theory and (2) cognitive anthro-

Linguistics: Mr. Fillmore; Anthropology: Mr. Kay (F)

171A-171B. Language and Social Institutions. (3-
3) Three hours of lecture per week. Linguistic problems
connected with people’s encounters with social insti-
tutions in the United States. The language of adver-
ses in intelligence testing, legal, and the legal
process. Analysis of misunderstandings, indirect com-
munication, deception with language, etc.

Linguistics: Mr. Fillmore; Mr. Lakoff
Anthropology: Ms. Nader (F, W)

175. Introduction to the Ethics and Value Assump-
tions of Planning and Systems Design. (4) Two lec-
ture hours and two discussion periods per week. The
course introduces the student to the considerations of values and ethics in structural planning and policy
making, e.g., the role of values in cost-benefit analysis, political
science-cost benefit analysis, urban and national plan-
ing, world modeling. Business Administration: Mr. Churchman;
Public Health: Mr. Bailey (W)

180. Economic and Biological Feedback Systems.
(3) Three hours of lecture per week. Prerequisites: Math-
ematics 51A or equivalent. Feedback sequences, sys-
tem responses to exogenous changes, estimation, sim-
ulation, and prediction. Examples in government, eco-
nomics, business, and social aspects. Introduction to
phase-plane methods, state variables, statistical sig-
nals, sampled data, stability, gradient meth-
dods, and applications to many large systems.

Electrical Engineering and Computer Sciences:
Mr. Smith (W)

190A—190B. Principles and Applications of Psycho-
analysis. (4) Four hours of lecture per week.
Prerequisite: open to all upper division and gradu-
ate students. 190A is a prerequisite for 190B: 190B is
required for 190C. Survey of the theories, techniques and applications of psycho-
analysis from Freud to the present. Includes appli-
cation of these principles to the solution of personal
problems and to areas such as education, the arts,
and humanities, and rehabilitative work. Credit and
grade for 190A—190B to be awarded upon completion of
190B. Psychology: Mr. Penzen; Sociology: Mr. Latawiec;
Architect: Mr. Lagoric; Geology and Geophysics: Mr. McEvilly (Sp)

H195A—H195B. Senior Honor Thesis. (4-4) Open
to only to students with an individual major in the College
of Letters and Science. An overall 3.0 grade-point aver-
age and a 3.5 grade-point average in the major completed in the
major are required for admission. The senior
thesis will be written while a student is enrolled in
this course. One three-hour meeting per week upon
completion of the full thesis. The sequence serves to
teach and integrate the principal theme common to the courses com-
pleted and gives the student an opportunity
Adviser for the major in charge (F, W, Sp)

Courses numbered 195A—195B, 195D—195E,
195V—195W—195X are Field Studies Program courses.
For further information on these courses, consult Ms.
Graves, Program Director, U.C., 2536 Channing Way,
Berkeley, CA 94720.

196A—196B—196C. Field Studies Program: Child
Care and Development. (2-2-2) Two hours of lec-
ture and 12 hours of field work per week. Prerequisite:
Two quarters of the sequence must be taken for
credit. 196B or 196C is required for 196A. Courses are
limited and determined by Field Studies Program Staff.
196A is a prerequisite to 196B, 196A and 196B are pre-
requisites to 196C which is a prerequisite to 196D,
and special permission of Field Studies Program Staff.
Field Program Staff. Open not to students who have previously
certified in the Child Care Program. Students must
receive prior approval of Field Studies Program staff and Field
Placement Agency. Not open to students who have previously
taken the special permission of Field Studies Program Director.
The course is an interdisciplinary treatment of child development,
early childhood education, and the many facets of day-
care. Skills of working in and planning for child-care
centers, and of social observation in field settings, are
taught, using Berkeley Child Care Centers as field
domains. Field Sites: (196A: F 1966-A; W 1966-C;
Sp 1966-F) Field Studies Program: Faculty from relevant
departments: Program Director: Ms. Graves

NOTE: For key to symbols, see page 34.
242 / SPECIAL PROGRAMS: Interdepartmental Studies

**196D—196E—196F. Field Studies Program: Urban Dilemmas. (5—5—5) Two hours of seminar and twelve hours of field work per week. Prerequisite: Two quarters of the course must be taken for credit. Enrollment in each seminar limited and determined by Field Studies Program Staff. 196D is prerequisite to 196E and 196D and 196E are prerequisite to 196F which may be taken only with approval of Field Studies Program Staff and Field Placement Agency. Students work with persons involved with matters of public interest. Students work under attorneys' supervision in East Bay Legal Assistance Bureaus and the District Attorney's office of Alameda County. (196F: F; 196E—196W: 196E—196F: Sp)

Field Studies Program: Faculty from relevant departments; Program Director: Mr. Graves

**196E—196F. Field Studies Program: Community Mental Health. (5—5—5) Two hours of seminar and twelve hours of field work per week. Prerequisite: Two quarters of the sequence must be taken for credit. Enrollment in each seminar limited and determined by Field Studies Program Staff and Field Placement Agency. Open to students who have previously taken any other IDS 196 course except with special permission of Field Studies Program Staff and Field Placement Agency. Not open to students who have previously taken any other ID's course except with special permission of Field Studies Director. An examination of community advocacy as an urban dilemma such as affirmative action, citizens' advisory boards, present problems of urban bureaucracies to these systems and an exploration of policy alternatives for future advocacy systems from the point of view of community organizations such as Oakland Rehabilitation Project, Community Ownership Organizing Project, etc. (196D: F; 196E—196W: 196E—196F: Sp)

Field Studies Program: Faculty from relevant departments; Program Director: Mr. Graves

**196G—198H—196G. Field Studies Program: The Economic Crisis. (5—5—5) Two hours of seminar and twelve hours of field work per week. Prerequisite: Two quarters of the sequence must be taken for credit. Enrollment in each seminar limited and determined by Field Studies Program Staff and Field Placement Agency. Not open to students who have previously taken any other IDS 196 course except with special permission of Field Studies Program Staff and Field Placement Agency. Not open to students who have previously taken any other IDS 196 course except with special permission of Field Studies Director. An interdisciplinary exploration of the roots and dimensions of the current economic crisis and its impact on social services and daily life. Placements include unemployment, welfare, and food agencies as well as community organizations. (196F: F; 196E—196W: 196E—196F: Sp)

Field Studies Program: Faculty from relevant departments; Program Director: Mr. Graves

**196J—196K—196L. Field Studies Program: Criminal Justice. (5—5—5) Two hours of seminar and twelve hours of field work per week. Prerequisite: Two quarters of the sequence must be taken for credit. Enrollment in each seminar limited and determined by Field Studies Program Staff and Field Placement Agency. Not open to students who have previously taken any other IDS 196 course except with special permission of Field Studies Director. This course attempts to integrate theoretical perspectives on community mental health with practice in interdisciplinary. This practicum includes: group work, peer-group learning. Placements are arranged in East Bay mental health centers, clinics, and homes for emotionally disturbed young people. (196F: F; 196E—196W: 196E—196F: Sp)

Field Studies Program: Faculty from relevant departments; Program Director: Mr. Graves

**196M—196N—196O. Field Studies Program: Consumer Protection. (5—5—5) Two hours of seminar and twelve hours of field work per week. Prerequisite: Two quarters of the sequence must be taken for credit. Enrollment in each seminar limited and determined by Field Studies Program Staff. 196D is prerequisite to 196E and 196D and 196E are prerequisite to 196F which may be taken only with approval of Field Studies Program Staff and Field Placement Agency. Not open to students who have previously taken any other IDS 196 course except with special permission of Field Studies Director. Course attempts to integrate theoretical perspectives on community mental health with practice in interdisciplinary. This practicum includes: group work, peer-group learning. Placements include a wide variety of criminal justice institutions including courts, jails, and service agencies. (196D: F; 196E—196W: 196E—196F: Sp)

Field Studies Program: Faculty from relevant departments; Program Director: Mr. Graves

