Key to Symbols

The following symbols are used in the departmental faculty rosters and course listings:

Faculty Roster

1. On leave, Fall, Winter, Spring
2. On leave, Fall
3. On leave, Winter
4. On leave, Spring
5. On leave, Fall and Winter
6. On leave, Winter and Spring
7. On leave, Fall and Spring
8. Recalled to active service

Course Listings

1. Not to be given, 1977–78
2. To be given if a sufficient number of students enroll
3. To be given even-numbered years (1978–79)
4. To be given odd-numbered years (1977–78)
5. Approved for one year only
6. Approved for two years only
7. Approved for three years only

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 Studies. Departments are treated as subdivisions within Colleges, Schools, and Special Studies. 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). Students should not expect to use more than a total of ten units of 198 credit for a bachelor's degree without the permission of their 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 (1) the Collegiate Seminar Program and (2) the Personalized System of Instruction, both presented under Special Studies; (3) some of the Interdepartmental Studies courses, also under Special Studies; and (4) all courses numbered 91, 191, and 291 in various departmental course listings throughout this Catalog.
School of Business Administration

School of Business Administration Office, 350 Barrows Hall

Professors:
- David A. Aaker, Ph.D.
- David A. Audretsch, Ph.D.
- K. Roland A. Artina, Econ.Dr.
- Frederick E. Balderston, Ph.D.
- Wayne S. Boulton, Ph.D., C.P.A.
- Louis P. Buckley, Ph.D.
- James M. Carmean, Ph.D.
- John P. Carte, Ph.D.
- Alan R. Cerf, Ph.D., C.P.A.
- Earl F. Child, Ph.D., J.D.
- H.L.D. (hon.) (Chairman)
- C. West Churchman, F.S.A.
- C. Bartlett McGuire, M.A.
- Thomas A. Marschak, Ph.D.
- John C. Harsanyi, Ph.D.
- Earl F. Cheit, Ph.D., J.D.
- Louis P. Bucklin, Ph.D.
- Robert N. Freeman, M.A.S.
- Hayne E. Leland, Ph.D.
- Richard H. Hotton, Ph.D.
- Michael Conant, Ph.D., J.D.
- F. George Giunan, M.B.A.
- Robert C. Goshay, Ph.D.
- Robert A. Meyer, Ph.D.
- K. Roland A. Artina, Econ.Dr.
- William A. Bums, M.B.A.
- Nils H. Hakansson, Ph.D.
- Andrew W. Shogan, Ph.D.
- Malcolm M. Davisson, Ph.D.
- Dow Votaw, LL.B., M.B.A.
- James M. Carman, Ph.D.
- Delbert J. Duncan, Ph.D.
- Van Dusen Kennedy, Ph.D.
- David A. Revzan, Ph.D.
- Robert N. Nett, J.D., M.B.A.
- Jack D. Rogers, Ph.D.
- Albert H. Schaal, Ph.D.
- Wallace F. Smith.
- George J. Sizunis, Ph.D., C.P.A.
- George Strauss, Ph.D.
- Lawrence L. Vance, Ph.D.
- Dow Volow, LL.B., M.B.A.
- John T. Wheeler, Ph.D.
- Hector R. Anton, Ph.D.
- Malcolm David, Ph.D.
- Leonard A. Doyle, Ph.D.
- Delbert J. Duncan, Ph.D.
- Erwin T. Grether, Ph.D.
- Louis. M. Donnelly, Ph.D.
- Van Dusen Kennedy, Ph.D.
- Clara Ker, Ph.D., J.D.
- Catherine Delmotte Guire, Ph.D.
- David A. Revzan, Ph.D.
- William J. Volow, Ph.D., C.P.A., F.A.S.A.
- Mark B. Garman, Ph.D.
- Richard C. Grinnold, Ph.D.
- Hayne E. Leland, Ph.D.
- F. Theodore Malm, Ph.D.
- Robert A. Meyer, Ph.D.
- Jeffrey Pfeifer, Ph.D.
- Richard P. Bagozzi, Ph.D.
- Peter R. Brown, Jr., Ph.D.
- Robert B. Bratton, Ph.D.
- David H. Downes, Ph.D.
- John F. Freeman, M.B.A.
- Gillian G. Garcia, Ph.D.
- Timothy R. Crichfield, M.S. (Acting)
- Robert N. Freeman, M.A.S. (Acting)
- William A. Burns, M.B.A.
- David W. DeMiles, Ph.D.
- Rex F. Guy, Ph.D.
- Stephen W. Kothdipan, Ph.D.
- James A. Otis, Ph.D.
- Joseph A. Pratt, Ph.D.
- Andrew W. Shogan, Ph.D.
- David Vogel, Ph.D.
- Ernest Koenigsberg, Ph.D.
- Philip McGuilp, Ph.D.
- Bruce R. Ricks, Ph.D.
- Marvin B. Smith, J.D.
- Lee B. Heter, M.B.A.
- Richard A. Light, Ph.D.
- Robert N. Ketz, J.D., M.B.A.

Undergraduate School of Business Administration

The Undergraduate School of Business Administration admits students at the junior level and offers a curriculum leading to the undergraduate degree of Bachelor of Science in Business Administration. The primary function of the School is to prepare students for eventual responsible administrative and executive positions in business, non-profit and governmental organizations, and for business ownership. You may specialize in such fields as accounting, finance, marketing, management science, organizational behavior, and real estate and land economics.

Prior to admission to the School, you should obtain a Catalog of Undergraduate School of Business Administration, available in 310 Barrows Hall.

Graduate School of Business Administration

The Graduate School offers curricula leading to the Master of Business Administration degree and to the more specialized Master of Science degree. These curricula afford opportunity for advanced and specialized training based either upon the fundamental undergraduate course work in Business Administration or upon undergraduate study in other fields.

The core courses for the master's degree include basic work in economic analysis, quantitative decision models and techniques, accounting, political, social, and legal environment of business, finance, marketing, and organizational behavior. All graduate students must maintain a B average in all courses and must pass a comprehensive examination.

You may pursue a program leading to the Ph.D. in Business Administration if you wish to prepare for university and college teaching and research or for high-level research positions in business or government.

For detailed information, consult the Announcement of the Graduate School of Business Administration.

As part of the Extended University, the Graduate School also offers an evening program in San Francisco leading to the Master of Science in Business Administration. The evening 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 Annoucement of the Graduate School of Business Administration as well as the Announcement of the Graduate Division.

LOWER DIVISION COURSE

1. Introduction to Accounting. (5) Two 2-hour lectures and 3 hours of discussion per week. Prerequisite: sophomores and juniors. Required for admission to the School of Business Administration. The identification, measurement, and reporting of the financial effects of economic events on enterprises; the contemporary model and its origins.

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

UPPER DIVISION COURSES

Prerequisites: basic micro and macro economic theory; Statistics 2 or equivalent, Mathematics 16A or equivalent, and Computer Science 1 or equivalent are required for nearly all upper division courses. Junior standing is required for all upper division courses.

100. The Price System and Business Enterprise. (5) Four and one-half hours of lecture per week. Prerequisite: must have completed basic micro and macro economic theory; Mathematics 16A or equivalent. Economic analysis applicable to the problems of business enterprises with emphasis on the determination of the nature of prices, outputs, and income effects of the state of the competitive environment on business and government policies.

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

101. Business Fluctuations and Forecasting. (5) Three and one-half hours of lecture per week. Prerequisite: course 100. Analysis of the operation of the market system with emphasis on the factors responsible for economic instability, analysis of public and business policies which are necessary as a result of business fluctuations.

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

102. Advanced Managerial Economics. (5) Three 1 1/2-hour lectures per week. Prerequisite: courses 100 and 101. Advanced analysis of the theory and practice of economic decision making in the context of the concepts and techniques of managerial economics. The business decisions to be investigated include pricing policies, internal transfer pricing, inventory management.

Mr. Meyer (W)

103. Theory and Models of Economic Forecasting. (5) Three 1 1/2-hour lectures per week. Prerequisite: course 102 or equivalent. Theory and analysis of the long-run and short-run forecasts of economic activity.

Mrs. Garcia (Sp)

NOTE: For key to symbols, see page 38.
110. 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, legal reasoning and the operation of law within the United States legal system, followed by a discussion of the legal problems pertaining to contracts and related topics, business associations, and the impact of law on economic enterprise. Mr. Katz, Mr. Conant.

Mr. M. Smith (F, W, Sp)

111. Social and Political Environment of Business. (5) Four and one-half hours of lecture per week. Pre-requisite: course 110. The development and evolution of modern society and its impact on business. Emphasis on current and common business transactions and situations, including problems arising in sales, installment buying, inventory financing, obtaining and extending credit, and the use of negotiable instruments, with emphasis on the Uniform Commercial Code. Mr. M. Smith (W)

115. Legal Aspects of Real Estate. (5) Three 1 1/2-hour lectures per week. Pre-requisite: course 110. An introduction to the basic principles of law governing the acquisition, use and disposition of real property; insurance aspects of real property. Mr. Crichfield, Mr. Smith, Mr. Hassert, Mr. Brown (F, W, Sp)

117. Law, Government and Economic Enterprise. (5) Three 1 1/2-hour lectures per week. An analysis of the impact of law upon American economic enterprise and the role of government participation in the operation of our business community. Discussion of current problems in the fields of unfair competition, securities regulations, pricing, marketing, and taxation. Mr. Conant (F)

120. Managerial Accounting. (6) Two 1 1/2-hour lectures and ten hours of discussion per week. Prerequisite: course 115 or by permission of the instructor. Development of techniques to assist management with the formulation and analysis of such linear models. This course will concentrate on the formulation and analysis of such linear models. Mr. Gilmam (F, W, Sp)

121. Financial Accounting I. (5) Three hours of lecture and two hours of discussion per week. Prerequisite: courses 1 and 120. Required for those specializing in accounting. An intermediate level course in the theory and practice of financial accounting. The measurement and reporting of the economic effects of events involving long-term assets.

122. Financial Accounting II. (5) Three hours of lecture and two hours of discussion per week. Prerequisite: course 121. Continuation of course 121. Accounting for investments in securities, intangible assets and sources of long-term capital; funds statements, financial analysis. Mr. Penman, Mr. Rhode (F, W, Sp)

123. Problems of Financial Reporting. (5) Three hours of lecture and two hours of discussion per week. Prerequisite: course 122 or the equivalent. Accounting for partnerships; consolidated financial statements; adjustments of accounting data using price indexes; accounting for the financial aspects of pension and other advanced accounting problems. Mr. Moonitz, Mr. R. Freeman (F, Sp)

124. Cost Accounting. (5) Three hours of lecture and two hours of discussion per week. Prerequisite: course 123. Study of cost accumulation systems and their interface with the flow of funds through an enterprise. Cost accumulation, direct and indirect costs; cost accounting; analyses of relevant costs and other data for decision-making.

127. Accounting Systems for Management Information. (5) Three hours of lecture and one and one-half hours of discussion per week. Prerequisite: course 124 or equivalent. Emphasis on the use of CPM, Pert and simulations.

Mr. Vance (F, W, Sp)

128. Federal Income Taxation. (5) Four and one-half hours of lecture per week. Prerequisite: courses 124 and 125. Federal income taxation; characterization of specific types of income; personal exemptions; dependency exemptions; tax 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: courses 1 and 120. Intensive study of basic cost accounting and the role of government participation in the operation of our business community. Research reports based on the field study required. Mr. Cerf (in charge) (W)

130. Financial Management. (5) Four and one-half hours of lecture per week. Pre-requisite: courses 110 and 120. Analysis of the use of real property; transfers; titles; development of industrial facilities. Special problems of uncertainty in asset valuation; income taxation; control of standards with respect to pollution; and use of scientific research and development.

Mr. Goshay (W)


133. Investments. (5) Three 1 1/2-hour lectures per week. Prerequisite: course 130 or by permission of the instructor. Sources of and demand for investment capital, operations of security markets, determination of investment policy, and procedures for analysis of securities.

Mr. Goshay, Mr. Morrissey, Mr. M. Smith, Mr. Gask (F, W, Sp)

137. Economics of Insurance. (5) Three 1 1/2-hour lectures per week. An introduction to the underlying principles of insurance, corporate financial management, and the flow of funds through an enterprise. Cash management, sources and application of funds, term loans, types and sources of long term capital, cost of capital, and financial structure. Introduction to capital markets.

Mr. Goshay (W)

138. Contemporary Problems of Insurance. (5) Three 1 1/2-hour lectures per week. Pre-requisite: course 137. Selected topics of current interest in insurance: specialized topics in life insurance, corporate finance, and international insurance.

140. Introduction to Production Management. (5) Three hours of lecture and one and one-half hours of discussion per week. Management problems related to the design, planning and control of processes, equipment, and jobs; relationship of the design, planning and control of processes, and the formulation and analysis of such linear models. Mr. Rogers (F, Sp)

141. Planning of Production Facilities. (5) Four hours of lecture and one and one-half hours of discussion per week. Prerequisite: course 140 or equivalent. Cost analysis of the design and installation of industrial facilities. Special problems of equipment selection: capacity, location; scale of operation and layout; line-balancing and waiting line analysis; systems for manufacturing and receiving and planning and control of production; materials-handling and other ancillary systems.

Mr. Rogers (F, Sp)

144. Management Science Workshop. (5) Four and one-half hours of lecture per week. Prerequisite: course 144 or equivalent. Development and application of models in decision making. Each student will prepare a report dealing with a concrete problem.

Mr. Shogan (Sp)

145. Survey of Operations Research. (6-8) Four and one-half hours of lecture per week. Prerequisite: Mathematics 16A, 16B, 110, 115, 116, and 144. The formulation and analysis of such linear models. Problems covered include linear programming, network analysis includingPERT/CMP, dynamic programming, queuing theory, and inventory theory.

146A. Applications of Linear Models to Management Decision Making. (5) Four and one-half hours of lecture per week. Prerequisite: courses 110, 107G and 116. Application of linear models to management decision making. Special emphasis on the formulation and analysis of such linear models.

Mr. Shogan (F)

146B. Problems in Decision Under Uncertainty. (5) Four and one-half hours of lecture per week. Prerequisite: courses 107G, 106G or Mathematics 116. Mathematically oriented models of decision making. Special emphasis on the formulation and analysis of such linear models.

Mr. Shogan (F)

146C. Project Management. (5) Four and one-half hours of lecture per week. Prerequisite: courses 110, 107G or Mathematics 116. Study of problems in the fields of planning, scheduling, and controlling the operations of organizations of all types.

Mr. M. Smith (F, W, Sp)

146D. Quantitative Methods in Industrial Engineering. (5) Four and one-half hours of lecture per week. Prerequisite: course 140. The use of models in the design and operation of systems. Research reports based on the field study required. Mr. Cerf (in charge) (W)

147. Computers and Modern Organizations: Theory and Application. (5) Four and one-half hours of lecture and discussion per week. Prerequisite: course 124 or the equivalent. Study of the use and limitations of computer programming or familiarity with one computer language. A survey course concerned with the importance of computers in organizations including small groups, universities, firms, government agencies, and society at large. Topics include history of development of computer technology, computerization of some management problems, information storage and retrieval, compilers, problem-oriented languages, simulation models, current developments in computer systems.

Mr. Hoggatt (F)

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, leadership, morale, social structure, groups, communications, hierarchy and control in complex organizations. The intersection of technology and social systems. Research reports based on the field study required. Mr. Brown, Mr. Freeman, Mrs. Roberts (Sp)

151. Management of Human Resources. (5) Four and one-half hours per week. Prerequisite: courses 107G or permission of the instructor. The designs and implementation of personnel policies and programs for organizational development. The interaction of selection, placement, training, personal evaluation, and career ladders within an on-going organization. Role of the HR manager. Introduction of change. Implications of behavioral research for management problems and policies.

Mr. Hoggatt (F, Sp)

154. Industrial Relations. (5) Four and one-half hours per week. Prerequisite: courses 107G or permission of the instructor. A production management courses will be offered in one or more courses. Prerequisites: courses 107G and 116. An introduction to human resource management covering the functions of management and human resource management courses. Topics include recruitment, selection, training, compensation, and employee relations. Background and functioning of employee and employer organizations. Wage, man-
functions of advertising in the economy; consumer goods and services; store management; government regulations. Mr. Revzan (W).

103. Advertising. (6) Three 1 1/2-hour lectures per week. Prerequisite: course 160. Basic concepts and fundamentals of advertising; the economy; consumer motivation; problems in utilizing advertising and measuring its effectiveness. Mr. Nicosia (F, So).

104. Industrial Procurement. (6) Four and one-half hour lectures per week. The interaction of buyer and seller in a non-ultimate consumer environment. The problems met in purchasing by industrial organizations as affecting components; major buying policies; vendor selection; quantity and quality determination; and relation of buying price, production cost, and selling price. Mr. Jacobs (W).

105. Marketing Management. (6) 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. W. Smith (F).

106. Wholesaling. (5) Three 1 1/2-hour lectures per week. Prerequisite: course 160. The meaning and importance of the wholesaler's place in the marketing structure; functions of wholesaling; the agency structure of wholesaling; internal managerial aspects; government regulations; trends and costs, profits, and efficiency. Mr. E. Kruk (F).

107. Marketing Policies and Problems. (5) Four and one-half hours of lecture per week. Prerequisite: course 160 or consent of instructor. Special topics in marketing including geographic market structures, consumer behavior, price policy, consumerism, and other topics. Course may be repeated for credit. Mr. Bucklin (F).

108. Physical Distribution and Transportation Management. (5) Three 1 1/2-hour lectures per week. The concept and practice of transportation and physical distribution of goods. Provision of transportation facilities by government and transportation services by professional and private carriers. Analysis of governmental subsidies and regulations. Mr. Conant (W).

109. Introduction to Real Estate and Urban Land Economics. (5) Three 1 1/2-hour lectures per week. The concept of real estate as a market, its value, construction, cycles; mortgage lending; equity investment; real estate administration; metropolitan growth; urban land utilization; real property valuation; public policies. Mr. W. Smith (F, W, So).

110. Valuation of Real Property. (5) Three 1 1/2-hour lectures per week. Prerequisite: course 160 or equivalent. Development of appraisal concepts and methods; the role of value estimates in private land-use and real estate investment decisions and in the implementation of public policy affecting development. Mr. W. Smith (W).

111. The Financial Management of Real Estate Resources. (5) Four and one-half hours of lecture per week. Prerequisite: course 160. Real estate debt and equity financing; mortgage market structure; effects of credit on demand; equity investment criteria; public policies in real estate finance and urban development. Mr. Schafel (SP).

112. Introduction to International Business. (5) Four and one-half hours of lecture per week. Prerequisite: senior standing. A survey involving environmental, economic, political, and social constraints on doing business abroad; effects of overseas business activities on national foreign economies; foreign market analysis and operational strategy of a firm; management problems and development potential of international operations. Mr. Burns (W, So).