**196P—198Q—196R. Field Studies Program: Public Advocacy. (5—5—5) Two hours of seminar and twelve hours of field work per week. Prerequisite: Two quarters of the sequence must be taken for credit. Enrollment in each seminar limited and determined by Field Studies Program Staff. 196P is prerequisite to 196Q and 196P and 196Q are prerequisite to 196R which may be taken only with approval of Field Studies Program Staff and Field Placement Agency. Not open to students who have previously taken any other IDS 196 course except with special permission of Field Studies Director. Issues and skills involved in providing legal assistance to disadvantaged persons and others involved with matters of public interest. Students work under attorneys' supervision in East Bay Legal Assistance

GRADUATE COURSES


Field Studies Program: Faculty from relevant departments; Program Director: Mr. Graves

200L. Advanced Laboratory in Neurophysiology. (5) Formerly Zoology 225L. Two one-and-one-half hour lectures per week. Prerequisites: consent of instructor. Lectures and exercises include: electrophysiological and psychophysical tools in the investigation of single action potentials, studies of basic principles of neural integrations, control of motor systems, and the development of functional aggregates; human psychological, and physiological mechanisms of sensation, perception, coordination and motor control in vertebrates. The organization of reflex activity, rhythmic and patterned behavior, and psychophysical neurobiology. (196F: F; 196E—196W: 196E—196F: Sp)

Field Studies Program: Faculty from relevant departments; Program Director: Mr. Graves

202L. Advanced Laboratory in Neutral Integration and Coordination. (2) Four hours of laboratory per week. Prerequisite: course IDS 200L. 202L or consent of instructor. Advanced laboratory in electrophysiological and psychophysical tools in the investigation of single action potentials, studies of basic principles of neural integrations, control of motor systems, and the development of functional aggregates; human psychological, and physiological mechanisms of sensation, perception, coordination and motor control in vertebrates. The organization of reflex activity, rhythmic and patterned behavior, and psychophysical neurobiology.

Physiology/Anatomy: Mr. Keller (Sp)

203A—203B—203C. Concepts of Mental Dysfunction. (3—3—3) Three hours of lecture per week. Prerequisite: 196L. 203B and 203C are prerequisite to 203A which is open to students who have previously taken any other IDS 196 course except with special permission of Field Studies Director.

Course numbers 203A—203B—203C (see above), 205A—205B—205C, 205E—205F, 205G—205H, 205J—205K, 205L—205M, 207E—207F, 207G—207H, 207I—207J, 208A—208B, 208C—208D, 208E—208F, 208G—208H, 208I—208J, 209A—209B—209C are courses offered by Health and Medical Sciences Program. Information about this program, the Health and Medical Sciences Program, can be obtained by calling the Building 17 office.

205A—205B—205C. Physician Skills. (2—3—3) 205A formerly 205A; 205C formerly 205B. Prerequisite: IDS 205A and 205B; graduate standing in Medical Option of Health and Medical Sciences Program. Simultaneous enrollment in IDS 205C. IDS 205A provides an introduction to physician skills and techniques which will be put into practical application in community clinical settings during 205B and 205C. Physical diagnosis principles and history taking will be taught with direct 1:1 supervision.

205D—205E—205F. Clinical Correlates: Introduction to Clinical Medicine. (2—2—2) Two 1/2 hour lectures and 2 1/2 hours of laboratory per week. Prerequisite: consent of instructor. Patho-physiological correlates of medicine. Introduction to specific aspects of medicine (gynecology, obstetrics, pediatrics, psychiatry, surgery, psychiatry). Lectures and presentations of clinical cases. Health Sciences: The Staff; Genetics: L. Baldwin, and Economics 201 or Econometrics.

206A—206B—206C. Introduction to Clinical Medicine: Basic Principles of Disease Processes. (3—3—3) Four and a half hours of lecture per week. Prerequisite: Graduate standing in Medical Option of Health and Medical Sciences Program. Introduction to medical disease process: (1) presentation of clinical diseases selected to correlate with basic science courses; (2) lectures covering the basic principles of disease processes. (196F: F; 196E—196W: 196E—196F: Sp)

Field Studies Program: Faculty from relevant departments; Program Director: Mr. Graves

206D—206E—206F. Introduction to Clinical Medicine: Problem-Solving Approach to Clinical Diagnosis. (3—3—3) Three hours of lecture per week. Prerequisite: IDS 206A—206B—206C and graduate standing in the Medical Option of the Health and Medical Sciences Program. 206D emphasizes the problem-solving approach and, through didactic presentations, development of the relationship between clinical manifestations and the underlying disease process. 206E is a seminar devoted to critical thinking. 206F is an individual seminar with the student and instructor. (196F: F; 196E—196W: 196E—196F: Sp)

Field Studies Program: Faculty from relevant departments; Program Director: Mr. Graves

210. Physical Basis of Radiology and Nuclear Medicine. (4) Three hours of lecture and discussion and one half-day field trip per week. Provides the basic in radiation physics necessary for intelligent use, understanding and evaluation of clinical services given by radiologists and nuclear medicine clinicians. Topics: fundamental radiation physics, radiation biology, environmental radiation, introduction to physical basis of nuclear medicine, clinical diagnostic and therapeutic radiology. To be offered 1976–77 only. Mr. Brear, Mr. Nichols, Mr. Hayes, Mr. Mel (Sp)

211. Geological and Engineering Factors In Environmental Science. (4) Three hours of lecture and discussion and one half-day field trip per week. Prerequisite: consent of instructor. Consideration of the influence of geology and site conditions on urban land use. Field trips and observations of procedures for incorporating geologic and engineering considerations into planning to avoid problems such as landslides, flooding, and earthquake damage. Text required. Geology and Geophysics: Mr. Leopold (W).

Civil Engineering: Mr. Harler; Landscape Architecture: Mr. Graham (W).

212A–212B. Physical Diagnosis for the Mental Health Practitioner. (2–2) One and a half hours of lecture per week. Prerequisite: Graduate standing in the Mental Health Option of the Health and Medical Sciences Program. Two-quarter sequence provides basic instruction for mental health practitioners in taking and analyzing personal history and performing physical examinations. Emphasis during first quarter on normal finding with some exposure to relevant pathologic findings, and second quarter emphasizes format of history and presentation of findings. To be offered 1976–77 only. Mr. Jauregui (W, Sp)

214A–214B–214C. Law and Society. (4–4–4) Two hours of lecture per week. Prerequisite: consent of instructor. Undergraduate students and social science graduate students doing advanced graduate work in the area of law and society. Introduction to interdisciplinary research in the role of law in society. Credit and grade to be awarded upon completion of the sequence. Anthropology: Law; Sociology: Criminology.

215A-215B. Faunal Analysis in Archeology. (4–4) One hour of lecture, one 3-hour laboratory per week. Prerequisite: a course in comparative anatomy or Paleontology 126, which may be taken concurrently. Introduction to the study of small animal remains in the context of archeological principles and procedures in faunal analysis of archeological sites, and practical training in the use of research methods. May be taken on a pass/no pass basis. Paleontology: Mr. Clemons, Mr. Savage; Anthropology: Mr. Isaac, Mr. Roder (Sp).