113. Introduction to Organization and Decision. (5) Four and one-half hours of lecture per week. Normal organizational behavior under organizational games and the analysis of conflict in organizations; computer simulation of organizational behavior; approaches to organization design. Mr. Auerbach (F, So).

114. Experimental Courses. (5) Four hours of lecture per week. Prerequisite: course 100 or equivalent. The evolution of marketing and advertising; organization and management, marketing functions, pricing and promotion policy, marketing cost and efficiency, public and private regulation. Mr. Benkran (F, W, So).

115. Accounting I: Financial Reporting. (4) Three hours of lecture per week. Prerequisite: courses 101G, 106G, and 126G. Business finance, with emphasis upon financial problems and policies of corporations; the role of commercial banks, institutional and other investors in supplying funds for corporations. Mr. Rubinstein, Mr. Morrissey, Mr. Hoag (F, W).

116. Marketing Organization and Management. (6) Three 1 1/2-hour lectures per week. Prerequisite: consent of instructor. The meaning and importance of the wholesaler's place in the marketing structure; functions of wholesaling; the agency structure of wholesaling; internal managerial aspects; government regulations; trends and costs, profits, and efficiency. Mr. W. Smith (F).

117. Business Computing I. (F) Three hours of lecture per week. Prerequisite: admission to the Graduate School of Business Administration. Introduction to and history of computers and computer programming for business purposes. Includes the BASIC programming language and exercises drawn from finance, production, and marketing. To be coordinated with 107G.

118. Business Computing II. (4) Three hours of lecture per week. Prerequisite: course 107G. Principles of data processing and the design of systems. Exercises drawn from accounting, finance, and marketing. To be coordinated with 108G.

119. Business Computing III. (4) Three hours of lecture per week. Prerequisite: course 108G. Advanced computer applications and exercises in business computing. To be coordinated with 109G.

120. Accounting II: Managerial Accounting. (4) Three hours of lecture per week. Prerequisite: courses 101G, 106G, and 126G. Business finance, with emphasis upon financial problems and policies of corporations; the role of commercial banks, institutional and other investors in supplying funds for corporations. Mr. Rubinstein, Mr. Morrissey, Mr. Hoag (F, W).

121. Experimental Courses. (5) Four hours of lecture per week. Prerequisite: consent of instructor. The evolution of marketing and advertising; organization and management, marketing functions, pricing and promotion policy, marketing cost and efficiency, public and private regulation. Mr. Benkran (F, W, So).

122. Quantitative Analysis for Business Decisions I. (4) Four and one-half hours of lecture per week. Prerequisite: course 107G or equivalent. Economic analysis applicable to the problems of business and society, including the determination of prices, inputs and outputs; effects of the state of the competitive environment on business policies. Mr. Artie, Mr. Alhajjoud (F, W, So).

123. Quantitative Analysis for Business Decisions II. (4) Four and one-half hours of lecture per week. Prerequisite: course 108G or equivalent. Statistical methods and computer applications for business decision making. Mr. Artie, Mr. Alhajjoud (F, W, So).

124. Quantitative Analysis for Business Decisions III. (4) Three hours of lecture per week. Prerequisite: course 108G or equivalent. The theory and use of statistical and economic methods with special emphasis on practical applications. Topics include regression analysis; special problems in applied regression analysis; simultaneous equations estimation; elements of multivariate analysis. Mr. Arne, Mr. Myers (F).

125. Market Failures and Bounds of the Firms. (4) Three hours of lecture per week. Prerequisite: courses 101G, 106G, 107G and 108G or the equivalent. The theory and use of statistical and econometric methods with special emphasis on practical applications. Topics include regression analysis; special problems in applied regression analysis; simultaneous equations estimation; elements of multivariate analysis. Mr. Arne, Mr. Myers (F).


127. Management in the Public Sector. (4) Three hours of lecture per week. Prerequisites: courses 101G and 102G or the equivalent. Planning—

NOTE: For key to symbols, see page 35.
programming—budgeting systems and benefit—cost analysis for resource allocation and planning in the public sector. Use of pricing in public enterprise. Efficiency when profit criteria are absent. Applications in natural resources, transportation, and education.

Mrs. Flanagan (W)

206A—206B. Applications of Digital Computers to Problems in the Social Sciences. (4—4—4) Three hours of lecture per week. Prerequisite: course 107G or 111G or equivalent. Analysis and visualization of data; use of computer programming. 206A prerequisite to 206B. Problems and projects in the computer simulation of economic and social systems, decision processes, artificial intelligence and information systems. Credit and grade awarded upon completion of full sequence. 

Mr. Hopp, Mr. Gamaliel (W, Sp)

*207. Seminar in Applied Economics. (4) Three hours of lecture per week. Topics will vary with the interests of the instructor. A description of the topics and objectives will be available to interested students during the winter quarter each year.

209. Introduction to Management Science. (4) Formerly 109G. Three hours of lecture and one and one-half hours of discussion section per week. Prerequisite: course 111G or equivalent or consent of instructor. Although focusing primarily on linear models, the course also includes an introduction to dynamic programming, PERT, Markov chain and queuing theory. 

Mr. Shogan, (F, W, Sp)

211. Seminar on the Modern Corporation. (4) Three hours of meetings per week. Prerequisite: course 111G or equivalent or consent of instructor. The theory of the modern corporation, its social role, regulation, financial structure, labor-management conflict, change, dimensions and limitations of corporate power, and other issues which appear to be appropriate to the interests of the students. 

*212. Seminar in Managerial Accounting. (4) Three hours of lecture per week. Prerequisite: course 125 and 126 or equivalent. The role of information in the management process. The development of measures and reports for management, decision making, and control. The impact of research on public policy. Completion of individual research projects. 

Mr. Wheeler, Mr. Downes, Mr. Ohlson (F)

224. Advanced Managerial Accounting. (4) Three hours of lecture per week. Prerequisite: course 212. Advanced topics in managerial accounting. Emphasis on current issues in the area. Problems of本书 only includes sections for course 40 / BUSINESS ADMINISTRATION
285. Seminar in Manpower Economics and Labor Markets. (4) Three hours of lectures per week. Dynamics of the labor force, manpower policies, employment displacement and unemployment. Analysis of supply and demand in labor market and labor market behavior of occupational groups; production and clerical workers, manual and professional workers. Wage and income policies of the firm, union and the national economy. Mr. Garbarino (F).

286. Seminar in Collective Bargaining. (4) Three hours of lecture 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; administration of agreements; administration and arbitration of grievances; processes of disputes settlement; influence of the larger environment. Mr. Garbarino (W).

287. Human Behavior in Organizations. (4) Three hours of lecture per week. Prerequisite: course 150G or equivalent or consent of instructor. A study of the social science approaches affecting human behavior and performance in work places. Topics include motivation, job design, leadership, conflict, human information processing, social influence and inter-group dynamics. Mrs. Pfeffer, Mrs. Roberts (F, W, Sp).

288. Technology, Organization, and Environment. (4) Three hours of lecture per week. Prerequisite: course 150G or equivalent. Focus is on the interplay between technology, organization, and environment. Subjects include organizational growth, structure, control systems, professionalism, and reactions to change and uncertainty. Mr. Grether (F, W).

289. 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 relative to such topics as organization development; environmental determinants of organization structure and design; organization and professional leadership; professionalism, and management in temporary structures; cross-cultural studies of management and organizations. Mr. J. Freeman (Sp).

290. Consumer Behavior. (4) Three hours of lecture per week. Prerequisite: course 150G or equivalent. Examines concepts and theories from behavioral science used in marketing. Course 280 is recommended. A specialized place behavior and demand analysis. Emphasizes applications to the development of marketing policy planning and strategy, and to various decision areas within marketing. Mr. Burckin (F).

291. Marketing Management and Strategy. (4) Three hours of lecture per week. Prerequisite: course 150G or equivalent. Focus is on the planning and control of marketing activities. Cases are used to analyze the marketing mix including sales management and personal selling, and include broad policy issues dealing with the broad aspects of the total marketing program. Mr. Carman, Mr. Bucklin (W, Sp).

292. Retailing Policies and Problems. (4) Three hours of lecture per week. Prerequisite: course 150G or equivalent. Case study of executive determination of organizational structure; nature and scope of policy making; financial and credit policies; personnel and purchasing policies; sales promotion; personnel management; operating policies; accounting and control policies, and general management policy. Study of the nature of competition at the retail level. Mr. Fink (F).

293. Advertising Management. (4) Three hours of lecture per week. Prerequisite: course 150G or equivalent. Methods and practice of advertising. Topics include objective-setting, copy decisions, media decisions, budgeting, and execution. Mr. Benneker (F, W).

294. Industrial Marketing Behavior. (4) Three hours of lecture per week. Prerequisite: course 150G or equivalent. Course 280 is suggested. The environment of an industrial firm and its interdependence with the external environment. Planning and implementation of marketing policies, marketing decision processes: examination of structural-behavioral characteristics of industrial procurement and selling practices. Mr. Nicosia (W).

295. Marketing Organization. (4) Three hours of lecture per week. Prerequisite: course 150G or equivalent. Analysis of recent literature and developments related to the development and performance of marketing research organization; marketing organization at the wholesale and retail levels; general marketing strategy and policy formulation; problems of "orderly" marketing. Mr. Baederson (Sp).

296. Marketing Research. (4) Three hours of lecture per week. Prerequisite: courses 108G and 160G. Nature and scope of marketing research; marketing research methods; survey research, observation, and use of different multivariate techniques; analysis of significance of marketing research. Mr. Aaker, Mr. Myers (W, F, W).

297. Seminar in Marketing. (4) Three hours of lecture per week. Prerequisite: course 150G or equivalent. Seminar treatment of marketing topics such as development of marketing thinking; marketing organization and performance; marketing models; multivariate methods; marketing in nonprofit organizations; public and private regulation. Mr. Nicosia, Mr. Holton, Mr. Salmon, Mr. Grether (F, W, Sp).

298. Transportation Management. (4) Three hours of lecture per week. Prerequisites: course 150G or equivalent. Problems in the management of urban passenger, interurban, and international transport. Cost analysis and rate structure. Regulation and governmental restrictions. Mr. Carter (F).

299. Economic Analysis in Transportation. (4) Three hours of lecture per week. Prerequisite: course 150G or equivalent. Urban transportation, civilian air transport, highways, ports. Cost analysis, pricing. Demand and supply. Mr. Morrissey (W).

300. 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. Carter (Sp).

301. Real Estate and Urban Land Economics. (4) Three hours of lecture per week. Prerequisite: consent of instructor. Literature and practice in the areas of land utilization, urban growth and real estate market behavior; property rights and valuation; residential and non-residential markets; construction; debt and equity financing, public controls and policies. Mr. Schauf (F, Sp).

302. Seminar in Urban Economic Resource Policy. (4) Three hours of lecture per week. Prerequisite: consent of instructor. Urban development and the national economy; the interaction of business institutions and public agencies in the performance of urban functions; environmental impacts; economic aspects of property rights; unmet housing needs. Mr. W. Smith (Sp).

303. 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 nonresidential development and financing, urban redevelopment, real estate taxation, mortgage market developments, equity investment, valuation. Mr. Nicosia (W).

304. Applied International Economics. (4) Three hours of lecture per week. Prerequisite: courses 101G and 102G or equivalent. Analysis and review of international business models, financial aspects of international business agreements, the effects of trade and customs union, and a comprehensive view of the changing international monetary system as a backdrop for international business operations. Mr. Kohlhagen (F, W).

305. International Operations Management. (4) Three hours of lecture per week. Prerequisite: course 285 or consent of instructor. A summary of management problems unique to international operations including strategic planning and forecasting, currency and tax planning, financial management, and especially marketing supplemented with cases. Mr. Langeard, Mr. Bucklin (W), Mr. Nicosia (W).

306. International Financial Management. (4) Three hours of lecture per week. Prerequisite: courses 130G and 285 or their equivalents. The financial problems of an international corporation. Topics include the international financial system, foreign exchange markets, international sources of funds, foreign direct investment, capital budgeting, multinational business, international taxation, and foreign equity ownership. Mr. Guy (W, Sp).

307. Seminar in International Business. (4) Three hours of lecture per week. Prerequisite: course 286 or consent of the instructor. Seminar techniques will be applied to highly topical subjects in the international business field. The subject of the seminar generally varies from quarter to quarter. May be repeated for credit. Mr. Langeard (F, Sp).

308. Organization and Decision. (4) Four hours of lecture per week. Prerequisite: primarily for students at the Ph.D. level. Examination of organizations, primarily on assessment of their marketing strategies and practices. Mr. Belkin (F, W).

309. Process Decision Making. (4) Four hours of lecture per week. Prerequisite: primarily for students at the Ph.D. level. Examination of organizations, primarily on assessment of their marketing strategies and practices. Mr. Belkin (F, W).

310. Experimental Courses. (4) Courses will vary from quarter to quarter and will be listed in the bulletin at the beginning of each quarter. Mr. Bucklin, Mr. Schaaf (F, W).


312. 292A. Two two-hour meetings per week. Prerequisite: restricted to Ph.D. students. Survey of the various normative and empirical approaches to research available to and used by scholars in administration. The focus will be on the logic and strengths of an approach opposed to its statistical presentation. Mr. Belkin (F).

313. 292B. Two two-hour meetings per week. Prerequisite: restricted to Ph.D. students or by instructor's permission. Advanced, intensive application of descriptive and probability theory. The focus is upon defining a research problem, designing and employing specialized techniques to solve the problem. Topics will include concepts of causality, variance, experimental design, survey research, observation, and use of different multivariate analytical techniques. Mr. Begozzi (W).

314. 292C. Two two-hour meetings per week. Prerequisite: restricted to Ph.D. students or by instructor's permission. Mathematics 190A–190B–190C or equivalent. Topics include the application of mathematical models of individual and group decision-making under conditions of risk and uncertainty. Topics to be covered may include the role of uncertainty, the design of organizations, game theory, and models of social organization reflecting elements of conflict and cooperation. Mr. Jastram (Sp).

315. 293. Individually Supervised Study for Graduate Students. (0–9) Individually supervised study of subjects not available to the student in the regular schedule, approved by faculty adviser as appropriate for the student's program. The Staff (Mr. Bucklin in charge) (F, W, Sp).

316. 294. Seminar in Business Policy. (4) Fifteen two-hour meetings per quarter. Prerequisites: a satisfactory grade in one of the seniors' executives covering organizational planning, policy formulation, policy communication, and administrative control. Extensive participation, assignment, and written report. Mr. Jastram (Sp).

317. 295A–295B. Entrepreneurship and Business Development. (2–2) Three hours of lecture per week. Prerequisite: completion of all master's level courses bearing "QR" suffix. 295A prerequisite to 295B. Guest lecturers discuss various aspects of starting, operating and expanding the new business. Each student prepares a business plan for a new company for which financing is sought. The integration of financial accounting, marketing, economics and organizational problems in a well-written proposal for financing is emphasized. Credit and grade awarded upon completion of full sequence. Mr. Hetzel (F, W).

318. 296. Special Topics in Business Administration. (2–4) Prerequisite: graduate standing. Advanced
Recommended high school preparation for Chemistry or Chemical Engineering should include: chemistry (1 year); physics (1 year); mathematics (2 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

**Professors:**
- Alexis T. Bell, Bsc.D.
- Alan S. Foss, Ph.D.
- Simon L. Green, BEng.
- Edward A. Gren, Bsc.D.
- Donald N. Hansen, Ph.D.
- C. Judson King, Bsc.D.
- Scott Lynn, Ph.D.
- David N. Lyth, Ph.D.
- John S. Newman, Ph.D.

**Assistant Professors:**
- Clayton J. Radek, Ph.D.
- Eugene E. Peterson, Ph.D.
- John M. Prausnitz, Ph.D.
- Michael Shen, Ph.D.

**Lecturers:**
- Ern. R. Mullen, Ph.D.
- Otto Rechlin, Ph.D.
- J. Frank Velle-Restra, M.S.

The College of Chemistry offers a major in chemical engineering leading to the B.S. degree. The program equips the student for professional work in development, design, and operation of chemical processes and of process equipment. Students with high scholastic attainment are well prepared to enter graduate programs. The curriculum is accredited by the Engineers Council for Professional Development.

**Chemical Engineering Major**

The requirements for the degree are: A total of 180 quarter units. Mathematics: 1A, 1B, and 1C of and 51A, 51B, 51C. Physics: 5A, 5B, 5C, 5D, 5E. Chemistry: 1A, 1B, 1C, 5 (or 4A, 4B, 4C); 12A, 12B, 14, 110A, 110B, 111A, 111B. Chemical Engineering: 140, 141A, 142, 150, 151A, 151B, 152, 153, 160, 270, 271. Six additional units of elective courses in chemical engineering; 10 units of advanced technical electives; 20 units of courses in the College of Engineering, approved by the student's adviser.

Satisfaction of the American History and Institutions requirement; 27 units in the humanities and social sciences, chosen from a list provided by the College of Chemistry.

**Interdisciplinary Options.** Students can select their courses in the chemical engineering electives, the advanced technical electives, and many of the College of Engineering units so as to explore several scientific fields, or so that they supplement one another and provide an in-depth study of a single field and its relation to chemical engineering. The options now available for the in-depth alternative are chemistry, applied physics, systems analysis and applied mathematics, materials and molecular engineering, space systems, earth and ocean sciences, environmental balances, applied biology, food resources and processing, business organization and enterprise, and science education. Further information is available from the Department of Chemical Engineering.

**Graduate Study**

Students interested in graduate study are invited to write to the Department of Chemical Engineering for information.

**LOWER DIVISION COURSE**

40. Modern Chemical Technology, (3) Three hours of lecture and discussion per week. Prerequisite: Chemistry 1A. Application of chemical science and engineering to society and economically significant problems. Case studies illustrate scientific, engineering, and economic aspects as well as for others interested in exploring chemical technology. 

**UPPER DIVISION COURSES**

Stated prerequisites for each course indicate the desirable background level. Students majoring in other engineering or physical science fields should consult the instructor to determine whether they have acquired sufficient preparation.

**100. Introduction to Chemical Process Technology.** (3) Three hour class meetings per week. Prerequisite: Chemistry 15 (which may be taken concurrently), and prior elementary knowledge of general chemistry or concurrent enrollment in Computer Science 101 or 102. Material and energy balances on batch systems, and on flow systems in steady or unsteady state. Thermodynamic properties of gases, liquids, and solids, including mixtures, useful for calculations applying to the chemical process industries. Sources of data; use of tables and graphs; iteration methods. 

**114A. Chemical Engineering Thermodynamics.** (4) Four 1-hour class meetings per week. Prerequisite: course 140 with a grade of C or higher; Chemistry 14, Thermodynamics of real gases, Phase transitions. Flow systems, power cycles, refrigeration, gas liquefaction. Properties of solutions; phase equilibria. Chemical equilibria for homogeneous and heterogeneous systems.

**114B. Chemical Engineering Thermodynamics.** (3) Three 1-hour class meetings per week. Prerequisite: course 14A, 14B, Process center problems on selected topics, such as phase equilibria, chemical equilibria, interfacial phenomena, electrolytes, and polymers.