216. Pollen Analysis. (4) Two hours of lecture and three hours of laboratory per week. Prerequisite: consent of instructor. Introduction to the theory and techniques of the pollen analysis of palynological materials in archaeological and paleo-ecological contexts. Advanced undergraduates may enroll with consent of instructor. Paleontology: Geology: Mr. Byrne (F) 217A-217B–217C. Theoretical Concepts in Mental Health. (3–3–3) Three hours of lecture per week. Prerequisite: Graduate standing in the Mental Health Option of the Health & Medical Sciences Program or consent of instructor. Basic theory of mental health and human development. Emphasis on the development of a theoretical framework. Unified overview will integrate theoretical concepts of the psychological apparatus, unconscious mental activity and conflict, of adaption and motivation with research data and observations from biological, anthropologic and other disciplines. Health and Medical Sciences: Mr. Armspach; Public Health: Mr. Duh (F, W, Sp)

218A–218B. Developmental Concepts in Mental Health. (3–3) Three hours of lecture per week. Prerequisite: Graduate standing in the Mental Health Option of the Health and Medical Sciences Program or consent of instructor. Basic principles of human development and the life cycle presented within a psychoanalytic framework. Emphasis is on the use of material derived from sociology, psychology and clinical psychoanalysis; infant and child observations and experimental situations to study normal stages of development. Mr. Alterman, Mr. Duh (F, Sp)

219A–219B. Multidisciplinary Design. (3–4) Four hours of lecture and variable hours of laboratory per week in winter quarter; four hours of lecture and variable hours of laboratory per week in spring quarter. Prerequisite: graduate standing or consent of instructor. Course dealing with approaches to design of projects requiring participation of several disciplines and design professions. Organization and conduct of multidisciplinary design teams. Interaction with community decision-making processes in establishing project goals, social and environmental.

City and Regional Planning: Mr. Webber; Civil Engineering: Mr. Garrison (W, Sp)

220. Ethical Perspectives on Health Issues: Biomedical Ethics. (3) Three hours of lecture per week. Prerequisite: familiarity with at least one area of health sciences (e.g., biology, genetics, public health, mental health, etc.) is assumed. Prior work in philosophy required but would be helpful. The purpose of the course is to identify and discuss cases and issues in health where it is clear that ethical principles and specifically, ethical concerns are interwoven with biomedical issues in the world of social policy. Health and Medical Sciences: Mr. Blum (F).

221A–221B. Problems in Municipal Services. (4) Two hours of lecture and two hours of recitation each week. Prerequisite: graduate standing; Statistics 134A-134B or equivalent, or Economics 140 or equivalent, or City and Regional Planning 201 or 205 or equivalent, or Economics 201A-201B-201C or equivalent, plus consent of instructor. Credit and grade will be awarded on completion of the sequence. Law: Mr. Diamond; Health and Medical Sciences: Mr. Elson, Mr. Karan (Su)


223A–223B. Mental Health Practicum. (3–3) Three hours of lecture per week. Prerequisite: Graduate standing in Health Science Program/Mental Health Option. Attendance in both quarters required for grade. Practicum approach to a study of human development.

Participant observation in various settings illustrate normal and pathological development. Two-hour observation period including didactic presentation and interviewing followed by a one-hour discussion. After the first quarter, students conduct their own interviews.

Law: Mr. Diamond; Health and Medical Sciences: Mr. Elson, Mr. Warner (Su)

223C. Mental Health Practicum. (3) Three hours of lecture per week. Prerequisite: Second year graduate standing in Health Science Program/Mental Health Option, or consent of instructor. A practicum approach to a study of human development. Participant observation in various settings illustrate normal and pathological development. Two-hour observation period including didactic presentation and interviewing followed by a one-hour discussion. Students conduct their own interviews.

Law: Mr. Diamond; Health and Medical Sciences: Mr. Elson, Mr. Warner (Su)

223D–223E–223F. Mental Health Practicum. (3–3–3) Three hours of lecture per week. Prerequisite: Second year graduate standing in Health Science Program/Mental Health Option or consent of instructor. Credit and grade will be awarded on completion of sequence. A practicum approach to a study of human development. Participant observations in various settings illustrate normal and pathological development. Two-hour observation period including didactic presentation and interviewing followed by a one-hour discussion. After the first quarter, students conduct their own interviews.

Law: Mr. Diamond; Health and Medical Sciences: Mr. Elson, Mr. Warner (Su)

224. Cooperative Research Workshop in Transportation Economics. (3) Prerequisite: Economics 201A–201B–201C, or equivalent, plus consent of instructor. May be repeated for credit. Demand and supply in the transportation sector; behavior of transportation agencies; financing of transportation systems.

NOTE: For key to symbols, see page 34.
225A–225B. Experimental Design Project in Solid Waste Management. (4) Three hours of lecture per week. Prerequisite: consent of instructor. Offers task oriented group design experience in selected solid waste management problems. Emphasis will focus on current community needs for waste management systems. Mechanical Engineering: Mr. Hurblut; Environmental Engineering: Mr. Glassy; Graduate School of Public Policy: Mr. McGuire (W, Sp).

226. Family Systems. (3) Three hours of seminar per week. Prerequisite: permission of instructor. An interdisciplinary course focusing on different family systems from historical and sociological backgrounds. The purpose of this course is to develop the knowledge as a basis, problems inherent in both functional and dysfunctional family systems, as they relate to health, education, and the professions. Social Welfare: (F, W, Sp)

227A–227B. Introduction to the Clinical Process. (3–3) One and one-half hour lecture and one and one-half hour lab per week. Prerequisite: consent of instructor. A seminar course devoted to consideration of patient research in Paleanthropology and related subjects. Anthropology: Mr. Collins (W).

230. Urban Environmental Planning. (4) Two 2-hour meetings per week. Prerequisite: Graduate standing. Comprehensive environmental analysis emphasizes the values can be incorporated into the planning, project review, and the urban design process. Case studies will represent planning strategies, environmental impact assessments, design participation methods, the role of "design"; zoning, standards, and in risk evaluation techniques in planning for environmental quality. City and Regional Planning: Mr. Appleyard; Landscape Architecture: Mr. Appleyard; Mr. Dickert (Sp).

232A–232B–232C. Interdisciplinary Course for Key Personnel in Day Care. (2–2–2) Two hours of seminar per week, and one hour of conference per week. Prerequisite: consent of instructor. A seminar-oriented interdisciplinary Program for Key Personnel in Day Care Services. Selected topics relevant to the faculty, coordination, and supervision of personnel. Emphasis will be placed on the day care and related health services. Must be taken concurrently with IDS 232A–232B–232C. Credit and grade assigned upon completion of full sequence. Miss Almy; Public Health: Miss Wallace; Mr. Chang; Social Welfare: Mr. Witte (F, W, Sp).

232L–232M–232N. Laboratory in Day Care. (1–3; 1–3; 1–3) Formal IDS 232L; 1 hour of conference per week. One hour of session and five to fifteen hours of field work per week. Prerequisite: admission to Interdisciplinary Program for Key Personnel in Day Care Services. Field experience in agencies whose work relates to day care and related child development and health services. Must be taken concurrently with IDS 232A–232B–232C. Credit and grade assigned upon completion of full sequence. Education: Miss Patterson; Public Health: Mr. Diamond; Law: Mr. Diamond; Public Health: Mr. Syma, Mr. Marmol (F); Anthropology: Mr. Appleyard; Mr. Dickert (Sp).

240. Nutrition of Population Groups. (3) One 3-hour lecture per week. Prerequisite: consent of instructor. Study of nutrition in contemporary society, aimed at developing understanding of the interrelationships among groups of people. Emphasis will focus on current community needs for food management systems. Mechanical Engineering: Mr. Hurblut; Environmental Engineering: Mr. Glassy; Graduate School of Public Policy: Mr. McGuire (W, Sp).

241. The Urban Environment. (3–4) Two 1 1/2-hour lectures and one 2-hour laboratory per week. Prerequisite: consent of instructor. An interdisciplinary course focusing on different family systems from historical and sociological backgrounds during significant life changes. Using this environment as the content, the course will present the interrelationships among the physical and social environment. Environ mental problems, attitudes, and crises. Emphasis will be placed on the urban design process. City and Regional Planning: Mr. Appleyard; Psych: Mr. Clark (Sp).

242. Environmental Psychology. (4) One 2 1/2-hour lecture and one 1-hour discussion per week. Prerequisite: consent of the instructors. Review of current research in environmental psychology, the psychological functions of the urban and natural environments, theories of man-environmental relations, and research and survey techniques in planning and design. City and Regional Planning: Mr. Appleyard; Psychology: Mr. Clark (Sp).

253. Astrophysical Spectroscopy. (3) Three hours of lecture per week. Prerequisite: Physics 110A-110B or equivalent. Basic physics of radiation processes in an astrophysical environment. Cosmic ray production and propagation. Applications selected from pulsars, x-ray sources, supernovae, interstellar medium, intergalactic absorption, radio sources, quasars, and big-bang cosmologies. Physics: Mr. McKee; Astronomy: Mr. Arons (Sp).

272. Neurobiology of Language. (4) Four hours of lecture per week. Prerequisite: consent of instructor. A seminar course focusing on the role of biology in language development. Topics will include (1) language evolution and change; (2) functional and neurophysiological substrates of language, especially from a developmental perspective; (3) neuropsychology of language and cognition; and (4) language systems in humans. Course will include lectures and reports. Linguistics: Mr. Wang; Psychology: Mr. Leiman (Sp).

275. Qualitative Educational Evaluation. (3) Three hours of seminar per week. An intensive seminar in the non-statistical aspects of designing, implementing, and analyzing evaluations of educational projects, procedures, personnel, students, and systems. Emphasis on realistic examples, probably including collaboration on a contract for an evaluation. Most materials will be provided, including background materials on ethics, value judgments in science, etc. Education: Philosophy: Mr. Slevin (F).

276. Theoretical Astrophysics Seminar. (2) Two hours of seminar per week. Must be taken on a satisfactory/unsatisfactory basis. The study of the theoretical astrophysics. Astronomy: Mr. Arons; Mr. Silk, Mr. Shu (F, W, Sp).

289A. Turbulence and its Mathematical Analysis. (4–4) Three hours of lecture per week. Prerequisite: Mathematics Students: exposure to partial differential equations. Engineering and Physics Students: a graduate course in fluid mechanics. Mathematics: Dr. Decarlo; Astronomy: Mr. Gaustad (F).

292A–292B. Psychology and Aesthetics. (5–5) Two hours of lecture per week. Prerequisite: completion of year of English Composition. A graduate course in fluid mechanics. Mathematics: Dr. Decarlo; Astronomy: Mr. Gaustad (F).

300. Techniques of Teaching for Teaching Assistants. (2) Two hours of seminar per week. Prerequisite: T.A. S must be teaching during quarter of enrollment. A seminar directed toward improving the teaching skills of the assistants. The variety of methods of facilitating learning is investigated and evaluated, common classroom problems are discussed, and videotapes of A's classroom teaching are analyzed. Miss Napel (F, W, Sp).

International Education
Department Office, 2538 Channing Way, Room 104, Building D
William A. McCormack, Ph.D. (Director and Chairman)

The Education Abroad Program for undergraduates and graduates is under the Office of International Education. For additional information see index.

The Office of International Education also sponsors the Professional Studies Program in New Delhi, India. Students from the professional schools spend three quarters in New Delhi and the University of California at Berkeley. Each student is given an academic staff member from the program's academic staff. The students also work as interns in local government agencies appropriate to their professional interest.

UPPER DIVISION COURSES
100. Cultural Traditions of India. (1–4) One to four hours of seminar per week, plus field trips. An inter-
disciplinarily to the religious, historic, literary, artistic, and architectural achievements of Indian civilization. Activities will include: readings, lectures, slides, and discussions. Field trips to performances, museums, and historic sites will be included. Enrollment limited to participants in the Professional Studies Program: India. The Staff (F, W, Sp)

GRADUATE COURSES

200. Cultural Traditions of India. (1-4) One to four hours of seminar per week, plus field trips. An interdisciplinary approach to the religious, historic, literary, artistic, and architectural achievements of Indian civilization. Activities will include: readings, lectures, slides, and discussions. Field trips to performances, museums, and historic sites will be included. Enrollment limited to participants in the Professional Studies Program: India. The Staff (F, W, Sp)

299. Supervised Independent Study and Research. (1-5) Prerequisite: open only to graduate students who are engaged in advanced study. Credit earned only with specific arrangements with a Berkeley professor, approval of the student's major adviser and the Director of International Education, before leaving for the study abroad. Must be taken on a passed/not passed basis. Mr. McCormack

400. Modernization in Contemporary India. (1-4) One to four hours per week. This course will deal with problems of development and social change; the economics of modernization, the impact of industrialization. The role of the professional as an aspect of modernization. Open only to graduate students. The Staff (F, W, Sp)

497A. India. Limited to participants in the Professional Studies Program: India. The Staff (F, W, Sp)

497B. Japan. Limited to exchange students in the Berkeley/Sakai program in Landscape Architecture.

Military Science

Department Office, 74 Harmon Gymnasium

Professor: Monte R. Bullard, M.A., Lieutenant Colonel

Associate Professors: Masayoshi Ruselski, M.A., Patrick L. Hatcher, M.A., Major

Assistant Professors: Terence C. Holland, M.S., Captain Michael S. Taylor, M.A., Captain

Adjunct Professor: William G. Eckhardt, L.D., Major

The Department of Military Science offers a variety of courses of general interest and provides a program which can lead to a commission in the United States Army. Candidates for a commission complete a series of Military Science courses and laboratory work while earning a baccalaureate degree in any accepted university discipline and are commissioned in the Regular Army or Reserve Army upon graduation.

ROTC cadets can complete the Military Science requirement through a four-year, two-year, or special program. In the four-year program, students enter as freshmen and complete course work progressively until graduation. To qualify for the two-year program, students must have three years of resident work (undergraduate or graduate) remaining at the University and must attend a basic six-week camp (Military Science 439) unless they have active duty experience. Application for the two-year program must be submitted by April 1 annually. Special programs through compression of course work and credit for related academic work in other departments is possible on approval of the Department Chairman. Veterans are given credit for the first two years of ROTC and can enter the program as a Junior without attending the basic camp.

Students seeking a commission normally complete the following courses in the sequence listed: (I) 12, 432, 431; (II) 20, 21, 121; (III) 302, 142, 401; (IV) 170, 144, 145. These courses, however, are not all mandatory, and with the concurrence of the Professor of Military Science, a required course may be replaced by another course in the Department. In addition, appropriate university courses from other departments may be substituted.

Throughout the academic year a mandatory leadership lab will be conducted for ROTC cadets. It consists of a one-hour session per week of applied leadership and professional training in military skills.

One summer training period, course 440, is required of all cadets before they are commissioned. This training lasts six weeks and is conducted at an active Army post. The purpose of summer training is to offer a real life situation in which the theoretical approaches of management and leadership are practically applied. Students are furnished texts, uniforms, travel allowance and cadet pay (50% of 2nd Lieutenant's pay) for the duration of this course.

Students planning to attend graduate school are commissioned and routinely deferred from active service until their graduate training is completed at no expense to the government.

Students who qualify may train as pilots at government expense during the last year of their ROTC program. Successful completion of this course leads to a private pilot's license.

ROTC cadets receive financial assistance during their Junior and Senior years, ($100 monthly for up to 10 months), and are eligible for a three- or one-year scholarship awarded in nation-wide competition. These scholarships pay all university fees, tuition, books, and a $100 monthly living allowance during the school year. (High school seniors interested in a four-year scholarship should contact the department prior to December 1 of their senior year.)

NOTE: For key to symbols, see page 34.
Students are also paid for attendance at the basic and advanced camps, as well as transportation to and from those camps. Veterans can continue to receive their GI Bill financial benefits in addition to the Roto Service obligation for scholar-ship students is four years active duty. All others incur a two-year obligation (which may be reduced to 3 months).

Military Science courses are open to all students, male and female, with the permission of the instructor. Military courses can also be taken through University extension or through cross-enrollment from East Bay community colleges.

For more information concerning Roto or the Military Science program, call the Chairman of the Department—Phone: 642-3574.