**142. Chemical Kinetics of Industrial Processes.** (4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: Chemistry 14 or 108A-108B or other course involving thermodynamics with chemical applications; Mathematics 51C and previous introduction to chemical kinetics are desirable, but not required. Kinetics and classical interpretation in flow and nonflow processes, including catalytic systems. 

**143. Chemical Reactor Design and Catalysts.** (3) Two 3-hour lecture and one 3-hour laboratory per week. Prerequisite: course 142 or equivalent introduction to kinetics. Physical and chemical characteristics of catalysts; catalytic kinetics; analysis of reaction systems; reactor design. Laboratory experiments in catalysis, characterization, combustion, homogeneous kinetics, and reaction mechanisms. 

**146. Principles of Electrochemical Processes.** (3) Three 3-hour lectures per week. Prerequisite: courses 14A or 14B or either 150 or 100A, 100B, and 100C, and 114A. Physical science or engineering, Principles and application of electrochemical equilibria, kinetics, and processes. Techniques of electroanalysis and electrochemical energy conversion.

**150. Fluid Flow and Heat Transfer Processes.** (4) Four 1-hour class meetings per week. Prerequisite: course 140 with grade of C or higher; Mathematics 51C is recommended. Principles of fluid mechanics and heat transfer with applications to chemical engineering problems.

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**College of Chemistry**

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.
15A-15B. Chemical Engineering Laboratory. (4-4) Two 4-hour laboratories per week. Sequence beginning each quarter.

15A. Prerequisite: course 150, Chemistry 111A. Experiment in chemical engineering, mass transfer, heat transfer, refrigeration. Emphasis on investigation of basic relationships important in engineering. Experimental design, analysis of results, and preparation of engineering reports are stressed.

Mr. Hanson (F); Mr. Lynn (W); Mr. Vermeulen (Sp)

15B. Prerequisite: course 153. Experiments in mass transfer, simultaneous heat and mass transfer, vaporization, evaporation and distillation. Mr. Hanson (F); Mr. Lynn (W); Mr. Vermeulen (Sp)

152. Separation Processes. (3) Three 1-hour class meetings per week. Prerequisite: course 150, course 152 (which may be taken concurrently). Principles of mass transfer. Design of processes based on mass transfer and/or change of phase. Simultaneous heat and mass transfer. Mr. Wicks, Mr. King (F); Mr. Grens (Sp)

155. Perticulate Systems. (3) Three 1-hour lectures per week. Prerequisite: course 150 or knowledge of air pollution. Design and operation of equipment for the separation of particulate systems in force and flow fields. Dust and mist collection, sedimentation, crystallization, and coagulation. (W, Sp)

156. Transport Phenomena. (3) Three 1-hour lectures per week. Prerequisite: course 153 or senior standing in physical science or engineering. The differences between the macroscopic and microscopic views of transport processes. A transferred to laminar and turbulent flow and to interphase transfer. Mr. Williams (F)

158. Polymer Science and Technology. (3) Two 1-hour lectures and one 3-hour laboratory per week. Prerequisite: course 150 or senior standing in physical science or engineering; one course in organic chemistry. Introduction to the principles of polymer science and technology. Polyelectrolytes, pressure-sensitive adhesives, and special polymer systems. Applications to separation operations. Equilibrium properties of pure and mixed liquids. Mr. Pranzin (F)

162. Dynamics and Control of Chemical Processes. (3) Three 1-hour class meetings per week. Prerequisite: Materials Science and Engineering 130 or graduate standing. Chemical processing and properties of solid-state materials. Cryogenic processing — purification. Thin film technology. Control of growth defects and morphology - influence on electrical, magnetic, and optical properties. Principles of chemical processing to the manufacture of semiconductors and solid-state devices. (W)

160. Chemical Process Design. (4) Four 1-hour class meetings per week. Prerequisite: course 150 and one 3-hour laboratory. Design principles for chemical processing equipment. Design of integrated chemical processes with emphasis upon economic considerations. Mr. Lynn (F); Mr. Blue (W); (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. The unsteady behavior of industrial chemical process units; methods and theory of their control. Laboratory studies of process control characteristics of chemical processes. Dynamics of chemical processes. (W)

165. Selection and Evaluation of Chemical Processes. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 152 Development and design of processes and evaluation of process performance. A simple case study involving the cooling of chemical processes. Design and synthesis of a process and its components. Identification and evaluation of process modifications and alternatives. Mr. Lynn (Sp)

170. Introduction to Biochemical Engineering. (3) Two 1-hour lectures and two 3-hour laboratory periods per week. Prerequisite: course 153, which may be taken concurrently, or 100. A review of special methods and techniques in the development and operation of processes in the biochemical industries with particular emphasis on fermentation systems. Laboratory techniques for batch and continuous processes. Mr. Blum (Sp)

171. Individual Study for Advanced Undergraduates. (2-5) Prerequisite: a written proposal like that required for course 199, as described on page 36. Independent study on theoretical or computational problems. The Staff (Mr. King in charge) (F, W, Sp)

H194. Research for Advanced Undergraduates. (3-6) Prerequisite: written proposal like that required for course 199, as described on page 36. Students with honors standing may carry out research under the direction of one of the members of the 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. Lectures 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 196, as described on page 36. Special laboratory work for advanced students.

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

200. Internship. (3-5) Prerequisite: senior standing, or consent of instructor. Practice is offered through participation in a program of industrial research and for the separation and purification of biological products.

Mr. Vermeulen (W)

201. Separation Processes. (3) Three 1-hour lectures per week. Prerequisite: course 192 or consent of instructor. Principles of separation processes, separation of multiphase systems. Continous, semicontinuous and batch operation.

Mr. Grens (F)

**231. Analysis of Chemical Engineering Problems. (3) Three 1-hour lectures per week. Prerequisite: course 230 or equivalent. Continuation of course 230. Solution of complex chemical engineering problems involving variables, boundary value problems, integral equations, and approximate methods.

Mr. Goren (W)

**232. Computational Methods in Chemical Engineering. (3) Three 1-hour lectures per week. Prerequisite: Mathematics 51C or equivalent, or course 232. Open to senior honor students. Introduction to methods for treatment of problems not amenable to analytic solutions. Application of numerical techniques to chemical engineering calculations with emphasis on computer methods.

Mr. Grens (F)

240. Phase Equilibria. (3) Three 1-hour lectures per week. Prerequisite: graduate standing. Molecular thermodynamics of monophasic systems with applications to separation operations. Equilibrium properties of pure and mixed fluids.

Mr. Pranzin (F)

**241. Applications of Statistical Mechanics. (2) Two 1-hour lectures per week. Prerequisite: course 240 and consent of instructor. Principles of statistical mechanics with emphasis on configurational properties of gases and liquids, polymers and surfaces with applications to separation operations.

Mr. Pranzin (Sp)

**243. Cryogenic Engineering. (3) Three 1-hour lectures per week. Prerequisite: course 243 or equivalent. Low-temperature refrigeration principles and applications; gas liquefaction, low-temperature and separation; magnetic, thermoelectric and von Ettinghausen cooling; transport properties of materials at low temperatures; cryogenic techniques in chemical engineering.

Mr. Bell (W)

244. Applied Chemical Kinetics. (3) Three 1-hour lectures per week. Prerequisite: course 244 or equivalent. Principles of surface and colloid chemistry with current contacting. Techniques for computation, and for the separation and purification of biological and chemical materials. Design of systems for cultivation of microorganisms and for the separation and purification of biological products.

Mr. Vermeulen (Sp)

245. Catalysis. (3) Three 1-hour lectures per week. Prerequisite: course 244 or Chemistry 219A, or consent of instructor. Adsorption and kinetics of surface and catalytic reactions. Poisoning and selectivity and empirical activity patterns in catalytic systems; catalytic chemistry and modern experimental techniques in catalytic research; descriptive examples of industrial catalytic systems.

Mr. Bell (Sp)

246. Principles of Electrochemical Engineering. (3) Three 1-hour lectures per week. Prerequisite: graduate standing or consent of instructor. Electrode processes in electrolysis and in galvanic cells. Charge and mass transfer in ionic media. Criterio for electrode reaction.
Chemistry Department Office, 419 Latimer Hall

**Graduate Study in Chemistry**

Students interested in graduate study are invited to write to the Chairman of the Department of Chemistry, 419 Latimer Hall, for information.

**LOWER DIVISION COURSES**

1A-1B—1C. General Chemistry. (3-4-4) Two 1-hour lectures, one 1-hour discussion and one 4-hour laboratory per week. Prerequisite: high school chemistry (high school physics is also recommended). This course is offered in three sets: (1A, 1B, 1C) with grade C or better, (1A, 1B, 1C) without grade requirements, and (1C) which is offered for students not majoring in chemistry and not planning to take additional courses in organic chemistry. A study of the fundamental aspects of organic chemistry, with emphasis on material of interest to students of the biological sciences. Students with credit in Chemistry 1A-1B may not receive credit in the corresponding quarters of Chemistry 8-10. See Chemistry Department for information.

5. Quantitative Analysis. (4) Two 1-hour lectures and one 1-hour laboratory per week. Prerequisite: course 1C with grade C or higher. Acid-base, redox, complex formation equilibria and their applications in volumetric titrations. Principles and applications of colometry, potentiometry, and polarography. Ion-exchange separation techniques. Selective and tolerant methods in instrumental analysis.

Choice of College

A student can complete a major in chemistry in either the College of Chemistry (B.S. degree) or the College of Letters and Science (A.B. degree). Both curricula are approved by the American Chemical Society if the student includes certain courses in the total program, and either is a satisfactory foundation for a career in chemical industry, for the teaching of chemistry, or, if completed with high academic standing, for graduate work in chemistry.

Chemistry Major in the College of Chemistry

The requirements of a B.S. degree in the College of Chemistry, with a chemistry major are: a total of 180 quarter units. Mathematics: 1A, 1B, 1C and one of 51A, 51B, 51C. Physics 5A, 5B, 5C, 5D, SE Chemistry. 1A, 1B, 1C, 1D, 1E, 4A, 4B, 104A, 104B, 110A, 110B, 110S, 111B, 111E, 112A, 112C, 12A, 12B may not receive credit in the corresponding quarters of Chemistry 8-10. Three-quarter sequence beginning (F, W, Sp) Mr. Novacek (Sp) Mr. Cason

12A-12B—113. Organic Chemistry. (5-5-5) Two 1-1/2-hour lectures and one 1-1/2-hour laboratory per week. Prerequisite: course 1C or 4A, 4B, intended for students not majoring in chemistry and not planning to take additional courses in organic chemistry. A study of the fundamental aspects of organic chemistry, with emphasis on material of interest to students of the biological sciences. Students with credit in Chemistry 1A-1B may not receive credit in the corresponding quarters of Chemistry 8-10. Three-quarter sequence beginning (F, W, Sp) Mr. Novacek (Sp) Mr. Cason

14. Chemical Thermodynamics. (3) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: course 1C or 4A, 4B, with grade C or better. Primarily for students whose interests require a fuller knowledge of organic chemistry. A study of the fundamental aspects of organic chemistry, including many types of reactions, mechanisms and structures.

Preparation for Teaching. (3) A course designed for students interested in teaching. Prerequisite: course 1C or 4A, 4B, with grade C or better. Primarily for students whose interests require a fuller knowledge of organic chemistry. A study of the fundamental aspects of organic chemistry, including many types of reactions, mechanisms and structures.

40. Modern Chemical Technology. (3) See Chemistry Department for the complete description of this course.

**UPPER DIVISION COURSES**

104A—104B. Advanced Inorganic Chemistry. (3-3) Three 1-hour lectures per week. Prerequisite: course 14. 104A, nonmajors; 104B, majors. Two-quarter sequence beginning (F, W). Mr. Powell (W)

105. Advanced Quantitative Analysis. (2) Two 1-hour lectures and two 1-1/2-hour laboratories per week. Prerequisite: course 5 or 4C, 4D, 4E. Mr. Falick (F)

106. Inorganic Synthesis. (5) Two 1 hour lectures
and two 1 1/2-hour laboratories per week. Prerequisite: course 5 or 4C, 104A. Mr. Powell (W)
Mr. Brewer (W)

107. Inorganic Reactions. (6) Two 1-hour lectures and three 3-hour laboratories per week. Prerequisite: course 5 or 4C, 104A. Kinetic and thermodynamic studies of some inorganic reactions.
Mr. Connick (Sp)

109A–109B. Biophysical Chemistry. (3 or 4, 3 or 4) Three 1-hour lectures and one optional 1-hour discussion period per week. Prerequisite: course 1C or 4C, and at least one quarter course in calculus. Intended for students majoring in the biological sciences. Students with credit in course 14 may not receive credit for 109A. Students with insecure backgrounds in mathematics and the quantitative aspects of chemistry should enroll in the course for 4 units instead of 3. Those taking the course for 4 units will attend a 1-hour discussion period each week in addition to problem solving and the applications of calculus in physical chemistry.

110A–110B. Physical Chemistry. (3–3) Three 1-hour lectures and three 3-hour laboratories per week. Prerequisite: course 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. Johnston, Mr. Scheer, Mr. Lee, Mr. Pitzer, Mr. Connick, Mr. Winn

111A—111B. Physical Chemistry Laboratory. (3—3) One 1-hour lecture and two 3-hour laboratories per week. Prerequisite: course 110A with a grade of C or higher, 110A, which may be taken concurrently, or 109B with the consent of instructor. Two-quarter sequence beginning (F, W, Sp).

Mr. Jura, Mr. Myers, Mr. Strauss, Mr. Templeton; 111A: (F, W); 111B: (W, Sp)

112. Organic Chemistry. (6) See Chemistry 12A for description of this course. (F, Sp) Mr. Bartlett

112E. Organic Chemistry Lecture Only. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 12B with grade of C or better. The course is part of 112. Intended for students in chemical engineering who wish an additional course in organic chemistry, but open to others with permission of the instructor. (F, Sp)

H116C. Physical Chemistry Laboratory: Kinetics, Mechanisms, and Spectroscopy. (3) Three 1-hour lectures per week. Prerequisite: course 110B and honors standing. A rigorous presentation of classical theoretical techniques. Requirements: laboratory and real solutions. Application of tabulated thermodynamic data. Systems involving intensive variables besides pressure and temperature. Mr. Shirley, Mr. Pitzer (F); Mr. Brewer (Sp)

H117. 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 atoms and molecules.

Mr. Johnston, Mr. Scheer (F); Mr. M. (F); Mr. Scheer (Sp)


Mr. Moore (Sp)

123. Nuclear Chemistry. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 110A or equivalent. Radioactivity, fission, nuclear models and reactions, nuclear processes in nature.

Mr. Rasmussen (W)

127. Physical Organic Chemistry. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 112 and 110A, or consent of instructor. Application of molecular orbital and resonance concepts to bonding, electronic structure, and reaction of organic compounds. Topics discussed include orbital symmetry reaction rules. A reading knowledge of German is recommended.

Mr. Streitwieser (F)

128. Organic Chemistry—Structural Methods. (5) One 1-hour lecture and three 4-hour laboratories per week. Prerequisite: course 5 or 4C; 122; reading knowledge of German or consent of instructor. Determination of organic structures by chemical and spectroscopic methods. Mr. Jones (W); Mr. N. (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. Rapoport (Sp)

192. Individual Study for Advanced Undergraduates. (1–3) All properly qualified students who wish to pursue a program of their own choice, through reading or nonlaboratory study, may do so if their proposed project is acceptable to the member of the staff with whom they work.

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

H194. Research for Advanced Undergraduates. (2–5) Prerequisite: honors standing, course 110B, 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)

195. Special Topics. (3) Three 1-hour lectures per week. Prerequisite: consent of the instructor: Special topics will be offered from time to time. Examples: photochemical air pollution, computers in chemistry.

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

196. Special Laboratory Study. (2–5) Prerequisite: course 111B and at least one of courses 105, 106, 107, or 129; consent of instructor and consent of the adviser. Special laboratory work for advanced undergraduates.

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

199. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations listed on page 36. Additional limitation: nonlaboratory study only. Must be taken on a passed/not passed basis.

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

TEACHER TRAINING COURSE

301. Undergraduate Chemistry Instruction. (2) One hour of lecture and 5 hours of laboratory per week. Prerequisite: sophomore standing, completion of Chemistry 1A–1B–1C with a grade of B- or better. Tutoring of students in Chemistry 1A–1B–1C. May be repeated once for credit. Given on a passed/not passed basis only.

GRADUATE COURSES

204A–204B–204C. Advanced Topics in Inorganic Chemistry. (3–3–3) Three hours of lecture per week. Prerequisite: Chemistry 104A and B, Chemistry 110A and B, Chemistry 111A and B, or consent of the instructor. A study of the equivalents of these courses. Current techniques and theory in inorganic chemistry including discussion of the structure, bonding and reactions of inorganic compounds.

Mr. N. Bartlett (Sp)

205A–205B–205C. Organic Chemistry. (3–3–3) Two 1 1/2-hour lectures per week. Prerequisite: course 112; course 127 should be taken concurrently with 205A, or consent of instructor. The application to synthetic studies of current knowledge of reaction mechanisms, molecular structure, and stereo fics. Emphasis is on typing of reactions according to mechanism. Three-quarter sequence beginning (F).

Mr. Heathcock, Mr. Washburn, Mr. Dauben

207. Organic Chemistry. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 206C. The chemistry of heterocyclic compounds, with emphasis on those of natural origin. Must be taken on a satisfactory/unsatisfactory basis.

Mr. Rapoport (W)

208. Organic Chemistry. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 206C. Kinetics and mechanism of organic reactions, mechanisms of rearrangements. Must be taken on a satisfactory/unsatisfactory basis.

210. Contemporary Organic Chemistry. (1) One hour of lecture per week. Prerequisite: graduate standing in Chemistry. Recent significant developments in the theory and practice of organic chemistry. Must be taken on a satisfactory/unsatisfactory basis.

Mr. Rapoport, Mr. Jensen (F, W, Sp)

216A—216B. Statistical Mechanics. (3–3) Three 1-hour lectures per week. Prerequisite: course H114, and an introduction to quantum mechanics (which may be taken concurrently). Open to senior honors 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 equilibria.

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

Mr. Moreto, (W, Sp)

217A—217B. Advanced Quantum Mechanics. (3–3) Three 1-hour lectures per week. Prerequisite: course

NOTE: For key to symbols, see page 36.
H117 or equivalent. Representation theory and matrix methods; symmetry and conservation laws; coupling of angular momentum; stationary-state perturbation theory; time-dependent quantum mechanics; intersection with radiation with matter; introduction to scattering theory. Two-quarter sequence beginning (F, W). Mr. Miller, Mr. Gwinn

218A–218B. Chemical Kinetics. (3–3) Three 1-hour lectures per week. Prerequisite: 218A. Introduction to statistical mechanics, which may be taken concurrently; 218B, course H117 which may be taken concurrently. Two-quarter sequence beginning (F, W). Mr. Marascuilo (F), Mr. Marascuilo (W)

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 (W). Mr. Rasmussen

298. 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), Mr. Levine (Sp)

299. Seminars for Graduate Students. (1–3) Beside the weekly Graduate Research Conference and weekly seminars on topics of interest in biology, 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 faculty.

The Staff (F, W, Sp)

300. Professional Preparation: Supervised Teaching of Chemistry. (2) Prerequisite: graduate standing and appointment as a teaching assistant. Discussion, curriculum development, class organization, and practice teaching in chemistry. 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 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)

IDS 124. Chemical Methods in Nuclear Technology. (3) See Interdepartmental Studies for the complete description of this course.

School of Education

School of Education Office, 1501 Tolman Hall

Professors:

Milton Almy, Ph.D.
Charles S. Benson, Ph.D.
Guy Bonvouloir, Ph.D.
Nadine L. Boyer, Ph.D.
Marte L. Borrowman, Ed.D. (Elementary)
Elis M. Bower, Ed.D.
Earl F. Ciehl, Ph.D., J.D.
John D. H. Clark, Ed.D.
Gerardine Jonch Clifford, Ed.D.
Lyman A. Glenn, Ph.D.
Curtis D. Hendricks, Ph.D.
Paul A. Heist, Ph.D.
John G. Hurst, Ph.D.
James L. Jensen, Ph.D.
Arthur R. Jensen, Ph.D.
Reginald J. Jones, Ph.D.
Harry F. Kaiser, Ph.D.

Nadine L. Boyer, Ph.D.
Frederic Lige, Ph.D.
Lloyd D. Lobers, Ph.D.
Jack London, Ph.D.
Leonard A. Marasculo, Ph.D.
John U. Michaelis, Ph.D.
William D. Rohwer, Jr., Ph.D.
Robert T. Ruddell, Ed.D.
Lloyd F. Scott, Ph.D.
Michael Schenck, J.D., Ph.D.
Lawrence H. Stewart, Ed.D.
James J. Stimpson, Ed.D.
David T. Tillesy, Ph.D.
William A. Watts, Ph.D.
Satan W. Webster, Ph.D.
Alan B. Wilson, Ph.D.
William A. Brownell, Ph.D., LL.D. (Emeritus)

Leland L. Medsker, Ed.D. (Emeritus)
Edward L. Morphon, Ph.D. (Emeritus)
Theodore L. Reiter, Ph.D. (Emeritus)
J. Chester Swanson, Ph.D. (Emeritus)

Associate Professors:

Paul R. Ammon, Ph.D.
James W. Armfield, Ph.D.
Donald A. Hansen, Ph.D.
Lawrence P. Lowery, Ed.D.
John David Miller, Ph.D.

Assistant Professors:

Lilly Wong Fillmore, Ph.D.
David J. Lehn, Ph.D.

Professors:

William M. Banks, Jr., Ph.D.
Shirley B. Chater, Ph.D.

Senior Lecturers:

John P. Mathin, Ed.D.

Lecturers:

Elaine M. Boice, Ph.D.
Patrick S. Duffy, Ph.D., J.D.
Hermine Marshal, Ph.D.
Martha J. Maxwell, Ph.D.
William H. Riggs, Ed.D.

Supervisors:

Beck J. Albus, M.A. (Elementary)
Maritn Jung Buckley, Ph.D.
M. Kathleen Fairbanks, Ph.D. (Administrative Services Credential)
Lance Flanagan, Ed.D.
Judith M. Fendall, M.A. (Elementary)
Kendal Ien, Ph.D. (Bilingual/Elementary)
Margaret C. Jackson, M.A. (Social Sciences)
Kenneth S. Lane, B.A. (Elementary)
Constance C. L'Arbre, M.A. (Social Sciences)
Mark C. Luso, Ph.D. (A.U.)
Barbara J. Luffin, M.A. (Reading)
Ronald W. Lundeberg, M.A. (Elementary)
Grace M. Maertins, M.A. (Elementary)

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, pupil personnel services in the public schools; and degree programs, both academic (M.A. and Ph.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. This 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 above requirements may be completed concurrently, candidates who 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.

UPPER DIVISION COURSES

100. Quantitative Methods in Education. (3) Two 2-hour lectures per week. An elementary survey course for students with limited background in mathematics. Location, dispersion, and association. Linear transformations. Reliability, relevance, and validity. Linear hypotheses. Canonical correlations.

Mr. Kaiser (Sp)

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

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

110. The Alternative Education Movement. (4) Formerly 119A. Four hours of lecture per week. Prerequisite: consent of instructor. In this quarter, the development and current status of the "Alternative Education Movement" will be examined. Focus will be the underlying alternatives that have emerged from the grassroots and are autonomous, democratic, and tuition free.

115. The Exceptional Child. (2–5) One 2-hour lecture per week. Introduction to social, psychological, and educational problems and programs for exceptional children. Must be taken concurrently with course 115.

115A. Mental and Emotional Handicaps. Topics: mentally retarded, emotionally disturbed, learning disabilities, multihandicapped, gifted, and preschool programs for young handicapped. Mr. Kaiser (F), Mr. Marascuilo (W).

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

115L. The Exceptional Child Laboratory. (1–5) Three weeks of lectures, one symposium, small group conferences, observations, and supervised field experiences with a variety of exceptional children. May be repeated twice.

Mr. Bower (F, W)

117. Introduction to Inquiry and Educational Research (Formerly course 116A). One 2-hour lecture per week. Introduction to the logic and skills of social-psychological and educational research. The major topical areas will be the structure of inquiry, the modes of observation and data collection, and a conceptual-descriptive approach to the means of data analysis.

Mr. Kaiser (F), Mr. Marascuilo (W)

118. Special Research Concerns and Methods. Prerequisite: courses 100 and 117 are recommended. The several courses are focused on topics, concerns, and methods and for which students frequently need special preparation and/or advanced study.

118A. Experimental and Quasi-experimental Designs. (3) Three hours of lecture per week. Mr. Watts (W)

118B. Personality Assessment. (3) Three hours of lecture per week. Presentation of tests relevant to the structure of major personality inventories and human development. Examination of the content and scoring of inventories, appropriateness, and emphasis given to the assessment of change.

Mr. Watts (W); Mr. Heist (Sp)

118C. Questionnaire Construction and Survey Research. (3) Three hours of lecture per week. Mr. Kaiser (Sp)

118D. Field Research Methods in Education (3) Three hours of lecture per week. Theory and practice of various qualitative field research techniques drawn from the disciplines of anthropology and sociology.

Ms. Walker (F)

119. Introduction to Data Analysis for Educational Research and Program Evaluation. Statistical techniques and their applications in the context of educational research and program evaluation. Packaged computer software is used in the teaching of these techniques. Problems in estimation, confidence intervals, hypothesis testing, and explained variance are discussed.

Mr. Kaiser (Sp)

119B. Data Analysis: Theory. (4) Two 2-hour lectures per week. Prerequisite: consent of Instructor. An introduction to probability and its role in decision making is presented. Methods based on ranking and frequency count are emphasized. Microcomputers (PC) are used.

Mr. Kaiser (Sp)

119B. Data Analysis: Applications. (4) Two 2-hour lectures per week. Prerequisite: course 119A or consent of Instructor. Methods and normal distributions are examined in terms of the analysis of variance, correlation, and regression. Post hoc and related comparisons are presented along with tests of significance and independence are considered.

Mr. Marascuilo (W)

119L. Educational Statistics Laboratory. (1) One 3-hour laboratory per week. Must be taken concurrently with course 119A. Mr. Marascuilo (W, Sp)
critically reviewed and evaluated. Mr. Hardyck, Prerequisite: courses 119A, 119B or equivalents.

214D. Intellectual Development and Education. Three hours of lecture per week. A consideration of the measurement, assessment and history of fields in education. Mr. Ammon (Sp)

214C. Mental Health—Individual and Group Processes. Five lectures and seminars per week. Prerequisite: consent of instructor.

214B. Play and Games in Human Learning. Three hours of lecture per week. Prerequisite: consent of the instructor. Multidisciplinary examination of play and games in relationship to human learning and development. Each student will devise and present a game or theory related to human learning. Game developers and researchers in play will serve as consultants. Mr. Bower (W)

216A. Advanced Topics on Exceptional Children. Three hours of lecture per week. Prerequisite: consent of instructor. Topics: Problems in mainstreaming mildly handicapped children.

216B. Principles and Theories of Psychological Measurement. Three 1-hour sessions per week. Prerequisite: courses 119A and 119B, or consent of instructor. Advanced readings in normal, abnormal, and educational measurement, evaluation and appraisal. Mr. Jensen (Sp), Mr. Woodson (Sp)

216C. Advanced Studies in Theory and Research Regarding Measurement and Change of Attitudes and Opinions. Three 1-hour sessions per week. Prerequisite: consent of instructor. Topics vary from quarter to quarter. (W) Personality variables related to persuasibility. Mr. Watts (W)

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

217A. Seminar in Intellectual Development and Education. (3) Three 1-hour sessions per week and 480-minute seminar on a satisfactory/unsatisfactory basis. Mr. Ammon, Mr. Marasculo (Sp), Mr. Hardyck, Mr. Rohwer (F)

217B. Cognitive Development of Children. One 3-hour session per week. A graduate-level introduction to the developmental stages of the child. Counseling and consulting models and techniques will be explored for appropriateness to this population. Mr. Bower (W)

217C. Development of Speech, Language, and Cognitive Processes. (3) Three 1-hour sessions per week. Mr. Ammon (W), Mr. Hardyck (F)

217D. Children's Learning. (3) Three 1-hour sessions per week. A consideration of theories, methods, and experimental research pertaining to varieties of children's learning that have relevance for education and science. Mr. Hardyck (F)

217E. Theories of Intelligence. (3) Three 1-hour session per week. A consideration of psychometric approaches to the study of intelligence. Conceptual and methodological aspects of the history of intelligence tests and the development of theories of intellectual processes. Current published journal reports of research in cognition in children and adults will be critically reviewed and evaluated. Mr. Rohwer (Sp)

218. The Critical Analysis of Research on Cognitive Processes. (3) Three 1-hour sessions per week. Prerequisite: consent of instructor. Conceptual and methodological aspects of the history of theories and research on cognitive processes. Current published journal reports of research in cognition in children and adults will be critically reviewed and evaluated. Mr. Rohwer (Sp)

218B. Language. (3) One 3-hour seminar per week. Seminar devoted to selected topics in such areas as language and cognition, the development of communicative skills, and subcultural variation in children's language and thought. Mr. Ammon (Sp), Mr. Marasculo (Sp), Mr. Hardyck (F)

218C. Learning. (3) One 3-hour seminar per week. An intensive examination of specific topics (e.g., the development of imagery processes; social-class comparison of the area of the development of (anti) social processes. Mr. Rohwer (W)

218D. Cognitive Style. (3) One 3-hour seminar per week. This seminar explores the relationship between cognitive processes and individual development. Particular emphasis is placed on the cognitive style of field independence or dependence, and its importance in understanding Piagetian data on development and learning.

218E. Individual Differences. (3) One 3-hour seminar per week. Recent theory and research on individual differences in intelligence and learning. Emphasis is placed on the cognitive style of field independence or dependence, and its importance in understanding Piagetian data on development and learning.

218F. Information Processing. (3) One 3-hour seminar per week. A consideration of theory and research on verbal processes such as speech and thinking, inner speech, and sensory deficits in verbal information processing, with reference to education.

219A. Advanced Topics in Data Analysis for Educational Research and Program Evaluation. Two 2-hour lectures per week. Prerequisite: courses 119A and 119B, or equivalent. Advanced statistical techniques are described and illustrated within the context of examples from educational research and program evaluation. A computer software is used in the teaching of these topics.

219B. Analysis of Variance. (4) One- or two-way and multiple univariate analysis of variance with interactions and nested hypotheses are studied. Mr. Marasculo (Sp)

219C. Factor Analysis. (4) Three 1-hour lectures per week. A consideration of the applications of factor analysis, principal components, and discriminant analysis in educational research. Mr. Kaiser (F)

219D. Factor Analysis. (4) Three 1-hour lectures per week. A consideration of the applications of factor analysis, principal components, and discriminant analysis in educational research. Mr. Kaiser (F)

219E. Piaget as Philosopher. (3) The study of Piagetian ideas and the concept of the unconscious will be explored, with some background consideration of Plato, Aristotle, Paul, Descartes, Locke, and Kant. The emphasis will be on the concept of the unconscious. Mr. Marasculo (Sp)

219F. Correlation and Regression. (3) Multiple regression and correlation analysis, analysis of covariance, significance testing, and multiple regression analysis of variance. Mr. Kaiser (F)

219G. History of Educational Thought. (3) Three 1-hour seminars per week. The development of educational thought with special emphasis upon reform movements and the evolution of the American University. Mr. Clifford (W)

219H. Anthropology of Education. Three hours of lecture and discussion per week. An examination of which educational systems, events and issues in both western and non-western societies have been viewed from the perspective of cultural anthropologists. Mr. Walker (Sp)

219I. Sociology of Education. (4) Two 1 1/2-hour lectures and 1-hour discussion per week. The organization, structure of educational institutions, the processes of control and socialization in schools, and the functions of schools in society. Mr. Wilson (F)

219J. Sociological Theory and the Study of Education. (4) Two 1 1/2-hour lectures and 1-hour discussion per week. Prerequisite: Sociology 157 or equivalent. The interplay between theoretical perspectives and 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.

219K. Theories of the Self: Freud and his Predecessors. (3) Three one-hour sessions per week. Psychological and sociological theories of the nature of human nature, the psyche, the person, the self. After some background consideration of Plato, Aristotle, Paul, Descartes, Locke, and Kant, the emphasis will be on the concept of the unconscious. Mr. Marasculo (Sp)

219L. Advanced Educational Statistics Laboratory. (3) One 3-hour laboratory per week. Must be taken concurrently with course 219. Mr. Kaiser (F, W)

220A. Philosophy of Education: An Introduction. (3) One 2-hour lecture and one 1-hour discussion per week. Ontology, ethics, political philosophy, religion, psychiatry, and aesthetics as they relate to educational thought. Mr. Mosier (F)

220B. Philosophy of Education: An Introduction. (3) One 2-hour lecture and one 1-hour discussion per week. Ontology, ethics, political philosophy, religion, psychiatry, and aesthetics as they relate to educational thought. Mr. Mosier (F)

221A. History of Educational Thought. (3) One 2-hour lecture and one 1-hour discussion per week. The development of educational thought through special reference to philosophical analysis and the techniques of inquiry.

221C. History of American Education. (4) Four hours of lecture per week. Social and intellectual history of American education from the colonial period to the Civil War, with special emphasis upon adaptations of European school practices and their causes, apprenticeship education, and the facts as to its operation. Mr. Borrowman (Sp)

222. Anthropology of Education. Three hours of lecture and discussion per week. An examination of which educational systems, events and issues in both western and non-western societies have been viewed from the perspective of cultural anthropologists. Mr. Walker (Sp)

223A. Sociology of Education. (4) Two 1 1/2-hour lectures and lectures and 1-hour discussion per week. Prerequisite: Sociology 157 or equivalent. The interplay between theoretical perspectives and 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)

224A. Theories of the Self: Freud and his Predecessors. (3) Three one-hour sessions per week. Psychological and sociological theories of the nature of human nature, the psyche, the person, the self. After some background consideration of Plato, Aristotle, Paul, Descartes, Locke, and Kant, the emphasis will be on the concept of the unconscious. Mr. Marasculo, et al.

224B. Philosophy of Education: An Introduction. (3) Three one-hour sessions per week. Topics on selected educational theorists and trends in educational thought.

224C. History of Educational Thought. (3) Three one-hour sessions per week. An examination of selected educational thought and principles in education and its impact.

225. Seminar in Philosophy of Education. One 3-hour seminar per week. Topics on selected educational philosophers and trends in educational thought.

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

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

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

225E. Seminar in Educational Measurement: Selective Topics. (3) Three 1-hour sessions per week. An examination of selected educational measurement topics.

225F. Comparative Education: Soviet Union. (3) Three 1-hour sessions per week. An examination of educational measurement topics.

227A. Comparative Education: Soviet Union. (3) Three 1-hour sessions per week. Educational policy, thought, and institutions in the Soviet Union from 1917 to the present.

227B. Comparative Education: Western Europe. (3) Three 1-hour sessions per week. Educational policy, thought, and institutions in England, France, and Germany in the Twentieth Century.