### LOWER DIVISION COURSES

**110. The Role of the Military In Society.** (2) Two hours of lecture per week. A survey of the relationships between military institutions and the societies within which they function. Focus will be on the political, social, and economical and ethical aspects of civil-military relationships. The Staff (F)

**117. National Security Policy.** (1) One hour of lecture per week. An introductory course on the subject of national security policy and its relationship to defense and foreign policy. Emphasis will be on the development of national security policy. Mr. Hatcher (F)

**210. Evolution of American Warfare: 1775–1865.** (3) Three hours of lecture per week. A study of the evolution of American warfare. Social, economic, and political influences are examined, tracing the development of the military institution. Emphasis is placed on the evolution of American military thought. Effect of American military organizations on social, political, and cultural life. Mr. Hatcher (W)


**213. Military Theory and Evolution of Warfare.** (2) Two hours of lecture per week. A study of the evolution of military thought, recent developments, and the impact of warfare on the social, political, and cultural life of society. Mr. Hatcher (F)

### PROFESSIONAL COURSES

**431. Fundamentals of Terrain Representation and Analysis.** (2) Two hours of lecture per week. Basic principles of graphic representation and interpretation, location plotting and methods of measuring distance and direction, the use of intersection and resection, use of topographic maps in offensive and defensive operations, patrol construction, use of symbols, aerial photo interpretation. One field trip. Mr. Holland (Sp)

**432. Military Organizations and Functions.** (2) Two hours of lecture per week. An analysis of the military organization, its structure, and functions. Mr. Holland (Sp)

**435. Leadership Laboratory.** Two hours of laboratory per week. Required of all Military Science cadets. Practical exercises in leadership military skills. Mr. Ekhardt (F, W, Sp)

**439. Basic Summer Camp.** Forty-eight hours of instruction. The Separate Roto Cadets. June 1 to July 31, 1967. Mr. Ekhardt (F, W)

**440. Advanced Summer Camp.** Forty-eight hours of instruction per week for six weeks. Prerequisite: open only to Roto Cadets. Attendance is required prior to commissioning. Mr. Ekhardt (F, W)

### NAVAL SCIENCE

Department Office, 25 Callaghan Hall

Six professors in this department are commissioned officers of the United States Navy and Marine Corps especially selected by the Navy and the University of California for teaching the Naval Science curriculum.

**Professor:**

Frank T. Watkins, Jr., M.S., U.S. Navy

**Assistant Professor:**

Paul R. Hudson, M.S., Lieutenant, U.S. Navy

David W. Blizzard, M.A., Lieutenant, U.S. Marine Corps Reserve

**Captain, U.S. Marine Corps:**

Frank T. Watkins, Jr., M.S., Captain, U.S. Marine Corps

**James C. Linville, B.S., Lieutenant, U.S. Navy Reserve:**

**Assistant Professor:**

David W. Blizzard, M.A., Lieutenant, U.S. Marine Corps Reserve

The Department of Naval Science offers several programs of instruction for men and women leading to regular or reserve commissions in the U.S. Navy or U.S. Marine Corps.

1. **NROTC College Program:** This is a four-year, non-scholarship program open to physically qualified men and women between the ages of 17 and 21. Freshmen, and sophomores in a five-year bachelor's degree program, are the most likely candidates for this program.

2. **NROTC Two-Year Program:** This program is open to men and women who will be entering their junior year of undergraduate study. Applications are made early in the fall. Scholarships may be offered to highly qualified College Program students.

3. **Two-Year Scholarships:** These programs are open to academically and physically qualified male students in their second year of undergraduate study, who have had some background in college physics and calculus. As with the Two-Year Program described above, candidates will attend a summer Naval Science Institute before their junior year. They will receive full tuition, fees, book expense, and $100 per month during their last two years. Upon graduation, they will receive Regular Navy commissions and enter nuclear power training or other Navy fields as Ensigns. Applications should be made by April 1, usually in the summer of the senior year.

4. **NROTC Scholarship Program:** This is a nationwide competition open to physically qualified men and women between the ages of 17 and 21. U.S. citizenship is required. High school seniors and students enrolled in the NROTC College Program are eligible to apply. Successful applicants receive $100 $100 per month for four years, plus full payment for tuition, fees, and book expenses. Three summer training cruises are required. Upon graduation, the student receives a commission in the Regular Navy or Marine Corps with a four-year active duty obligation. November 15th is the application deadline.

For further information, direct inquiries to the Professor of Naval Science, 25 Callaghan Hall.

### LOWER DIVISION COURSES

**1A–1B. Naval Ships Systems.** (3–3) Three hours of lecture per week. Study of the theory of operation of ship's internal systems. Emphasis on ship stability and its application to damage control systems, thermal propagation in marine plants, and electrical distribution and generation. Mr. Linville (F, W)

**2A–2B. American Military Affairs.** (4–4) Three hours of lecture per week. A study of U.S. military affairs from the American Revolution to the present with emphasis on the period since the Civil War. It analyzes the transformation from the limited wars of the eighteenth century to the total war of the twentieth century and the brushfire wars of the last two decades. Mr. Price (W)

### UPPER DIVISION COURSES

**112A–112B. Navigation.** (4–4) Three hours of lec-
ture per week. This course seeks to define the concept, warfare shipboard naval weapons systems. Emphasis
write a paper based upon research. (1-5) Prerequisite: upper division standing, 
explore the doctrinal origin and trace the evolution of
relations listed on page 34. Must be taken on a passed/
M. Blizzard (Sp)
**154. Amphibious Warfare. (3) Three hours of lec-
Mr. Hodson (Sp)
**199. Supervised Independent Study and Re-
Mr. Blizzard (W)
**194. Amphibious Warfare. (3) Three hours of lec-
Mr. Linville (Sp)
**411. Naval Operations. (2) Two hours of lecture
Mr. Hodson (F)

Personalized System of Instruction

A number of self-paced courses, also known as Keller
Plan or PSI (Personalized System of Instruction)
courses, are currently offered at Berkeley. Students
who do not need the motivation imposed by deadlines
are most likely to profit from these courses. While each
course is unique, they typically have the following char-
acteristics:
1. Few lectures are given. Students learn the material
through study guides, workbooks and textbooks.
2. Students complete the work at their own pace.
3. Students must demonstrate mastery of the material
covered, usually through a quiz or an assignment, be-
fore proceeding to more advanced topics.
4. Students meet periodically with the instructors or
tutors to ask questions or discuss problems.
5. Variable amounts of credit may be granted.
Example, if a student completes half of the assignments
required by a 4 unit course, 2 units of credit are as-
signed.

This method of instruction is most popular in intro-
ducory language and science courses. The following
courses are currently taught through this format: Com-
puter Science 1S, 3S, 101S, 103S; German 14A, 14B,
14C, 14D; Italian 14A, 14B, 14C, 14D; Landscape Ar-
chitecture 112; Mathematics PS, 1S; Physics 6AS, 6BS;
Spanish 14A, 14B, 14C.

Special Summer Program for Teachers

(June 21–July 23, 1976)
The Special Summer Program is an in-service education program
in several fields of specialization, is planned and administered by the School
of Education in cooperation with other departments of the University. Each
course offered carries nine quarter units, the equivalent
of six semester units, and one course constitutes a full
academic load. Credit earned may be applied toward
California teaching credentials. Admission to the pro-
gram is on a separate and different procedure from admi-
sion to a regular quarter or to a summer session at the
University. Fees for the five-week session in 1976 in-
clude a $10 application fee, a $213 tuition fee, and a
$2 student union fee—a total of $225. Auditors or
visitors are not allowed in the Summer Program
classes. You may obtain information about courses
offered and an application form by writing to Education
Admissions Office, 1605 Tolman Hall, University of
California, Berkeley, CA 94720. The telephone number is
(415) 642-0841.

Subject A: English Composition

Department Office, 216 Dwinelle Annex
Lecturers:
Phyllis Brooks, M.A. Kimberly S. Davis, M.A.
(Supervisor) (Acting Supervisor)
See page 15 for Subject A information.