227C. Education in Non-Intercultural Societies. (3) Three hours of lecture per week. An examination of...
educational systems of several non-literate societies in different parts of the world and emphasis on the rela-
tion of the relationships between education, culture, and social structure. Ms. Walker (W)

227D. Education In Developing Countries. (3) Three hours of lecture per week. The educational sys-
tems of several countries in Africa, Asia, and Latin America will be examined with the intent of under-
standing the problems and issues involved in the development of education appropriate to the needs and ap-
spirations of these developing nations. Mr. Walker (Sp)

228. Seminar In Sociology of Education. Three hours of lecture per week. The seminar in
contemporary sociology will be concerned with contemporary sociological theories and their appli-
cation to specific social problems. Students will be required to prepare a major paper, integratin
the student's work in other courses, will be required. Mr. Hansen (W); Ms. Walker (Sp)

230. Curriculum Development. One 3-hour session per week. Critical analyses of curriculum innovations. 230A. Reading. (3) Prerequisite: consent of instructor. Mr. Ruddell (F)

230B. Speaking, Listening, and Writing. (3) Prerequisite: consent of instructor. Mr. Lo--

230C. Literature. (3) Prerequisite: consent of instructor. Mr. Loban (W)

230D. Mathematics. (3) Prerequisite: consent of instructor. Mr. Scott (W)

230E. Social Sciences. (3) Prerequisite: consent of instructor. Topics will vary from quarter to quarter. Trends in social sciences. Mr. Michaelis (F, Sp)

230F. Science. (3) Prerequisite: Teaching credential 191L or equivalent: course 230F recommended: and an interview. Mr. Wilson (F); Mr. Hansen (W)

231. Research in Curriculum and Instruction. One 3-hour session per week. Critical analyses of research in the subject area. 231A. Reading. (3) Prerequisite: course 230A. Mr. Simons (Sp)

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

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

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

231E. Social Sciences. (3) Prerequisite: consent of instructor. Mr. Scott (Sp)

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

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

231K. Reading and Language Measurement Instruments. (3) Formerly 291J. Prerequisite: course 281 or consent of instructor. A survey and analysis of reading and language measurement instruments. Standardized readiness, decoding and word recognition, comprehension, vocabulary, diagnostic tests and criterion referenced tests will be covered. Mr. Simons (W)

232. Early Childhood Programs. One 3-hour session per week. Prerequisite: consent of instructor. Tradi-
tional and innovative programs for the education and care of young children. Mr. Simons (W)

232A. Infant and Pre-school Programs. (3) **232B. Kindergarten and Early Primary Programs. (3)

232C. Selected Issues in Early Childhood Education. (1/2) Mr. Am (Sp)

233. Production of Mediated Programs. (3) Three hours of lecture and six hours of laboratory/discussion per week. An introduction to the mediated environments, including: visual, audio, video, programmed and computer-assisted instruction, multi-media, simulations/games, cinematic-aryl materials. Mr. Simons (W)

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 the nature and functional-automated techniques in instruction. Emphasis will be upon instructional strategies. Students will prepare simple instructional programs and use a computer to evaluate their effectiveness. Mr. Woodson (Sp)

235A. Curriculum Planning: Bases for Curricular Decisions. (3) One 3-hour session per week. Theories of learning, cognitive and affective factors; taxonomies in the cognitive and affective domains; current structure of the school curriculum; modeling curriculum development problems associated with curriculum evaluation. A curriculum development project designed to integrate the various aspects of the course. Mr. Webster (F, Sp)

235B. Curriculum Planning: Theories, Principles, and Practices of Instruction. (3) One 2-hour session and one 1 1/2-hour laboratory per week. The course will cover: educational psychology; learning theory; environmental science; sociocultural factors; the functioning of instruction and curriculum development problems associated with curriculum evaluation. A curriculum development project designed to integrate the various aspects of the course. Mr. Webster (Sp)

236. Advanced Studies in Elementary and Secondary Education. (3) Prerequisite: consent of instructor. Mr. Mosier (Sp)

237. Educational Psychology. (3) Prerequisite: consent of instructor. Mr. Mosier (Sp)

238. Psychology of Learning. (3) Prerequisite: consent of instructor. Mr. Mosier (Sp)

239A. Research in Psychology. One 3-hour session per week. The seminar will be concerned with a variety of topics in the field of psychology. Mr. Webster (F, Sp)

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

240A. Principles and Theories of Guidance. (3) Prerequisite: consent of instructor. Mr. Mosier (Sp)

240B. Research in Counseling and Guidance. (3) One 3-hour session per week. The course emphasizes the development and scope of guidance work as a profession; critical analysis of basic philosophies, ethics, and professional responsibilities. Mr. Stewart (F)

240C. Environmental Factors in Counselor Adjustment. (3) Prerequisite: consent of instructor. Theories of interaction of environmental and personal factors in the counseling process; sources of career development; sources and interpretation of vocational data. Mr. Banks (W)

240D. Group Guidance. (3) Prerequisite: consent of instructor. Mr. Mosier (Sp)

240E. Individual Appraisal in Counseling. (3) Prerequisite: course 241A, and consent of instructor. Mr. Mosier (Sp)

241. Advanced Counseling. 245A. Counseling Theory and Research. (3) One 2-hour seminar and one 1-hour discussion per week. Prerequisite: consent of instructor. Theories and practices in counseling. Mr. Mosier (Sp)

245B. Case Analysis. (3) Three hours of discussion per week. Mr. Mosier (Sp)

246. Special Problems in Counseling Theory and Practice. (3) One 2-hour seminar and one 1-hour discussion per week. Prerequisite: consent of instructor. Mr. Mosier (Sp)

247. Foundations of Educational Administration. (3) Prerequisite: consent of instructor. Mr. Mosier (Sp)

250A-250B. Major Policy Problems in Education. (3-3) One 3-hour session per week. Prerequisite: required of all students in educational planning, economics, or politics. Core course oriented toward the practice of policy analysis in education. 250A: Introduction of major policy problems in contemporary education. 250B: Special topics in policy analysis (equity and access to education, deseg-
regulation, the role of the courts, citizen participation, state-wide or national planning). Mr. Benson, Mr. Benveniste, Mr. Guthrie (F, W)

251. Foundations of Educational Administration. (3) Prerequisite: consent of instructor. Mr. Mosier (Sp)

251A. Education and Government. One 3-hour session per week. Educational policy-making and administra-
tion in federal, state, and local governments; inter-
governmental relations in education; the role of the courts in the conduct of education. Mr. Dobson (Sp)

251B. The Administration of School Personnel, Educational Programs, and School Plant Programs. One 3-hour session per week. Problems of professional and classified personnel, student personnel services, programs of instruction, and school plant programs and facilities. Mr. Matlin (W)

251C. Educational Finance and Management Technologies. One 3-hour session per week. Problems in district and state planning of schools; the budgetary process; PPBS and other management technologies. Mr. Boyce, Mr. Salinger (Sp)

252. Administration of the Individual School. (3) Prerequisite: consent of instructor. Mr. Moorhead (Sp)

253A. Law and School Administration. (3) Formerly 259E. Three hours of lecture per week. An exam-
ination of the historic and contemporary influence of the law on education, the legal rights and responsibilities of teachers and students, curriculum content and ac-
cademic freedom, the authority of the school to regulate behavior, classly and penalize nonconformity. Mr. Duffy (F)

NOTE: For key to symbols, see page 56.
253C. Collective Negotiations in Education. (3) Formerly 251A. Three hours of lecture per week. Prerequisite: course 253A or 253B, or consent of instructor. Analysis of the legal implications of organizing, striking and settlement procedures. Special emphasis will be given to collective bargaining and the role of collective bargaining in the fulfillment of educational needs. Mr. Dufty (W)

253D. Equal Educational Opportunity and School Classification. (2) Formerly 251B. Three hours of lecture per week. Prerequisites: an introduction to educational data analysis such as Education 118A, or an introductory statistics course such as Statistics 130 or 131. Methods for constructing empirically based mathematical models of educational systems and related aspects of social structure. Students receive extensive opportunity to practice with actual data, using packaged computer software. No programming is required. Mr. Stern (F)

254. Quantitative Methods in Policy Analysis. 254A. Quantitative Analysis of Educational Systems, Part I. (4) Formerly 255C. Four hours of lecture per week. Prerequisites: an introduction to educational data analysis such as Education 118A, or an introductory statistics course such as Statistics 130 or 131. Methods for constructing empirically based mathematical models of educational systems and related aspects of social structure. Students receive extensive opportunity to practice with actual data, using packaged computer software. No programming is required. Mr. Stern (F)

254B. Quantitative Analysis of Educational Systems, Part II. (4) Formerly 255D. Four hours of lecture per week. Prerequisite: Education 254A or consent of instructor. Prerequisites: course 254A or equivalent, or consent of instructor. Use of empirical models in assessing efficiency of educational activity. Mathematical models, Lecture models, and the individual's rationality, central planning and decentralized markets, third-party payment and commodity markets, individual and collective rationality, central planning and decentralized markets, third-party payment and commodity markets, and the theory of commodity markets. Mr. Glenny (W)

255. Educational Planning and Evaluation. 255A. Educational Planning and Evaluation. (4) Three hours of lecture per week. Prerequisites: course 255D or consent of instructor. Analysis of the legal implications of organizing, striking and settlement procedures. Special emphasis will be given to collective bargaining and the role of collective bargaining in the fulfillment of educational needs. Mr. Dufty (W)

256. Organizational Theory and Education. 256A. Organizational Theory and Education. (4) Three hours of lecture and one one-hour discussion per week. Sociological approaches to the study of organizations and management in educational and non-educational settings. Theories of organizations, organizational analysis, organizational design, organizational development, and organizational change. Mr. Tillery (Sp)

257. Policies and Education. 257A. Determinants of State and Local Educational Policy. (4) One 3-hour lecture and one 1-hour discussion per week. Consideration of the role of state and local government in educational policy and social priorities. Emphasis will be placed on the processes and outcomes of policy making. Mr. Heist (W)

257B. National Government Influence on Educational Policy. (4) One 3-hour lecture and one 1-hour discussion per week. The role of the national government in forming and administering educational policy. Mr. Heist (W)

258. Organizational Theory and Education. (4) Three hours of lecture and one one-hour discussion per week. Sociological approaches to the study of organizations and management in educational and non-educational settings. Theories of organizations, organizational analysis, organizational design, organizational development, and organizational change. Mr. Tillery (Sp)

258A. Socialization and Socialization In Education. (4) One 3-hour lecture per week. Theory of socialization and socialization processes. Mr. Tillery (Sp)

261. Basic Concepts in Language and Reading. 261A. Higher Education: Historical and Philosophical Aspects. (4) Three hours of lecture per week. Social, economic, and political forces in historical and philosophical aspects of higher education. Mr. Glenny (W)

261B. Higher Education: Contemporary Development, Issues, and Changes. (3) One 3-hour lecture per week. Historical analysis of higher education in the United States; an examination of the major changes in higher education since 1960. Mr. Heist (F)

262. College Teaching. (3) One 3-hour session per week. Consideration of typologies of college teaching styles, issues and problems of adult learning. An analytic study of college teaching and the role of the teacher in college teaching. Mr. Reed (F, Sp)

268. 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 student as a developing human being, social creature, learner, and participant in institutional governance. Analytical review of research on teacher-student relations, analysis of personal characteristics, campus environments and cultures, as related to the influences and effects of college culture. Mr. Stone (F)

268D. Teacher Education. (4) One 2-hour session and one 1-hour of laboratory per week. Consideration of the philosophical, psychological, and social bases of general, liberal arts, and professional education. Analytical review of research on teacher education curricula, programmatic innovations, and innovations in teacher education. Mr. Glenny (Sp)

268E. Theories and Practices of Management and Leadership in Higher Education. (4) One 3-hour session per week. Selected theories of leadership and institutional management and their application, with emphasis on the identification and evaluation of leadership and management practices in higher education. Mr. Stone (F)

268F. Financing Higher Education. (4) One 3-hour session per week. Alternatives to the use of tax revenues in financing higher education. Mr. Tillery (Sp)

269. Sociology of Education. (3) Three hours of lecture per week. Analysis of educational systems with regard to social, economic, and political forces. Mr. Blumenthal (W)

270. Problems in Adult Education. (3) One 3-hour lecture per week. Problems in the development of educational programs for adults. Mr. Dufty (W)

270A-270B. Urban Educational Administration. (3-3) One 3-hour colloquium and one 1-hour discussion alternate weeks. Prerequisite: open only to students of special doctoral programs. Mr. London (Sp)

275A. Sociology of Adult Education. (3) A study of the social forces which create and mold various designs of adult education in an industrial society, and in newly industrialized countries and the United States. Mr. London (Sp)

275B. Problems of Work and Leisure. (3) Three hours of lecture per week. Attention will be given to the nature of work and leisure in relation to the total social system. Mr. Stone (W)

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

280A–280B. Concepts and Theory of Leadership in Educational Administration. (2–4; 2–4) One 2-hour laboratory per week. Consideration of the nature and character of leadership in educational administration. Mr. Tillery (F)

280C. Leadership in Educational Administration. (3–3) Three hours of lecture per week. Consideration of the nature and character of leadership in educational administration. Mr. Tillery (F)

280D–280E–280F. Colloquium on Educational Leadership in Research and Development. (2–4; 2–4; 2–4) One 3-hour colloquium and one 1-hour discussion period per week. Consideration of the nature and character of leadership in educational administration. Mr. Tillery (Sp)

280G. Basic Concepts in Language and Reading.
Development. (3) One 3-hour session per week. Prerequisite: consent of instructor. An introduction to: the relationship between language and society; linguistic and psycholinguistic concepts; language acquisition; language and reading in instruction; the reading and language development model; language and reading in early childhood; the aesthetic and the reader. Mr. Ammon, Mr. Ruddell, Mr. Johnson, Mr. Simons (F)

298. Small Group Processes. (3) One 3-hour session per week. Prerequisite: consent of instructor. Small group processes involving work groups, social groups, and the family. Group discussion will focus on the readings for the week, and on members' presentation of points of view to the subject. Course open to experiential and other theoretical.

290E. Methodology of Curriculum and Program Evaluation. (3) One 3-hour session per week. A systematic examination and critical analysis of evaluative research concepts, models, and procedures used in the appraisal of standard curricula, programs, projects, and courses. The reading and the other theoretical.

290N. Methodology of Language and Reading Research. (3) One 3-hour session per week. Prerequisite: consent of instructor. Development of instruction in language and reading research and strategies for dealing with them. Provides guided practice in evaluative research and evaluation. Completion of a research project per semester. Professor Ammon, Mr. Simons (W, F, Sp)

291. Experimental Courses.

291A. Formulating In-Service Professional Development Programs—Reading and Language Development (Sp). (3) One 3-hour session per week. Prerequisite: consent of instructor. Discussion and development of instructional elements basic to the design of in-service programs for language development programs for reading and language teachers. Process of change relative to teacher behavior will be given priority. Principles of reading and language development will be emphasized. To be offered 1977-78 only.

291B. Handicapped Persons in Literature: Social and Psychological Perspectives. (3) Two hours of lecture per week. An examination of books written by handicapped persons with emphasis on short stories, plays and poems in which psychological, social, and educational processes of handicapped persons are highlighted. Readings will be integrated with past and present concepts of the handicapped, historical perspectives and the authors' insights into the humanistic and psychological aspects of the handicapping condition.

291F. The European Perspective on Coordination of Systems of Higher Education. (3) One 3-hour session per week. A comparative study of European higher education in terms of the role of higher education in society, the function of higher education, and the interdependence of universities and other institutions. Three hours of seminar per week. Mr. Simons (F)

291G. Research in Instructional Technology. (3) Three hours of seminar per week. A seminar to critically analyze the research on instructional technology. Discussions of current topics in instructional technology and related research. The reading and the other theoretical.

299A. Humanistic and Policy Studies. (Formerly 299A). (3) Three hours of field studies per week. Prerequisite: course 291J. The strategies for implementation and management of instructional and informational programs into established curricula or programs. An introduction to the field and the unique problems of research methodology. Mr. Simonds (Sp)

299B. Instructional Development. Theory and Practice. (3) Three hours of field studies per week. Prerequisite: course 291J. The strategies for implementation and management of instructional and informational programs into established curricula or programs. An introduction to the field and the unique problems of research methodology. Mr. Simonds (Sp)

299C. Higher Education. (3) Two hours of seminar per week. Prerequisite: consent of instructor. Special programs. Must be taken on a satisfactory/unsatisfactory basis.

PROFESSIONAL COURSES

310. Internship in School Psychology. (1–3) Two hours of lecture and one hour of discussion 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)

333C. Directed Practice In School Libraries. (1) One hour of lecture 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. (2) Two hours of lecture and 9–12 hours of field work per week. Prerequisite: consent of instructor. Supervised work experience in the University of California Reading and Language Development Program. Students will work individually with high school and college students. Tasks will include diagnosis, planning, individualized remedial programs, and research. Must be taken on a satisfactory/unsatisfactory basis.

334A–334B–334C. Supervision Teaching. (3–12; 3–12; 3–12) One to three hours of lecture and 9–30 hours of field work per week in the public schools per week. Prerequisite: Enrollment in Teaching program. May be repeated in the same or another school district. Students enrolled in this course for a minimum of 10 hours of lecture and 30 hours of field work per week may be admitted to a credential program (multiple subject or single subject). Students enrolled for a maximum of 18 units. The number of units may be increased for students who complete the field work 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)

334D. Supervised Teaching. (3–12) One to three hours of lecture and 9–30 hours of field work per week in the public schools per week. Prerequisite: Enrollment is limited to students admitted to a credential program (multiple subject or single subject). The course may be repeated in the same or another school district. Students may repeat this course for a maximum of 18 units. The number of units may be increased for students who complete the field work 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. Application andlor the completion of the preparatory knowledge through implementation of exemplary reading-language programs in individual classrooms and school districts. Must be taken on a satisfactory/unsatisfactory basis. Ms. Buckley (F, W, Sp)

340. Field Work In Student Personnel and Counseling Psychology. (3–4) Counseling Practicum. (4–1; 4; 1) One 2-hour lab per week. Field work and field work per week; (W; Sp: 1 unit) supervised field work per week. Supervised experience in vocational, educational, and personal adjustment counseling. Ms. Windmiller (F)

340B. Internship In Student Personnel and Counseling. (3–9) Six to 20 hours of field work per week. Prerequisite: completion of 292A or consent of instructor. Supervised practice in selected aspects of student personnel and counseling services at educational, mental health, and in other agencies. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

NOTE: For key to symbols, see page 36.
350. Internship in Educational Administration. (1-8) One 2-hour class discussion alternate weeks plus supervised field experience. Prerequisite: open only to students admitted to Administrative Services Credential Program. Conferences and supervised field experiences. The Staff (F, Sp)

399. Special and Advanced Professional Study. (1-4) Prerequisite: open to seniors in teaching credential programs who wish to pursue special or advanced professional studies in various curriculum areas. Supervised study under direction of a staff member through conferences, observations, and field experience. The Staff (F, W, Sp)

INDIVIDUAL STUDY COURSES

601. Individual Study for Master's Candidates. (1-8) Individual study for the comprehensive examination in consultation with the faculty 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.

602. Individual Study for Doctoral Students. (1-8) Individual study in consultation with the faculty adviser, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ed.D. or Ph.D. degrees. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

IDS 120. Environmental Education and Design. (6) See Interdepartmental Studies for the complete description of this course.

IDS 203A-203B-203C. Concepts of Mental Dysfunction. (3-3-3) See Interdepartmental Studies for the complete description of this course.

IDS 221A-221B. Problems in Municipal Services and Regulatory Functions. (4) See Interdepartmental Studies for the complete description of this course.

IDS 232A-232B-232C. Interdisciplinary Course 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.

*IDS 282. Qualitative Educational Evaluation. (5) See Interdepartmental Studies for the complete description of this course.

College of Engineering

Office of the Dean, 315 McLaughlin Hall

Dean: Ernest S. Kuh, Ph.D.
Monaugh P. O'Brien, B.S.,
Sc.D. (hon.), D.Eng. (hon.),
LL.D. (hon.) (Emeritus)

Associate Deans:
Arthur M. Hopkins, Ph.D.
David M. Pirtz, M.S.

Assistant Deans:
William G. Godden, Ph.D.
Joseph A. Pask, Ph.D.
James T. Lapey, Jr., M.S.
Frederick S. Sherman, Ph.D.

The College of Engineering offers programs in a wide variety of engineering fields, based on the concept that the engineer must be well grounded in the sciences and in humanistic-social studies, with a full command of the principles and practices of the profession.

Four-year undergraduate curricula are offered in the following professional fields: civil engineering, electrical engineering and computer sciences, industrial engineering and operations research, manufacturing engineering, mechanical engineering, and materials science and engineering. Each of these curricula is administered by a separate department within the College and each emphasizes a core program of science and engineering subjects related to the particular field. In addition, there is a curriculum in Engineering Science with programs in bioengineering, engineering geoscience, engineering mathematics or mathematical statistics, and engineering physics. An individual program in engineering science may be developed in consultation with the advisor and the Committee on Engineering Science. Double major programs leading to a B.S. degree in two fields are offered through most departments in conjunction with either Materials Science and Mineral Engineering or Nuclear Engineering.

High school preparation for study in engineering includes the following: algebra (2 units); plane geometry (1 unit); trigonometry (1/2 unit); physics or chemistry, preferably both (1 or 2 units). Advanced mathematics courses are acceptable if they include the mathematics topics listed above.

Students may refer to the Announcement of the College of Engineering for a detailed presentation of the curriculum available. Specific courses are listed in the Announcement and in the course section of this catalog.

Effective Fall Quarter 1977, a student who has attempted more than 185 quarter units of college work will not be permitted to register in the College of Engineering without permission of the Dean of the College. Institution in the College should occasion no hardship or difficulty for continuing undergraduates, regardless of units attained, they pursue engineering-related programs of study.

Graduate programs are offered leading to the Master of Science and Doctor of Philosophy degrees for study emphasizing engineering applied sciences, and Master of Engineering and Doctor of Engineering degrees for advanced professional studies of design and development. Fields of study include civil engineering, electrical engineering and computer sciences, industrial engineering and operations research, mechanical engineering, nuclear engineering, materials science and mineral engineering, engineering geoscience, fluid mechanics, applied mechanics, and naval architecture. Also, interdisciplinary graduate programs are available in air pollution engineering, bioengineering, bioengineering, energy, earthquake engineering, energy and energy resource engineering, environmental engineering, mining and mineral resources, ocean engineering, and urban and public systems. Specific graduate programs may also be found in the Announcement of the College of Engineering.

Civil Engineering

Department Office, 760 Davis Hall
Chairman: Carl L. Montanith, M.S.

Hydraulic and Sanitary Engineering

Division Office, 633 Davis Hall

Professors:

Hugo B. Fletcher, Ph.D.
James R. Anderson, Ph.D.
David Jenkins, Ph.D.
Walter B. Lawrence, Ph.D.
William J. Odlum, Ph.D.
Erman A. Pearson, Ph.D.
Robert E. Smurr, Ph.D.
Jerome F. Thomas, Ph.D.

Associate Professor:

Alexander J. Horn, Ph.D.

Assistant Professor:

Jorg Imberger, Ph.D.

Lecturers:

T. C. Golezak, Ph.D.
Frank H. Pearson, Ph.D.

R. B. Wosilatow, Ph.D.

W. P. Wilcox, Ph.D.

E. M. Popov, Ph.D.

Graham H. Powell, Ph.D.

James M. Raphael, S.M.

Jerome L. Seckman, Eng.

S. D.

Alexander C. Scarcella, M.S.

Robert L. Taylor, Ph.D.

Edward L. Wilson, D.Eng.

Howard D. Eberhart, M.S.

Bruce Jameson, B.S.

Tung-Yen Liu, M.B. (Emeritus)

George H. Truckell, B.S. (Emeritus)

Professor:

P. Brady Williamson, Ph.D.

Associate Professor:

Earl R. Parker, M.E.

Lecturer:

Stephen A. Macri, Ph.D.

Roy M. Stephen, M.S.

Transportation Engineering

Division Office, 215 McLaughlin Hall

Professors:

James W. Anderson, Ph.D.
N. G. L. Brekke, Dr. Ing.
James D. Dunham, Ph.D.
William L. Garrison, Ph.D.
Ben C. Gorevic, Jr., B.S.
Richard E. Goren, Ph.D.
John N. Lin, Ph.D.
James K. Mitchell, Ph.D.

F. W. Mott, M.C.E.

Carl L. Montanith, M.S.

Associate Professors:

Keith C. Griswold, Ph.D.

William M. Houston, Ph.D.

Assistant Professors:

Carlos F. Dageno, Ph.D.

Weston T. Hostetler, D.Eng.

Lecturers:

Clarence K. Gann, M.S.

Wolfgang Homburger, M.S.

Thomas A. Long, M.S.

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 practice or with preparation for graduate study. Students may arrange their programs 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 of humanistic-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-
Science or Statistics: a 4-semester course in a subject appropriate for the major field of study. Mathematics 5A-5B in place of Mathematics 4A-4B may be substituted by the adviser. Physics 5A-5B or other courses in biological science or statistics may replace Physics 5A and/or Physics 5E. Substitutions may be made from an approved list of courses.

Engineering 28, 36, and 45. Civil Engineering 10. Computer Science 1 and Statistics 25. Electives: 22 units including at least 15 units in humanities or social sciences.

Upper Divisions. Required: Mechanical Engineering 104A. Civil Engineering 110, 116, 121, 130, 131, 133 or 134, 140, 141, 150A-150B, 170, 192 and 194. Electives: 15 units of upper division civil engineering courses. 12 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 fields of engineering, construction, geodesy and photogrammetry, hydraulics, sanitary, geotechnical engineering, ocean engineering, structural engineering and structural mechanics, transportation, and water resources. Details of admission and requirements for graduate study may be obtained by writing the Department Undergraduate Study Committee.

Electrical Engineering and Computer Sciences

Department Office, 231 Cory Hall
Computer Science Division Office, 573 Evans Hall

Professors:
Diogenes J. Angelakos, Ph.D. (Vice Chairman)
*Herbert B. Bakst, M.S.
*Elwin R. Bertska, Ph.D.  
Charles A. Bird, Ph.D.
*Richard S. Black, Ph.D.
Leon O. Chu, Ph.D.
Charles A. Desse, Ph.D.
Thomas E. Evans, Ph.D.
*Arthur Gill, Ph.D.
Mark D. Graham, D.E.E.
*Michael L. Harrison, Ph.D.
David A. Hodges, Ph.D.
Arthur M. Hopkins, Ph.D.
Elihu I. Jury, Sc.D.
*William Kahan, Ph.D.
*Richard K. Karp, Ph.D.
Eugene L. Lawler, Ph.D.
Edwin T. Land, Ph.D.
Allan J. Lichtenberg, Ph.D.
Kenneth K. Mc. Ph.D.
Richard S. Muller, Ph.D.
William G. Olcham, Ph.D.
*Walter F. and Alice E. Parlett, Ph.D.
Donald O. Pederson, Ph.D.
Eilen Polak, Ph.D.
*Charles R. Poultney, Ph.D.
*Chih-Yen R. Ramamoorthy, Ph.D.
David J. Sakrison, Sc.D.
*Steven E. Schwartz, Ph.D.

Associate Professors:
*Vinod R. Deshpande, Ph.D.
*Robert S. Fatemi, Ph.D.
*Robert L. Fenton, Ph.D.
*Samuel L. Graham, Ph.D.
Paul A. Gray, Ph.D.
T. Kenneth Gunanand, Ph.D.

Assistant Professors:
Robert W. Brodersen, Ph.D.
*Richard J. Fateman, Ph.D.
Cheong-Won Huh, Ph.D.
*David A. Patterson, Ph.D.

Professors:
*Vidal R. Anselmi, Ph.D.
Thomas F. Buttering, M.D.
*Robert I. Cahn, Ph.D.
Andrew Cori, Ph.D.

Graduate programs of study leading to the master's and doctoral degrees are available in the major fields of electrical and computer engineering, construction, geodesy and photogrammetry, hydraulics, sanitary, geotechnical engineering, ocean engineering, structural engineering and structural mechanics, transportation, and water resources. Details of admission and requirements for graduate study may be obtained by writing the Department Undergraduate Study Committee.

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, provides a wide selection of courses and seminars and allows 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 the 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 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 major 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.

NOTE: For key to symbols, see page 35.
Details of the available fields of graduate study in electrical engineering and computer sciences are described in the Announcement of the College of Engineering. For further information on graduate programs and procedures, see the Electrical Engineering and Computer Sciences 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, or medicine. Students in this program may choose to prepare for graduate study in the engineering fields, the natural sciences, or medicine. Graduate programs in engineering science are offered by the individual engineering departments.

Programs for the Bachelor's Degree

The undergraduate Engineering Science curriculum is multifaceted and is administered by the Engineering Science Committee. Admission to the engineering science curriculum requires a grade-point average of 2.75 or better. 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 courses must include at least 24 units of humanistic-social studies, of which 9 units must be of upper division level.

Lower Division. Required: (for all upper division programs in engineering science) Mathematics 1A–1B–1C, 5A–5B–5C; Chemistry 1A–1B–1C (except Engineering Mathematics—Mathematical Statistics); Engineering Physics requires Chemistry 1A–1B; Computer Science 1; Physics 5A–5B–5C–5D–5E (Engineering Mathematics—Mathematical Statistics requires Physics 5A–5B–5C); English 1A or Rhetoric 1A–1B; biological electives, 8 units which must include Biology 1A–1B for those in bioengineering; Geology 5 for those in engineering geoscience.

Upper Division. All Engineering Science programs must include 24 units of upper division engineering courses (required upper division engineering courses may be included).

Particular requirements of the various options in the engineering science program are described below. The Announcement of the College of Engineering should be consulted for full details.

Bioengineering. Required: Chemistry 8A–8B, 14 or 109A; Biochemistry 102; Medical Physics 120–122. Electives must include at least four upper division courses (mathematics, computer science, or chemistry) and an upper division course in mechanics; an upper division course in fluid mechanics. Note for premedical students: Zoology 105 is recommended; foreign language requirements of medical schools should be taken into account.

Engineering Geoscience. Required: Physics 105A or Mechanical Engineering 103, Physics 110A–110B or Electrical Engineering and Computer Science 117A–117B, Mathematics 120A–120B–120C, or 121A–121B and Engineering 115, or Mathematics 104A, 105B and 185. Geology 150; Geophysics 122A–122B; Civil Engineering 139 or Mechanical Engineering 185, electives which must include: (a) four units of upper division courses (areas in geology or geophysics); (b) an upper division course in statistics; (c) for those who did not take in the lower division a course in materials such as Engineering 45, an upper division course dealing with materials; (d) a course in thermodynamics; (e) a course in fluid mechanics.

Engineering Mathematics or Mathematical Statistics. Required: Mathematics 112, 120A–120B–120C or three courses from Mathematics 104A–104B, 105, 185; Statistics 134A–134B; electives, which must include at least four upper division courses in mathematics or statistics; sufficient units of physical or life sciences so that total is 24 units including Physics 5A–5B–SC.

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, Physics 137A–137B; Mechanical Engineering 103 or Physics 105A; Mechanical Engineering 175 or Physics 105B; Nuclear 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 185 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. or Ph.D. degree in engineering science. Programs of study and research leading to a graduate degree in engineering science are offered by all of the engineering departments. The student must learn the theoretical principles of mathematics, chemistry, physics, geology, and biology on which developments in engineering and the applied sciences are based.

Industrial Engineering and Operations Research

Department Office, 4135 Etcheverry Hall

Professors: Richard E. Berlow, Ph.D. Edward F. W. Grossman, Ph.D.
Stuart E. Dreyfus, Ph.D. Sheldon M. Ross, Ph.D.
Richard M. Karp, Ph.D. James T. Lapsley, Jr., M.S.
Michael G. Oliver, Sc.D. Ronald W. Wolff, Ph.D.
Eugene M. Mezfin, M.S. Robert M. Oliver, Sc.D.
William S. Jewell, Sc.D. (Chairman)

Associate Professors: C. Roger Glassow, Ph.D.
James T. Lapsley, Jr., M.S.
Ronald W. Wolff, Ph.D.

Assistant Professors: Walter Adair, 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 their interaction with the environment. 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 control, scheduling, systems reliability, engineering economics, incentives, organization, and man-machine systems.

Undergraduates in Industrial Engineering and Operations Research receive broad training in engineering fundamentals, 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. In order to satisfy the needs 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–1C, 5A–5B–5C; Chemistry 1A–1B; Physics 5A–5B–5C–5D; Engineering 17, 45; Computer Science 1, 2, 7 to 8 units of technical electives; to be selected from Computer Science 41, or Physical, or Biological Science courses approved by the advisor; to 22 to 2 units of electives.


Graduate Programs

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

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 operations, and thereby 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 comprehensive examination. Doctoral degrees require oral examination in the major and two minor fields followed by submission of 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 program details may be obtained from the Industrial Engineering and Operations Research Office, 4135 Etcheverry 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.

Electives: (1) Must include sufficient total units in humanistic-social studies so that total is at least 27. The 27 units must include a two-quarter sequence from an approved list and must include at least 9 units of upper division courses. (2) Must include at least 18 units of upper division courses in engineering, science, mathematics, or statistics, of which at least 7 units must be in courses given by the Department of Industrial Engineering and Operations Research.
Curriculum for the Bachelor's Degree

A total of 180 units is required, including:

**Lower Division.** Mathematics 1A–1B–1C, 51A–51B–51C; Chemistry 1A–1B; Physics 5A–5B–5C–5D; Computer Science 1; 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 160, 104A, 104B or 111–134 of Industrial Engineering and Operations Research 130; Industrial Engineering and Operations Research 120, 150, 153, 165; 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 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: Group I: Mechanical Engineering 123, 127, 131, 132. Group II: Industrial Engineering and Operations Research 170, 172, 154, 162, 166.

Ceramic Engineering

The ceramic engineer studies the physical and chemical properties of the raw materials and products of the ceramic industry and fundamental characteristics of materials. Research topics include study of the mechanical, chemical, surface, thermal, electrical, and magnetic properties of materials, and study of the kinetics, thermodynamics, and simulation of the processes by which materials are produced.

Graduate Study in Engineering Geoscience

This program is directed toward graduate education and research in applied geophysics. The course of study leads to the M.S., Ph.D., and Eng. degrees and is designed for students with undergraduate degrees in geophysics, engineering geology, physics, or mathematics. An M.S. program is available for persons currently in industry or government who wish to undertake graduate work in the geosciences. The program currently provides study in mineral and soil exploration, engineering geology, and applications of geophysical techniques in engineering and environmental geophysics, ocean engineering, and ground water hydrology.

Graduate Study in Materials Science and Engineering

**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, 51A–51B–51C; Chemistry 1A–1B; Physics 5A–5B–5C–5D–5E; Engineering Science 36, 45; Computer Science 1; 28 units of electives. **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 80 units has been completed in the first two years.

**Upper Division.** Required: Civil Engineering 110, 130; Electrical Engineering 30; and Computer Science 109 **Note:** Materials Science and Engineering 100, 101, 102, 103, 107, 108, 109, 109L, 121, 121L, 122, 122L, 141, 141L, 142, and 41 units of electives. **Options:** Students interested in either the metallurgy or ceramic engineering options should state their preference so that an appropriate faculty adviser can be assigned. A variety of elective course programs are available in either option.

**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. Research topics include study of the mechanical, chemical, surface, thermal, magnetic, and electrical properties of materials, and study of the kinetics, thermodynamics, and simulation of the processes by which materials are produced.

**Materials Science and Mineral Engineering**

**Department Office, 210 Hearst Mining Building**

**Professors:**
- Robert H. Bragg, Ph.D.
- Neville G. Cook, Ph.D.
- Douglas W. Fuerstenau, Sc.D. (Chairman)
- H. Frank Morrison, Ph.D.
- Earl R. Parker, M.D.
- Joseph A. Pask, Ph.D.
- Alan W. Sears, Ph.D.
- Gareth Thomas, Ph.D., D.Sc.

**Associate Professors:**
- J. W. Evans, Ph.D.
- Marshall L. Mehan, Ph.D.
- W. E. Ferrell, Ph.D.
- Professors:
  - Bimal K. Bhattacharyya, Ph.D. (Adjunct)
  - Kenneth K. Kelley, Ph.D.
  - Charles Swift, Ph.D.

**Lecturers:**
- Kenneth Westmacott, Ph.D.
- Pat White, Ph.D.

The Department of Materials Science and Mineral 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 the major in Engineering Geoscience.)

Materials science deals with natural and man-made materials—their extraction, development, and application for use in applications such as electronic, 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, extractive metallurgy, or physical metallurgy.

Engineering geoscience applies the discoveries and knowledge of mathematics, statistics, physics, chemistry, and the geosciences to our total environment: the solid earth, the oceans, the atmosphere, and space. The program provides education in the fundamental subject matter necessary for engineering occupations in mining exploration and exploitation, petroleum exploration, planetary exploration, marine geophysics, and engineering geophysics.
All students who have a strong interest in either theoretical or applied engineering should consider graduate study. The study may be in one or more areas of specialization provided the student wishes to undertake advanced work in nuclear engineering.

Nuclear Engineering

The Department of Nuclear Engineering offers a Master's degree and a Ph.D. The Master's degree requires the completion of 36 units of graduate credit and the Ph.D. degree requires the completion of 84 units of graduate credit. The Master's degree is awarded upon the successful completion of a thesis based on original research. This research must be in a field of nuclear engineering and it must be approved by the departmental advisor. The Ph.D. degree is awarded upon the successful completion of a dissertation based on original research. This research must be in a field of nuclear engineering and it must be approved by the departmental advisor.

Nuclear Engineering

Professors:

Harvey J. Ammeter, Ph.D.
Paul L. Chamber, Ph.D.
Robert M. Good, Ph.D.

Associate Professors:

S. W. Kaplan, Ph.D.

Assistant Professors:

Donald R. Olander, Se.D.
Thomas H. Pigtford, Se.D.
Lawrence Ruby, Ph.D.
Vigil E. Schrook, M.S., E.E.

Senior Lecturer:

Robert V. Pyle, Ph.D.

Lecturer:

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 coursework 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.

Curriculum for the Bachelor's Degree

A total of 180 units is required, including:

Lower Division. Mathematics 1A–1B–1C, 41, 14
51C. Chemistry 1A–1B; Physics 5A–5B–5C–5D–5E.
Computer Science 1; Engineering 28, 56, 45; 36 units of electives.


Mechanical Engineering Options. The following groups of technical electives are suggested to aid undergraduates in their choices of specific professional goals.

Aeronautics and Fluid Mechanics. Engineering 116, 117; Mechanical Engineering 133, 147, 151, 159, 162, 174, 175; Civil Engineering 139, 166A; Physics 132. Astronomy 101.


Environmental Engineering. Engineering 150, 151, 152, 156; Mechanical Engineering 110, 142, 145, 151, 159, 160, 173, 174; Civil Engineering 140; Geography 146; Architecture 110.

General Mechanical Engineering. Engineering 117; Mechanical Engineering 133, 134, 147, 151, 159, 185.

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


Naval Architecture. Naval Architecture 151, 152A–152B, 154A–154B; Civil Engineering 131, 135; 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 of specialization, or a professional emphasis. Specialization is offered in the following areas: (1) Dynamics and Dynamical Systems, (2) Fluid Mechanics, (3) Heat and Mass Transfer, (4) Mechanical Design, (5) Mechanics of Deformable Media, (6) Thermodynamics, (7) Environmental Engineering. Details on various aspects of graduate study are available from departmental brochures and from the Announcement of the College of Engineering.

Naval Architecture

Department Office, 202 Naval Architecture Building

Professors:

J. Randolph Pauling, Jr., D.Eng., (Chairman)

Associate Professor:

William C. Webster, Ph.D.

Lecturer:

Aron E. Mansour, Ph.D.

Oswald J. Stuhl, M.S.

The Department of Naval Architecture offers courses in the fundamental of marine-vehicle design and the theories of ship structures and ship hydrodynamics. There is no undergraduate major, but undergraduate courses are offered, and students interested in naval architecture may elect courses in this department as an option within the mechanical engineering major.