**1. Introduction to Language. (2) Four hours of
lecture and one-half hour of tutorial per week. An intro-
ductive course designed to develop the proficiency in
writing required for successful university work. Lect-
ures, readings, class discussions, regular writing as-
signments focusing on the nature and function of lan-
guage. Fulfills the Subject A requirement.
Miss Brooks, Mr. Davis and Staff (F, W, Sp)
SYSTEMWIDE ADMINISTRATIVE OFFICERS

David S. Saxon
President of the University

Chester O. McCorquodale, Jr.
Vice President of the University

Donald C. Swin
Academic Vice President

Arcibald Kleinhegner
Vice President—Academic and Staff Personnel Relations

James B. Kendrick, Jr.
Vice President—Agricultural Sciences

John A. Perkins
Vice President—Business and Finance

(to be announced)
Vice President—University and Student Relations

Angus E. Taylor
University Provost

Lowell J. Paige
Special Assistant to the President for Governmental Relations

Dorothy E. Everett
Assistant President—Coordination and Review

Beverly R. Liss
Assistant President—Campus and Internal Relations

Administrative Officers, Emeriti

Clark Kerr
President of the University, Emeritus, and Professor, Emeritus, of Business Administration

Charles J. Hitch
President of the University, Emeritus, and Professor, Emeritus, of Economics

Claude B. Hutchison
Vice President of the University, Emeritus, and Dean of the College of Agriculture, Emeritus

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Vice President of the University, Emeritus, Professor, Emeritus, of Agricultural Economics, and Agricultural Economist, Emeritus

Robert M. Underhill
Vice President of the University, Emeritus, Professor, Emeritus, of Economics, and Dean of the College of Agriculture, Emeritus

Thomas J. Cunningham
General Counsel of the Regents, Emeritus

Frank L. Kidder
Vice President of Educational Relations, Emeritus, and Professor, Emeritus, of Economics

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Chancellor at Berkeley

James H. Mayer
Chancellor at Davis

Daniel G. Aldrich, Jr.
Chancellor at Irvine

Charles E. Young
Chancellor at Los Angeles

Ivan Hinderaker
Chancellor at Riverside

William D. McElroy
Chancellor at San Diego

Francis A. Sooy
Chancellor at San Francisco

Vernon E. Chadde
Chancellor at Santa Barbara

Angus E. Taylor (Acting)
Chancellor at Santa Cruz

University Professors

Melvin Calvin
Department of Chemistry, Berkeley

Josephine Miles
Department of English, Berkeley

Neil Smelser
Department of Sociology, Berkeley

Murray Krieger
Department of English and Comparative Literature, Irvine

Glenn Seiberg
Department of Chemistry, Berkeley

Charles Townes
Department of Physics, Berkeley

Sherwood Washburn
Department of Anthropology, Berkeley

Edward Teller (Emeritus)
Department of Physics, Berkeley

Harald Urey (Emeritus)
Department of Chemistry, San Diego

Lynn White, Jr. (Emeritus)
Department of History, Los Angeles

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Albert H. Bowker, Ph.D.
Chancellor

Ira Michael Heyman, LL.B.
The Vice Chancellor

Robert F. Kerley, B.S.
Vice Chancellor—Administration

George J. Mesch, B.S.
Vice Chancellor—Professional Schools and Colleges

Roderic B. Park, Ph.D.
Vice Chancellor—Provost and Dean of the College of Letters and Science

Errol W. Maschulian, M.A.
Vice Chancellor—Budget and Planning

Richard E. Erickson, M.B.A.
Vice Chancellor—Development

Glen H. Grant, Ed.D.
Vice Chancellor—Executive Assistant

Theodore H. Chenoweth, A.B.
Associate Vice Chancellor—Business Affairs

Norvel Smith, Ed.D.
Associate Vice Chancellor—Student Affairs

Anthony L. Browne
Assistant Vice Chancellor—Administrative Information Systems

James M. Corley, B.A.
Assistant Vice Chancellor—Employee Affairs

Andrew G. Jameson, Ph.D., Dr. d'Université (Paris)
Assistant Vice Chancellor—Student Affairs

Austin J. Thompson, M.S.W.
Assistant Vice Chancellor—Community Affairs

Jack H. Schuster, M.A., J.D.
Assistant to the Chancellor

Garth B. Wilson, Ph.D.
Special Assistant to the Chancellor—Public Ceremonies

Robert L. Bailey, Ed.D.
Director, Office of Admissions and Records

Gerald Brown, A.M.
ASUC Executive Director

Herbert E. Salinger, Ed.D.
Director of Career Planning and Placement Center

Jane Moorman, Ph.D.
Director of Counseling and Psychological Services

John I. Danielson, M.A.
Director of Financial Aid

W. Sheridan Warrick, M.A.
Director of Foreign Student Services and Executive Director of International House

Alice T. Pappas, M.A.
Director of Housing and Child Care Services

Ed B. Hendricks, M.S.
Housing and Food Services Business Manager

William A. McCormack, Ph.D.
International Education Director

Kooman Boychell, Ph.D.
Director, Intramurals, Recreation, Sports Clubs

Richard M. Dougherty, Ph.D.
University Librarian

Richard P. Halter, Jr., M.J.
Public Affairs Officer

Lynn R. Baranci, M.P.A.
Director, Office of Relations with Schools

Betty H. Neely, M.A.
Director of Student Activities

Austin C. Frank, Ph.D.
Director of Student Affairs Research Unit

James R. Brown, M.D.
Director, Student Health Service

G. James Lemmon, A.B.
Director of Student Information Center

Martha J. Maxwell, Ph.D.
Director of Student Learning Center

Frederick P. Morrissey, Ph.D.
Summer Sessions Director

Milton R. Stern, M.A.
Dean of University Extension

Deans of the Colleges, Schools, and Graduate Division

Earl F. Cheit, Ph.D., LL.B., L.H.D.
School of Business Administration

Norman E. Phillips, Ph.D.
College of Chemistry

Merle L. Borrowman, Ed.D.
College of Education

Ernest S. Kuh, Ph.D.
College of Engineering

Richard Bender, M.Arch.
College of Environmental Design

Sanford S. Elberg, Ph.D., L.H.D., h.c.
Graduate Division

Edwin B. Bayley, B.A.
School of Journalism

Sanford H. Kadish, B.S.S., LL.B.
School of Law

Roderic B. Park, Ph.D.
College of Letters and Science

Michael K. Buckland, Ph.D.
School of Library and Information Studies

William E. Waters, Ph.D.
College of Natural Resources

Monroe J. Hirsch, Ph.D.
School of Optometry

Warren Winkelstein, M.D., M.P.H.
School of Public Health

Aaron Wildavsky, Ph.D.
Graduate School of Public Policy

Milton Chervin, Ph.D.
School of Social Welfare
Calendar, 1976/77*

Admission to Undergraduate Status:
Application packets are available one month prior to the date shown for the beginning of the application filing period. California high school and community college students may obtain packets from their counselors; others, in person at or by writing any University of California Office of Admissions and Records. Written requests may be made as early as six weeks in advance of the filing date in order to meet the release date for application packets. All campuses observe these dates for the beginning of application filing. All applications filed during the first month of the filing period are accepted for consideration. After the first month the deadline will vary. Each college and school has enrollment quotas that limit the number of new freshmen and advanced standing students that may be admitted. Once quotas have been filled, additional applications cannot be accepted. The application may be redirected to another University campus where enrollments are still open.

These dates apply to applicants for regular, limited, or special status; a second bachelor's degree; or intercampus transfer.

Admission and Readmission to Graduate Status:
Final date for filing credentials and applications with the Dean of the Graduate Division for admission or readmission to graduate standing.

Admission and Readmission to School of Law:

Readmission to Undergraduate Status:
Final date for filing applications with the Office of Admissions and Records for readmission to undergraduate status.

Registration of students, graduate and undergraduate, in departments at Berkeley.§

School of Law, registration of students.