Graduate study is offered in the areas of ship structures and ship hydrodynamics, leading to both the master's and doctoral degrees. The graduate courses in naval architecture may include Naval Architecture 241A–241B, 241C. Other courses are chosen according to the student's background and objectives. With sufficient undergraduate preparation, a student may earn a master's degree in three quarters of study. Further details on graduate programs (including the program in ocean engineering) are available from the department upon request.

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 programs.

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 students from outside 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 College-wide interdepartmental 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, and Doctor of Philosophy in Engineering or Engineering Science in certain of the departments within the College.

Further information on any of these programs can be obtained by writing to the Dean of Interdisciplinary Studies, College of Engineering, 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 some specialty within these areas. The intention of this type of hybrid education is to allow the student to become professionally involved in practical or theoretical problems related to biological or medical systems. With 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 own choice. The graduate program in Bioengineering at Berkeley spans the College of Engineering with cross-listed courses and research in most of the individual departments. More than twenty faculty members in the College of Engineering are directly involved in bioengineering research, and many more have research 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 department on the hydrodynamics of flagellar and cilia 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 neurosensory physiology, neuromuscular control systems, the development of electron microscopy for biomedical applications, biomedical instrumentation, electronic prosthesis design, and population dynamics and theoretical epidemiology, 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-neck injury studies and mechanical prosthesis design, biological fluid mechanics, biomedical applications of computers and intensive care patient monitoring, biological mass transport and heat transfer, cardiology, and 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 association with the several life science departments of the College of the Biological Sciences, the School of the Biological Sciences, the School of the University of California at San Francisco, or with local hospitals. Engineering professors also participate in joint projects with their colleagues in the Biophysics 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 departments to be arranged to fit 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 technical breadth complementary to the major field.

Energy and Energy Resource Engineering. It is generally recognized that a 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 supply, as well as a wide range 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 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 selection of course work in socio-economic and policy areas. Individual study including synthesis and project design is an important part of the total program.

Energy and energy resource discipline areas included in the engineering departments with associated fields of specialization are as follows:

Civil Engineering: structures; resources; environmental engineering; transportation.

Electrical Engineering & Computer Sciences: electric power, systems and optimization, solid state, plasmas.

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, systems and modeling, environmental engineering.

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

NOTE: For key to symbols, see page 36.
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 pollution 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 engineers qualified for professional practice builds upon sound training in disciplines of a parent field. This background is deepened and ranges of skills are broadened by additional studies appropriate to 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 students may arrange degree programs at all levels in fields of air pollution engineering, desalination, geothermal energy, solar energy, solid waste management, water resources, and others. (See brochure of Department of Mechanical Engineering.) Members of the Mechanical Engineering faculty are actively engaged in a rich 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 the areas of water quality and hydraulic engineering. Programs for students enrolled in this division may be arranged in coastal engineering, water resources engineering, and hydraulics. 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.

The various environmental engineering activities of the departments and laboratories within the College permit a close working cooperation with the College of Chemistry and School of Public Health.

Mining and Mineral Resources. The increase in demand for mineral resources will require a significant increase in attention to the science and technology involved in finding and extracting minerals. Among the critical resources are not only energy minerals but also fertilizer resources and domestic metallic ores. Scientists and engineers concerned with mineral resources must develop new technology to find and extract mineral and energy materials within the constraints of environmental engineering, and sanitary engineering. In addition, courses and programs can be arranged with such departments as Business Administration, Electrical Engineering and Computer Sciences, and Industrial Engineering and Operations Research.

At Berkeley, there are strong programs and excellent laboratory facilities related to finding, extracting and processing mineral resources. Faculty are involved with the inventory of resources, mining geology, mineral deposition, application of geophysics to mineral exploration, mining systems, rock mechanics, tunneling, fluid flow in rocks, mine drainage, and natural gas engineering, enhanced oil recovery, mineral processing, raw coal processing, mineral resources of the sea, extractive and process metallurgy, and recycling of metals and waste materials.

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 designs 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 disciplines, students may participate in Berkeley's Ocean Engineering Program: Civil Engineering, Materials Science and Engineering, Mechanical Engineering, and Naval Architecture.

Programs of interest to potential graduate ocean engineering students at Berkeley include air-sea interactions, coastal engineering, corrosion in sea water, desalination, marine and offshore construction, harbor design, marine geophysics, waste disposal, naval architecture, engineering properties of marine sediments, ocean mining and prospecting, oceanographic data analysis, marine sediment transport, ocean energy, oceanographic instrumentation, offshore platforms, marine and submersible pollution control, oceanographic vehicles, and properties of engineering materials in sea water.

Research is conducted chiefly in the various laboratories on the Berkeley campus and at the Richardson 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 Ma- rine Institute and other local sources and in San Diego for worldwide 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 assistantships 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 community derive from 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, education, 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 designed to meet these needs, and be responsive positively to the overall welfare; and "specialists" must become not only increasingly more competent in their own fields but also more aware of the interactions and their areas of expertise held within a larger context.

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 requires a minimum of 60 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 1 hour of discussion per week. Prerequisite: none. Not to open to students majoring in environmental engineering. Radioactivity and nuclear reactions; applications of radioisopes in medicine and industry; radiation effects and dosimetry; reactor principles; licensing and emergency release; computer and theoretical 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 SC. Principles of electric circuits; techniques of solution for circuits; construction and operation of electric currents in semiconductors; the p-n junction; the transistor; principles and applications of analog and digital devices. Mr. Lieberman, Mr. Schwarz (F, W, Sp)

18. Engineering Graphics. (4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: Mathematics 1A may be taken concurrently. Importance of graphical presentations in engineering. Freehand sketching in preliminaries. Fundamentals of orthographic projection with applications to two-dimensional drawings. Analysis of computer calculations. Graphical mathematics and empirical equations. Mr. Brown, Mr. Stieldal, Mr. Curnow, Mr. Radcliffe (F, Sp)

36. Engineering Mechanics I. (3) Three hours of lecture per week. Prerequisite: Physics 5A and Mathematics 1A. A review of the principles of statics of particles and rigid bodies. Application to 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. Schaaf, Mr. Brown (F, W, Sp)

44. Mineral Resources Engineering. (3) Three hours of lecture per week. Prerequisite: Physics 5A, Chemistry 1A, Mathematics 1A, or equivalent. The mineral resources available in the United States and world-wide for the production of steel, iron, copper, lead, zinc, tin, lead, zinc, sulfur, cement, ceramics, etc.) and energy. Exploration for such resources. Extraction and processing of mineral raw materials; conversion of such mineral resources into engineering materials. Mr. Evans, Mr. Morrison, Mr. Holden (Sp)

45. Properties of Materials. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: Physics 5A. Applications of basic principles to structure and properties of engineering materials, with special emphasis on mechanical behavior of metals, concrete, and ceramics and upon the electrical properties of semiconducting materials. Mr. Parker, Mr. Pitz, Mr. Williamson (F, W, Sp)

47. Supplementary Work in Lower Division Engineering. (3) Three hours of lecture and three hours of laboratory per week. Prerequisite: Physics 5A. Basic principles of engineering, materials, with special emphasis on mechanical behavior of metals, concrete, and ceramics and upon the electrical properties of semiconducting materials. It 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 com-
plice the work under this heading. May be repeated for credit.

Mr. Pirtz (F, W, Sp)

UPPER DIVISION COURSES

100. Materials and Methods Used in Manufacturing Processes (4) Three lecture hours per week. Prerequisite: not open to students in Engineering. Introductory study of the materials and production processes used in the various engineering disciplines, with emphasis on the familiarization of basic processes such as machining, forming, casting, and welding. Mr. Pickus (F)

102. Introduction to Operations Research. (3) Three lecture hours and one hour of discussion per week. Prerequisite: Math 1C. Not open to students majoring in Industrial Engineering & Operations Research. General overview of operations research techniques and their application to engineering system problems. Examples will be drawn from the various engineering disciplines to illustrate techniques, models, and optimization of engineering systems. The Staff (F, W, Sp)

110. History and Impact of Technology on Society. (3) Two lecture hours and one hour of discussion per week. Prerequisite: not acceptable as a technical elective in Engineering. Growth of technology as a result of historical and social development; its influence on the social, economic, and cultural aspects of contemporary problems. Mr. Whinnery (Sp)

115. Methods of Linear Algebra. (3) Three lecture hours per week. Prerequisite: Mathematics 41 or 51A. Representation and solution of systems of linear algebraic equations, formulation of matrix theory and methods of solution. Cartesian tensors and their applications to physical problems. Mr. Berger (F), Mr. Pacelli (W)

116. Application of Complex Variables. (3) Three lecture hours per week. Prerequisite: Mathematics 5 1C. Methods of theoretical engineering analysis; application of complex variables to the problem of finite analytic and numerical methods of engineering systems. Mr. Holt (F)

117. Methods of Engineering Analysis. (3) Three lecture hours per week. Prerequisite: Mathematics 5 1C. Methods of theoretical computer programming; analytical and numerical methods of engineering systems. Mr. Holt (F)

118. Application of Numerical Methods to Engineering Problems. (3) Three lecture hours per week. Prerequisite: Mathematics 5 1C or CS1. Application of digital computers to solution of engineering problems. Introduction to programming languages, linear algebraic equations, roots of polynomials, interpolating polynomials, ordinary differential equations, error analysis. Digital computer time available for course work.

Mr. Wolt (H), Mr. Kan (K), Hahn (Sp)


147. Supplementary Work in Upper Division Engineering. (3-4) Prerequisites: limited to students who must make up a fraction of a required upper division course. May be taken only with permission of the Dean of Engineering. Students with partial credit in an upper division engineering course may complete the work under this heading. May be repeated for credit. Mr. Pirtz (F, W, Sp)

150. Environmental Engineering: Air Pollution Control. (3) Three lecture hours per week. Prerequisite: Chemistry 1B, Physics 3C, Math 5C. An introduction to the technological aspects of air pollution with particular emphasis on pollutants, sources, combustion processes, control technology, and abatement. Mr. Thomas (F, Sp)

151. Environmental Engineering: Water Pollution Control. (3) Three lecture hours per week. Prerequisite: Chemistry 1B, Mathematics 5C, Physics 4C. An overview of the environmental problems and technical solutions in the management of surface, ground, and marine waters. Consideration is given to water and wastewater treatment processes and the environmental efforts of municipal and industrial wastewater. The Staff (F, W)

152. Environmental Engineering: Solid Waste Management. (3) Three lecture hours per week. Prerequisite: Engineering 45. Introduction to the practice and issues of solid waste management. Technological, economical, legal, and social aspects of solid waste disposal. Application of systems analysis and operations research. Institutional, local, social, and environmental aspects. Case studies. Mr. Goleseki, Mr. Huggins (Sp)

153. Environmental Engineering: Consequences of Nuclear Technology. (3) Three lecture hours per week. Prerequisite: Chemistry 1A-1B. Power demands and nuclear energy. Irradiation, advanced reactors, production and handling of radioactive and thermal wastes. Radioactivity: properties, biological and ecological effects. Consequences and avoidance of nuclear accident. Reactor siting considerations: demographic, geological, meteorological. Standards and regulations. Unusual nuclear applications. Mr. Amster (Sp)

160. Energy and Power. (4) Four lecture hours per week. Prerequisite: Physics 50, Math 51C or equivalent. Sources of energy in the economy, emphasis on requirements for energy in human society, concentrating on electric power. Thermodynamic principles. Fossil fuel cycles, nuclear power cycles, and solar energy. Geothermal, tidal, and solar power. Direct energy conversion. Ecological and social problems, including environmental problems. Mr. Pirtz (F, W, Sp)


180. Lower Division Courses

200. Applied Geophysics. (4) Three lecture hours per week and four afternoon field trips. Prerequisite: graduate or upper division standing in a technical field. Geophysical methods applied to mineral exploration, geological engineering, geological mapping and ground water hydrology. Seismic reflection and refraction, resistivity, magnetic, gravity, and electromagnetic surveys. Concepts and practical exercises in design and application of surveys. A field exercise will be devoted to each method.

Mr. Morrison (F)

201. Ocean Engineering Seminar. (2) Two and one-half lecture hours per week. Prerequisite: enrollment in Ocean Engineering M. Eng. program or permission of instructor. An integrated series of lectures on selected topics in Ocean Engineering to be given by faculty members. Invited guest lecturers designed to present the newest developments in their respective specialty fields of Ocean Engineering, followed by discussion in depth.

Mr. Gerwick, Mr. Pauling, Mr. Wieg (W)

230A-230B. Engineering Analysis. (4-4) Three lecture hours and one hour of discussion per week. Prerequisite: Mathematics 5 1C. Methods of theoretical analysis of typical engineering systems. Application of complex variable theory, orthogonal expansions and special functions to solve partial differential equations arising in engineering problems. Mr. Willis, Mr. Schaal, Mr. Greit 230A (F, Sp), Mr. Berger 230B (W)

230C. Engineering Analysis. (3) Three lecture hours of and one hour of discussion per week. Prerequisite: course 230A-230B. Theoretical analysis of typical engineering systems. Application of transform methods, linear integral equations, finite difference methods, perturbation methods, and asymptotic expansions. Mr. Berger (Sp)

230E. Engineering Analysis. (3) Three 1-hour lectures per week. Prerequisite: course 230A of Math 51A, Physics 3C, and Computer Science 119 or Mechanical Engineering 117 or equivalent. The practical purpose of the course is to acquaint students with the Fourier transform. Emphasis is placed on two dimensional transforms applied to problems of sampling, radiation, arrays and antennas. Mr. Hanke, Z, and I 1 short time in the Fourier analysis are also developed and applied to linear systems under discussion.

The Staff (F, W)

272. Application of Digital Computer Methods to Engineering Problems. (3) Three lecture hours per week. Prerequisite: knowledge of Fortran (or Algol) and an introductory course in basic numerical methods (e.g., Engineering 118). Application of digital computer techniques to the solutions of partial differential equations with special emphasis to equations related to engineering systems, e.g., vibration studies, trajectories, aerodynamics, heat flow, electricity, error analysis; stability of numerical methods.

Ms. Miller (Sp)

*290. I. Techniques in Discrete Dynamic Systems Analysis. (4) Three lecture hours per week. Prerequisite: Civil Engineering 225A or Mechanical Engineering 233 or Applied Mechanics 273A, knowledge of computer programming. Analytical and numerical techniques useful for analyzing complex discrete dynamical systems will be discussed. Emphasis on the use of modern computational methods to determine certain mathematical solutions; stability, response and stability, system response. Damped discrete systems and integration methods are included.

290J. Techniques in Continuous Dynamic System Analysis. (4) Three lecture hours per week. Prerequisite: Civil Engineering 225A or Mechanical Engineering 233 or Applied Mechanics 273A, knowledge of computer programming. Analytical and numerical techniques useful for analyzing continuous dynamical systems will be discussed. Lectures discuss philosophy and basis of numerical methods. Emphasis will be placed on implementation. Discretization, eigenvalue problems, boundary value problems, and numerical optimization techniques will be explained. Mr. Mote (F)

299. Group Studies or Seminars. (1-8) Advanced group studies or seminars in subjects which are interdisciplinary in the various fields of engineering or other sciences associated with engineering problems. Topics which form the basis of seminars will be announced at the beginning of each semester.

Mr. Pirtz (F, W, Sp)

IDS 1. Technology and Society. (4) See interdepartmental studies for the complete description of this course.

IDS 150. Economic and Biological Feedback Systems. (3) See interdepartmental studies for the complete description of this course.

Civil Engineering
102. Route Surveying. (4) Two 1 1/2-hour lectures and one 3-hour laboratory per week. Prerequisite: course 101. Simple, compound, reverse, and transverse horizontal curves; vertical parabolic curves; reconnaissance, preliminary, and location surveys; computations of earthworks and bridge piers. Mr. Anderson, Mr. Moffitt (Sp)

105. Higher Surveying and Good Survey. (3) Three hours of lecture per week. Prerequisite: course 100. Methods of geodetic surveying; geodetic triangulation; triangulation and theodolites; coordinate computation; control of large land areas; field notes. Mr. Moffitt (W)

107. Airphoto Analysis and Interpretation. (4) Three hours of lecture and two 3-hour laboratory periods per week. Prerequisite: senior standing in engineering or geology. Principles of photo reading, analysis and interpretation of maps and other photographic materials, and structures, selection of materials for engineering construction. Mr. Anderson (W)

110. Properties of Structural Materials. (2) Two 1-hour lectures and one 3-hour laboratory per week. Prerequisite: Engineering 45 and course 130 (may be taken concurrently). Determination of properties of structural materials; composition and proportion of inorganic con- struction problems in foundation engineering. Mr. Stearns (F, W, Sp)

122. Soil Mechanics and Foundation Design. (3) Three 1-hour lectures per week. Prerequisite: course 121. Principles of foundation design; ultimate bearing capacity of the soil; different types of conditions; number of foundation; lateral pressures on walls. Mr. Duncan, Mr. Lysmer (W, Sp)

123. Introduction to Structural Optimization. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 123. Introduction to the structural optimization of the main methods of construction. Mr. Hanner (W)

125. Structural Design in Timber. (3) Three hours of lecture per week. Prerequisite: course 125. Characteristic and properties of wood as structural mate- rials; design and detail of structural elements and of entire structures of wood. Topics include working stresses, design and detail of plain and glued beams, columns, connections, framing systems, and simple structures. Mr. Raphael (Sp)

126A. Structural Systems I. (4) Three hours of lectures and one 3-hour laboratory per week. Prerequisite: Architectural 120. Analysis and design of frame build- ings; response to vertical and horizontal loading; approximate methods of proportioning roof, floor, wall, and column elements in wood, beam and steel. Mr. Powell, Mr. Lysmer (W, Sp)

126B. Structural Systems II. (4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 126A. Analysis and proportion of long-span floor systems and special problems in high-rise buildings. Mr. Powell (W, Sp)

126C. Structural Systems III. (4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 126B. Analysis and design of long-span sys- tems. Approximate methods for proportioning frame elements of frame, arch, cable, and shell systems. Mr. Powell (W, Sp)

129. Introduction to Industrialized Building Sys- tems. (3) Three hours of lecture and two 3-hour laboratory periods per week. Prerequisite: course 130. Structural and mechanical properties of structural and prefabricated concrete. Mr. Raphael, Mr. Lin (W)

130. Mechanics of Materials. (4) Three 1 1/2-hour lectures per week. Prerequisite: Engineering 36. Elastic and ultimate resistance of materials; stress and de- formation analysis; bars, shafts, and beams; com- bined stresses; columns; elements of design for wood and metal members. Mr. Pister, Mr. Popov (F, W, Sp)

131. Introduction to Structural Analysis. (4) Three hours of lecture per week. Prerequisite: course 130. Analysis of forces and displace- ments in statically determinate and indeterminate elastic structures. Mr. Powell. Formulation in matrix notation. Introduction to the plastic analysis of structures. Mr. Powell, Mr. Clough (F, W)