School of Law, term begins.

Academic and Administrative Holiday.

School of Law, instruction begins.

School of Law, study-list filing.

English Placement Examination for foreign students.

School of Law, final date to register.

Quarter begins.§

Subject A Essay Examination.

Late registration begins. Fee $25.

Pre-enrollment and assignment to sections.

School of Law, final date for students to file petitions to add or drop courses. Fee thereafter, $3. At the discretion of the Dean, grade F may be assigned in discontinued courses.

* Importance of Early Application. In order to give time for necessary correspondence and for due notice to applicants who may be required to take examinations for admission, transcripts of records should be forwarded to the Office of Admissions and Records at the earliest possible date.

† Registration forms may be obtained beginning May 16 by students registered in the spring quarter who continue in the same status in the fall quarter. Students registered in the spring term in the School of Law who continue in the same status in the fall term may pick up registration forms beginning on April 25.

§ Except School of Law.

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</table>

† Registration forms may be obtained beginning May 16 by students registered in the spring quarter who continue in the same status in the fall quarter. Students registered in the spring term in the School of Law who continue in the same status in the fall term may pick up registration forms beginning on April 25.

§ Except School of Law.
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<tr>
<th>Event</th>
<th>Fall 1976</th>
<th>Winter 1977</th>
<th>Spring 1977</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final date for filing with the committees in charge of the final form of dissertations for all doctoral degrees to be conferred in 1976-77.</td>
<td>Sept. 10, Sunday</td>
<td>-</td>
<td>March 18, Friday</td>
</tr>
<tr>
<td>Instruction begins.§</td>
<td>Sept. 27, Monday</td>
<td>Jan. 10, Monday</td>
<td>April 4, Monday</td>
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<tr>
<td>Final date for entering undergraduates, graduate fellowship and scholarship applicants and Graduate Minority Program fellowship applicants to file application for financial aid and undergraduate scholarships for 1977-78 or any quarter thereof.</td>
<td>-</td>
<td>Jan. 15, Saturday</td>
<td>-</td>
</tr>
<tr>
<td>Final date for entering Law students to file application for financial aid for 1977-78 or any semester thereof.</td>
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<td>March 1, Tuesday</td>
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<tr>
<td>Final date for continuing graduates (not applying for graduate awards), undergraduates, and continuing Law students to file application for financial aid and undergraduate scholarships for 1977-78 or any quarter/semester thereof.</td>
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<td>April 15, Friday</td>
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<tr>
<td>Study-list filing. See instructions to Students received at time of registration for details. Fee for late filing, $10.§</td>
<td>Oct. 4-8, Monday-Friday</td>
<td>Jan. 17-21, Monday-Friday</td>
<td>April 11-15, Monday-Friday</td>
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<tr>
<td>Final date to register.§</td>
<td>Oct. 15, Friday</td>
<td>Jan. 28, Friday</td>
<td>April 22, Friday</td>
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<tr>
<td>Final date for filing applications in candidacy for all master's degrees to be conferred in 1976-77; Office of the Dean of the Graduate Division, 1 California Hall. All signatures required upon these applications must be obtained in advance.</td>
<td>Oct. 8, Friday</td>
<td>-</td>
<td>April 15, Friday</td>
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<tr>
<td>Last date for filing without fee announcements of candidacy for any bachelor's degree or the doctor of optometry degree to be conferred 1976-77. Fee thereafter, $3.</td>
<td>Oct. 11, Monday</td>
<td>Jan. 24, Monday</td>
<td>April 18, Monday</td>
</tr>
<tr>
<td>Final date for filing announcements of candidacy for the bachelor's degree.</td>
<td>Oct. 15, Friday</td>
<td>Jan. 28, Friday</td>
<td>April 22, Friday</td>
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<tr>
<td>Final date for filing applications in candidacy for all doctoral degrees to be conferred in 1976-77; Office of the Dean of the Graduate Division, 1 California Hall. All signatures required upon these applications must be obtained in advance.</td>
<td>Oct. 15, Friday</td>
<td>-</td>
<td>April 22, Friday</td>
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<tr>
<td>With the exception of undergraduate students enrolled in the College of Letters and Science, final date to file petitions to add and/or drop courses and to make changes in the option of enrolling in courses on a passed/not passed or letter-graded basis. Thereafter, special approval to make any changes in the study list is required for undergraduates from the Dean of the College or School and for graduates from the Dean of the Graduate Division. For those who receive approval there is a $3.00 fee.</td>
<td>Oct. 15, Friday</td>
<td>Jan. 28, Friday</td>
<td>April 22, Friday</td>
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<tr>
<td>Undergraduates not in the College of Letters and Science:</td>
<td>Oct. 15, Friday</td>
<td>Jan. 28, Friday</td>
<td>April 22, Friday</td>
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<tr>
<td>Graduates:</td>
<td>Oct. 22, Friday</td>
<td>Feb. 4, Friday</td>
<td>April 29, Friday</td>
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<tr>
<td>Undergraduates enrolled in the College of Letters and Science:</td>
<td>Oct. 15, Friday</td>
<td>Jan. 28, Friday</td>
<td>April 22, Friday</td>
</tr>
<tr>
<td>Final date to file petitions to add courses; thereafter, special approval of the Dean is required. Final date to file petitions to drop courses without fee. Fee thereafter, $3. Final date to make changes in the option of enrolling in courses on a passed/not passed or letter-graded basis.</td>
<td>Oct. 29, Friday</td>
<td>Feb. 11, Friday</td>
<td>May 6, Friday</td>
</tr>
<tr>
<td>Undergraduates enrolled in the College of Letters and Science:</td>
<td>Oct. 29, Friday</td>
<td>Feb. 11, Friday</td>
<td>May 6, Friday</td>
</tr>
<tr>
<td>Event</td>
<td>Fall 1976</td>
<td>Winter 1977</td>
<td>Spring 1977</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Final date for filing dissertations with the Dean of the Graduate</td>
<td>Nov. 12, Friday</td>
<td></td>
<td>May 20, Friday</td>
</tr>
<tr>
<td>Division for all doctoral degrees to be conferred in 1976-77.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final date for filing with committees in charge of the final form</td>
<td>Nov. 12, Friday</td>
<td></td>
<td>May 20, Friday</td>
</tr>
<tr>
<td>of theses for master's degrees to be conferred in 1976-77.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Academic and Administrative Holiday.</strong></td>
<td>Nov. 25–26,</td>
<td>Feb. 21,</td>
<td>May 30,</td>
</tr>
<tr>
<td>Instruction ends.§</td>
<td>Thursday–Friday</td>
<td>Monday</td>
<td>Monday</td>
</tr>
<tr>
<td>Final examinations in departments.§</td>
<td>Dec. 4, Saturday</td>
<td>March 19,</td>
<td>June 11,</td>
</tr>
<tr>
<td>Final date for filing applications for fellowships and graduate</td>
<td>Dec. 6–11,</td>
<td>March 21–26,</td>
<td>June 13–18,</td>
</tr>
<tr>
<td>scholarships for 1977-78.</td>
<td>Monday–Saturday</td>
<td>Monday–Saturday</td>
<td>Monday–Saturday</td>
</tr>
<tr>
<td>Final date for filing theses with the Dean of the Graduate Division</td>
<td>Dec. 1, 1976</td>
<td></td>
<td></td>
</tr>
<tr>
<td>for all master's degrees to be conferred in 1976-77.</td>
<td>Wednesday</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quarter ends.§</td>
<td>Dec. 10, Friday</td>
<td></td>
<td>June 17,</td>
</tr>
<tr>
<td>School of Law, instruction ends.</td>
<td>Dec. 11, Saturday</td>
<td>March 26,</td>
<td>June 18,</td>
</tr>
<tr>
<td>Academic and Administrative Holiday.</td>
<td>Dec. 7, Tuesday</td>
<td>Saturday</td>
<td>Saturday</td>
</tr>
<tr>
<td>School of Law, final examinations.</td>
<td>Dec. 24, Friday</td>
<td>March 28,</td>
<td>May 1,</td>
</tr>
<tr>
<td>School of Law, term ends.</td>
<td>Dec. 31, Friday</td>
<td>Monday</td>
<td>May 30,</td>
</tr>
<tr>
<td></td>
<td>Dec. 13–23,</td>
<td></td>
<td>May 9–21,</td>
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<tr>
<td></td>
<td>Monday–Thursday</td>
<td></td>
<td>Monday–Saturday</td>
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<tr>
<td></td>
<td>Dec. 23, Thursday</td>
<td></td>
<td>May 21,</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>Saturday</td>
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2401 Bancroft Way, D-3
2556-58 Channing Way, E-5
2241-51 College Ave., E-8
2223 Fulton St., D-1
2807 Hearst St., A-5
2120 Oxford St., C-1
2220-40 Piedmont Ave., D-6
Correspondence
Directory
University of California, Berkeley, CA 94720

Office of the President
714 University Hall
for University policy matters

Office of the Chancellor
200 California Hall
for campus policy matters

Admissions: Undergraduate
Office of Admissions and Records
120 Sproul Hall
School of Optometry
Office of the Dean
107 Minor Hall

Admissions: Graduate
Graduate Admissions
1 California Hall
(except School of Law)
School of Law
Office of Admissions
220 Boalt Hall

Admissions and Records, Office of
120 Sproul Hall
for undergraduate admissions, all academic records, registration fees and expenses, veterans (and dependents of veterans) education benefits, social security benefits, Railroad Retirement, Public Employees Retirement Systems, Civil Service Commission, State Teachers' Retirement System, and veteran's pensions. (see pages 10 to 18 and 32)

ASUC
(Associated Students of UC)
211 Eshleman Hall
(see page 29)

Career Planning and Placement Center
Building T-6 & 111 Wheeler Hall
for (a) careers in education, business, government, and other fields, and (b) for student employment (see page 27)

College or School, Office of the Dean
for academic matters (see Colleges and Schools section, page 32)

Financial Aid, Office of
201 Sproul Hall
for grants, loans, scholarships, prizes, undergraduate scholarships and honors, work-study (see page 28)

Foreign Student Services
International House
2298 Piedmont Avenue
(see page 30)

Graduate Division
1 California Hall
for graduate admission, fellowships and scholarships, graduate minority program, regulations and requirements governing the master's and doctor's degrees, petitions and other matters pertaining to graduate students (see pages 17 to 26)

Housing and Child Care Services, Office of
2401 Bowditch Street
(see pages 27 to 28)

International Education
Room 104A, Building D
2537 Channing Way
(see pages 23 and 31 to 32)

Relations with Schools, Office of
407 Eshleman Hall
for E.O.P. and general information
(see page 11)

Residence Matters, Attorney in
550 University Hall, for residence status
(see pages 11 to 12)

Student Activities and Programs, Office of
103 Sproul Hall
(see page 27)

Student Health Service
Cowell Memorial Hospital
(see page 28)

University Extension
2223 Fulton Street
(see pages 9 and 19 to 20)

Publications

General Catalog, Berkeley
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 general campus information.

Office of Admissions and Records, 120 Sproul Hall. (Price $1.50 if purchased directly at the ASUC or other local bookstores; $2.50 by mail, from the Office of Admissions and Records with checks made payable to The Regents of the University of California.)

Undergraduate Admissions Circular
A complete statement of the University's requirements for admission as an undergraduate.

Office of Admissions and Records, 120 Sproul Hall. (No charge.)

Admission to Graduate Study, Berkeley
A brief description of the graduate program, including procedures and dates for filing applications, degrees offered, fields of study available, fees and expenses, financial aids, living accommodations, and sources of additional information. Course descriptions are not included.

Dean of the Graduate Division, 1 California Hall. (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 Chemistry, Engineering, Environmental Design, Letters and Science, Natural Resources.
Schools of Business Administration, Graduate School of Business Administration, Education, Law, Library and Information Studies, Optometry, Public Health, Social Welfare
The Dean of the School or College.
(No charge.)

Schedule of Classes
Lists time and place of meeting for specific classes, names of instructors, and units of credit awarded. Also contains a directory of departmental offices and offices of Instruction.
Office of Admissions and Records, 120 Sproul Hall. (Price: 25¢; 50¢ by mail.)

Summer Session Bulletin
Complete Information about summer sessions instruction.
Office of the Summer Sessions, 22 Wheeler Hall. (No charge.)
Federal Requirements

Each student is entitled by law and University policy to examine and challenge most of the records maintained by the University on that student. These records are confidential, and in most circumstances may be released to third parties only with the prior consent of the student. Such matters are detailed in the Policy Governing Disclosure of Information Pertaining to Students and Access to Student Records, available in the Office of the Director of Student Activities, 103 Sproul Hall.

As required by Title IX of the Education Amendments of 1972 (45 CRF 86), the University of California does not discriminate on the basis of sex in admission to or employment in the educational programs and activities which it operates. Inquiries concerning Title IX may be directed to the Assistant for Legal Affairs to the Vice Chancellor, Administration, 228 California Hall, 642-7122, or to the Director of the Office for Civil Rights, Department of Health, Education and Welfare, Washington, D.C. 20203.

Refund Procedure

New Undergraduate Students: Prior to Day 1, Registration Fee paid is refunded except for the $50 Acceptance of Admission Fee, and other fees paid are refunded in full. Day 1 and after, the $50 Acceptance of Admission Fee is withheld from the Registration Fee, and the Schedule of Refunds is applied to the balance of fees assessed.

All Continuing and Readmitted Students and New Graduate Students: There is a service charge of $10.00 for cancellation of registration or withdrawal before the first day of instruction. After the first day of instruction the Schedule of Refunds is applied to the total of fees assessed.

Schedule of Refunds

| Tuition, Educational Fee, University Registration Fee, and Other Student Fees | 1-14 days: 80% | 15-21 days: 60% | 22-28 days: 40% | 29-35 days: 20% | 36 days and over: 0% |

1. If no credit for courses is received, a full refund of the Registration Fee of the regular session will be granted to all students entering the armed forces prior to the end of the sixth week of the quarter. No refund thereafter.

2. The Schedule of Refunds refers to calendar days, beginning with the first day of instruction. Percentages listed (days 1-35) should be applied respectively to each Tuition, Educational Fee, University Registration Fee, and other student fees. The effective date for determining a refund of fees is the date the student files an official notice of withdrawal with the University, and it is presumed that no University services will be provided to the student after that date.

Salary and Employment Information / University of California

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<tr>
<th>FIELD OF STUDY</th>
<th>AVERAGE MONTHLY SALARY OF GRADUATES</th>
<th>PROBABLE OR DEFINITE JOB COMMITMENT</th>
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<tr>
<td>Degree Level:</td>
<td>Bachelor's</td>
<td>Master's</td>
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<tr>
<td>Engineering</td>
<td>930-1,290</td>
<td>1,030-1,410</td>
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<tr>
<td>Humanities</td>
<td>510-935</td>
<td>665-1,200</td>
</tr>
<tr>
<td>Life Science</td>
<td>545-1,000</td>
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<td>Management</td>
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<td>1,100-1,545</td>
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<td>Physical Science</td>
<td>760-1,260</td>
<td>1,280-1,720</td>
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<tr>
<td>Social Science</td>
<td>560-975</td>
<td>730-1,180</td>
</tr>
</tbody>
</table>

1. Source: A national survey of a representative group of colleges conducted by the College Placement Council, representing the 80 percent range of offers throughout the country. It should be noted that a wide variation in starting salaries exists within each discipline based on job location, type of employer, personal qualifications of the individual, and employment conditions at the time of job entry.

2. Source: The Job Market for UCLA's 1974 Graduates. Percentages are based only upon those students who planned to work immediately after graduation.
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