132. Introduction to Dynamics of Structures and Earthquake Engineering. (3) Two 1 1/2-hour lectures per week. Prerequisite: courses 131 and 132. Analysis of response of structures to dynamic loads with emphasis on response to earth- quake ground motion. Basic concepts in earthquake resistant design of buildings. Mr. Choppin (Sp)

133. Theory of Reinforced Concrete Design. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: course 132. Stress-strain curves; design and ultimate strength of concrete. Mr. Raphael, Mr. Lin (W)

134. Elements of Metal Structures. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: course 134. Introduction to the design of metal structures. Mr. Raphael, Mr. Lin (W)

135. Reinforced Concrete and Prestressed Concrete Design. (4) Three 1-hour lectures and one 3-hour laboratory per week. Prerequisite: courses 133 and 134. Analysis of structures in reinforced concrete, prestressed concrete, and composite materials. The design of typical load sys- tems in reinforced concrete. Consideration of stress, Torsion, Prestressed concrete concepts, mate- rials, methods, losses, creep, shrinkage, continuous deflections, and earthquake forces. Mr. Jenkins (F)

136. Advanced Structural Analysis. (3) Three hours of lecture per week. Prerequisite: course 131. Digital computer analysis of linear structural systems. Dis- cussion of the theoretical bases for modern computer programs for the analysis of structures. Study of a variety of structures including three-dimensional buildings. Mr. Powell (F, W)

137. Synthesis and Design of Structural Systems. (4) Two 1 1/2-hour lectures and one 3-hour laboratory per week. Prerequisite: courses 133, 134. Planning and design of structural systems and components, including design of beams, columns, the bearing capacity of soils, and analysis of stress and strain; design criteria; layouts of structural systems; optimization, formal and informal methods of analysis. Mr. Powell (W, Sp)

138. Introduction to Flight Structures. (3) Three 1-hour lectures per week. Prerequisite: course 130. Stress, deformation and stability analyses of flight structures. Approximate methods of proportioning landing gear and tail landing gear; buckling and post buckling strengths of thin sheet ele- ments; stress and stability consideration of sandwich components; thermal stresses and thermal buckling; high-temperature creep effects. Mr. Taylor (W)

139. Introduction to Mechanics of Solids. (4) Two 1 1/2-hour lectures per week. Prerequisite: course 130. Stress analysis, displacement analysis, and inelastic materials; plastic flow, creep, relaxation, thermal effects; solution of problems in elasticity and inelasticity. Mr. Sackman (Sp)

140. Water Resources Engineering. (4) Two hours of lecture and one 3-hour laboratory per week. Prerequisite: course 168B (may be taken concurrently). Estimates of population and municipal, industrial, and agricultural water requirements; surface and ground water sources. Planning and design of wa- ter distribution systems and wastewater and storm water treatment plants. Special water conditioning problems, including taste and odor removal, desalination, and corrosion control. Mr. Selleck, Mr. F. Pearson and Staff (F, Sp)

141. Water Quality Management. (3) Three hours of lecture per week. Prerequisite: course 140. Chemical, physical, and biological aspects of water and waste- water. Theory and design of water and wastewater treatment plants. Special water conditioning problems, including taste and odor removal, desalination, and corrosion control. Water pollution control and its re- lation to process design. Mr. Lawrence and Staff (F, W)

142. Design of Water Quality Management Sys- tems. (3) Three hours of lecture per week. Prerequisite: course 141. Lectures and discussions of the nature of engineering organizations; role of design in engineering practice; and concepts of systems, process, and functional design. Design of simple systems, principles of system design and proportion of design problems. Approximation design problems to typical units of water and waste water treatment systems. Mr. Lawrence (W)

143. Applied Ecology. (3) Two 1 1/2-hour lectures per week. An introduction to some aspects of ecology for those with little or no biological training. Effects of ecological evaluation and organization to water quality for interpretation of changes in ecosystems. Real ecosystems will be observed and difficulties in val- idation of measurements shown. Mr. Horne (F)

144. Environmental and Sanitary Engineering. (3) Three 1-hour lectures per week. Prerequisite: course 143. Chemical, physical and biological aspects of waste and wa- ter. Theory and design of water and wastewater treatment plants. Special water conditioning problems, including taste and odor removal, desalination, and corrosion control. Water pollution control and its re- lation to process design. Mr. Lawrence and Staff (F, W)

145. Chemistry of Waters. (3) Three 1-hour lectures per week. Prerequisite: course 140. Chemical, physical and biological aspects of water and waste- water. Theory and design of water and wastewater treatment plants. Special water conditioning problems, including taste and odor removal, desalination, and corrosion control. Water pollution control and its re- lation to process design. Mr. Lawrence (W)

146. Soil and Foundation Engineering. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: course 142. Inorganic chemistry of soils and rocks, soil mechanics, soil-structure interaction, and pollutants in soils. Mr. Brinke (W, Sp)

147. Geotechnical Engineering. (4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 146. Properties of soils and water, laboratory determination of properties of soils and foundations, analysis of ground water, and influence of geological features on engineering works. Not open to civil engineering majors. The biochemical cycles of the inorganic components in water in terms of water quality. Emphasis is placed on the application of chemical principles employed to modify the concentration of the inorganic constituents. Mr. Thomas (F)

148. Hydrology. (4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 147. Principles of water resources, and properties of rural and urban watersheds. Mr. Jenkins (F)

149. Water Quality Engineering. (4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 148. Hydrology. Mr. Jenkins (F)

150. Water Quality Engineering. (4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 148. Hydrology. Mr. Jenkins (F)
21. Advanced Structural Theory. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 220A. Deformational design problems for structures such as behavior and design of reinforced concrete. Extensive principles and criteria. Behavior and design of reinforced concrete elements. Behavior and design of reinforced concrete elements. In-depth analysis of structure behavior. Variational principles and boundary value problems in structural mechanics. Mr. Clough (W)

22. Advanced Structural Theory. (3) Four one-half hours of lecture per week. Prerequisite: course 230B. Elements of tensor analysis; deformation and stress analysis of simple structures. Mr. Clough (W)

23A. Advanced Mechanics of Materials. (3) Four one-half hour lectures per week. Prerequisite: course 230A. Elements of tensor analysis; deformation and stress analysis of simple structures. Mr. Clough (W)

23B. Advanced Mechanics of Materials. (3) Four one-half hour lectures per week. Prerequisite: course 230A. Elements of tensor analysis; deformation and stress analysis of simple structures. Mr. Clough (W)

23C. Advanced Mechanics of Materials. (3) Four one-half hour lectures per week. Prerequisite: course 230A. Elements of tensor analysis; deformation and stress analysis of simple structures. Mr. Clough (W)

24. Advanced Mechanics of Materials. (4) Four one-hour lectures per week. Prerequisite: course 230A or equivalent. Constitutive theory for elastic and viscoelastic materials, uniqueness theorems for linear solids, correlation between stress and strain, energy methods. Mr. McIvor (F), Mr. Sackman (Sp)

25. Advanced Analysis of Structures. (3) Three 1 1/2-hour lectures per week. Prerequisite: course 220B. Structural analysis related to structural behavior and design. The ready interpretation of structural results. Mr. Kelly, Mr. Pister, Mr. Lubliner, and Mr. Sackman. Three-quarter sequence beginning (F)

26. Advanced Analysis of Structures. (3) Three 1 1/2-hour lectures per week. Prerequisite: course 220B. Structural analysis related to structural behavior and design. The ready interpretation of structural results. Mr. Kelly, Mr. Pister, Mr. Lubliner, and Mr. Sackman. Three-quarter sequence beginning (F)
reinforced concrete and in statically indeterminate structures. Application of shell theory, approximate methods, and computers to the design of shell and dome structures. Determination of displacements and stresses of prestressing requirements. Study of existing experimental results including ultimate strength tests. Design problems involving shell structures. Mr. Scoordelis (Sp)

246. Design of Steel Structures. (3) Three 1 1/2-hour lectures per week. Design of advanced bridge superstructures. Composite design: decks, prestressed steel construction, suspension systems, domes and tubular structures. Mr. Bouwkamp (Sp)

247. Analysis and Design of Concrete Dams. (4) Three 1 1/2-hour lectures per week. Prerequisite: course 220A; course 230A is desirable. Inelastic limit design. Limit states design: serviceability and ultimate limit states. Limit analysis and limit design. First and second order theories. Structures subjected to proportional excitations: design for strength, minimum weight, estimation of deflections, and accounting for general responses of generalized excitations: shakedown theorems. Mr. Raphael (Sp)

248A. Inelastic Design of Structures. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 220A; course 230A is desirable. Inelastic limit design. Limit states design: serviceability and ultimate limit states. Limit analysis and limit design. First and second order theories. Structures subjected to proportional excitations: design for strength, minimum weight, estimation of deflections, and accounting for general responses of generalized excitations: shakedown theorems. Mr. Raphael (Sp)

248B. Inelastic Design of Structures. (4) Four hours of lectures per week. Design of structures subjected to elastic analysis and design of members subjected to combined stresses due to bending, shear and axial forces, and torsion. Local, lateral buckling of members. Design of connections. Design for strength (arches, grids, plates, shells and multistory frames). Design for ductility. Mr. Bertore (F)

249. Advanced Concrete Technology. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 220A or equivalent. Advanced topics in concrete technology, including concrete mix proportions and hardened concrete properties with emphasis on environmental effects; durability of concrete subject to chemical attack; composition and properties of special concretes such as lightweight, heavyweight, high performance, reinforced, polymer and expansive concretes. Mr. Polivka (Sp)

250. Transportation Policy and Administration. (3) Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Development and supply in contemporary economic, social, political, and legal settings. Comparative analysis of modern transport systems. Examination of instruments of social and environmental guidance. Problems and processes of administering activities unique to transportation. Mr. May (F)

251. Traffic Stream Characteristics. (3) Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Study of traffic streams. Development and analysis of traffic stream design and operations of streets and highways. Stream characteristics include flow, speed, density and headways. Flow analysis includes flow interrelationships, headway distributions, traffic performance at intersections, and capacity investigations. Mr. May (F)

252. Systems Analysis in Transportation. (3) Two 1 1/2-hour lectures per week. Prerequisite: graduate standing in engineering. Analysis of transportation demand and supply in contemporary economic, social, political, and legal settings. Comparative analysis of modern transport systems. Examination of instruments of social and environmental guidance. Problems and processes of administering activities unique to transportation. Mr. May (F)

253. Transportation Engineering. (4) Four hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Technological characteristics of air, highway, rail, and other modes of transportation. Interaction of transportation into total development; terminal requirements for individual modes and interface problems among modes; forecasting and planning studies; techniques for evaluation of alternatives. Applications of systems analysis techniques to selected transportation problems. Mr. Kanafani (F)

254. Transportation Demand Analysis and Forecasting. (3) Two 2-hour lectures per week. Prerequisite: graduate standing or consent of instructor. Analysis of alternative forecasting techniques. Economic, social, and other factors applied to transportation services. Use of demand models for forecasting. Peak hour problems, choice of mode, and efficient prices for transportation services. Mr. Kanafani (W)

254B. Transportation Planning Applications. (3) Two hours of lecture and 3 hours of laboratory per week. Prerequisite: CE 254A and consent of instructor. Analysis of transportation planning problems for urban areas. Application of systems analysis techniques to selected transportation problems. Mr. Homanber (Sp)

255. Traffic Engineering. (3) Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Analysis of human and vehicular characteristics and their effect on highway traffic flow; traffic control; accident cause and prevention; techniques for facilitating and increasing flow on existing traffic systems; design of new traffic systems; and other terminal problems. Mr. Mey (W)

256. Transportation Optimization Techniques. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 252 and 253 or equivalent. A course which integrates optimization techniques and computers as applied specifically to the solution of selected problems in highway traffic analysis. These include: terminal locations, facility design, stage improvement, movement control, passenger services and freight handling. Mr. Mey (W)

257. Applications of Queueing Theory to Transportation Problems. (3) Three hours of lecture per week. Prerequisite: Statistics 134A or 202A. Deterministic queueing models. Strategy for design and control of transportation systems; service cost and service quality; and other terminal problems. Emphasis on practical aspects of the use of queueing models in transportation planning. Mr. Mey (W)

258. Performance Analysis of Transportation Systems. (3) Three hours of lecture per week. Prerequisite: Statistics 134A or 202A. Deterministic queueing models. Strategy for design and control of transportation systems; service cost and service quality; and other terminal problems. Emphasis on practical aspects of the use of queueing models in transportation planning. Mr. Mey (W)

259. Mass Transit Engineering. (3) Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Planning and evaluation of mass transit systems, their operation and design. Technology of transit vehicles and structures. Impact on urban land use. Public policy and financing problems. Mr. Homburger (W)

260A. Air Transport Engineering. (3) Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Planning and evaluation of air transport systems; airport location, airport design and development of airport facilities. Selection of airport sites. Mr. Kanafani (W)

260B. Air Transport Engineering. (3) Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Planning and evaluation of air transport systems; airport location, airport design and development of airport facilities. Selection of airport sites. Mr. Kanafani (W)

260C. Air Transport Engineering. (3) Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Planning and evaluation of air transport systems; airport location, airport design and development of airport facilities. Selection of airport sites. Mr. Kanafani (W)

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; selection of alternative systems; selection of discount rates. Transportation investment planning in developing economies. Mr. Zettell (Sp)

262. Simulation of Transportation Systems. (3) Three hours of lecture per week. Formerly 266D. 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, multiregional, time-dependent transportation systems, with application to surface and air systems. Mr. Zettell (Sp)

263. Highway Traffic Control. (3) Three hours of lecture per week. Formerly 267B. Two hours of lecture per week. Prerequisite: CE 251 and 257. Capacity and delay at isolated fixed-cycle and vehicle-actuated traffic signals. Traffic control systems, Arctic region. Mr. Newell (W)

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 route, minimum net-work cost, and equilibrium models. Application to trip distribution and traffic assignments. Mr. Newell (Sp)

265. Pavement Design. (4) Two 2-hour lectures per week. Prerequisite: graduate standing in engineering. Design principles and specific structural design and construction of highways and airport pavements including stabilization, design of rigid and flexible pavements, analysis and design of loadings, and the design of asphaltic mixtures. Mr. Monlamont (F)

266A. Construction Scheduling and Resource Allocation. (3) Three hours of lecture per week. Planning, scheduling, and allocation of resources for construction projects. Material will include Critical Path Methods of networking, diagramming and calculation; consideration for allocating constrained resources; and variation of schedules to optimize costs. Computer and non-computer solutions will be presented. Mr. Crandall (W)

266B. Construction Organization and Management. (3) Three hours of lecture per week. An introduction into the business aspects of construction management including organization and financial considerations, construction management techniques, cost analysis and construction operations. Topics include: legal, financial, labor relations, accounting practices as they affect decision making in the construction industry. Mr. Crandall (W)

267A. Advanced Foundation Construction. (3) Three hours of lecture per week. Prerequisite: course 181 or 191. Organization and management of major projects in international and multiple location construction projects. Planning, investigation, procurement, logistics, construction geography, personnel, relations with host area and government agencies, communication, financing, special engineering and management controls. Construction under adverse climatic conditions, including desert, tropical, mountain, and Arctic regions. Mr. Gerwick (W)

267B. Applications of Operation Research to Construction Management. (3) Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Optimization of risk relating to bid strategy, optimization of scheduling costs, aggregate and borrow optimization and decision theory. Relevant problems from the construction industry will be reviewed. Mr. Crandall (Sp)

267G. Construction Quality Assurance. (3) Three hours of lecture per week. Methods and considerations relating to quality control and assurance programs. Types of existing programs, identification and role of participating organizations, development of confidence and specifications, and initiation of programs. Mr. Hester (F)

267A. Construction of Harbors, Coastal, and Ocean Structures. (4) Three hours of lecture per week. Prerequisite: course 132 or 134, and 121. Design and construction of soil and structural problems connected with construction of deep foundations for major high-rise buildings and subways. Integration of engineering, economics, and environmental considerations. Mr. Gerwick (F)

267B. Advanced Concrete Construction. (3) Three hours of lecture per week. Prerequisite: course 135 and 189 and 169. Evaluation of construction methods and applications for pre-stressed reinforced, lightweight, high strength, and architectural concrete, precasting and segment construction. Application to pressure vessels, ocean control structures, ocean structures, and cryogenic containment. Mr. Hester (Sp)

267C. Construction of Harbor, Coastal, and Ocean Structures. (4) Three hours of lecture per week. Prerequisite: course 121, 133, 134. Construction methods and applications for pre-stressed reinforced, lightweight, high strength, and architectural concrete, precasting and segment construction. Application to pressure vessels, ocean control structures, ocean structures, and cryogenic containment. Mr. Hester (Sp)

267D. Advanced Construction Estimating. (3) Three hours of lecture per week. Prerequisite: course 181. Estimates used by heavy, engineering, building, and construction specialties. Mr. Gerwick (W)

NOTE: For key to symbols, see page 38.
and specialty contractors. Preparation of cost estimates including planning of methods and program evaluation of labor, material, equipment, subcontract, and individual jobs; construction recordkeeping; and preparation of profit margins. Value engineering. Mr. Hester (Sp)

269. Asphalt Paving Mixtures—Design, Construction and Performance. (3) Three hours of lecture per week. Prerequisite: graduate standing or consent of instructor. Course concerned with asphalt paving especially for highway and airport pavement; emphasis is placed on physical properties of asphalts, their classification, their combination and relationship of these properties to proper design and construction of pavements. Mr. Monismith (Sp)

270A. Advanced Soil Mechanics and Foundation Engineering. (3) Three hours of lecture per week. Prerequisite: course 121 and 114, or equivalent. Advanced theories of soil mechanics including consolidation, settlement analysis, stress distribution, lateral pressures, bearing capacity, and their application in foundation engineering. Mr. Duncan (F)

270B. Advanced Soil Mechanics and Foundation Engineering. (3) Three hours of lecture per week. Prerequisite: course 121 and 114, or equivalent. Detailed study of the shear strength of cohesionless and cohesive soils, strength of foundations, embankments, and dikes; methods for strength measurement; slope stability and stability analysis techniques. Mr. Duncan (W)

270C. Advanced Soil Mechanics and Foundation Engineering. (3) Three hours of lecture per week. Prerequisite: knowledge of differential equations, principles of laterally loaded piles, testing techniques. Mr. Goodman (W)

270L. Advanced Laboratory in Advanced Soil Mechanics. (3) Three 1-hour lectures and two 3-hour laboratories per week. Prerequisite: course 270A. Lectures and laboratories deal with special problems in soil mechanics. Mr. Goodman (Sp)

271. Seeage Through Soils. (2) Two 1-hour lectures per week. Principles governing the flow of water through soils and their applications in civil engineering. Mr. Houston (Sp)

272. Soil and Site Improvement. (4) Four hours of lecture per week. Prerequisite: standing. Soil stabilization using cement, lime, sand, asphalt and chemical materials; design and construction of embankments, dams, slopes, highways, and airfields; design and construction with stabilized soils; principles of pavement design; influence of soil treatment methods; development of marginal lands; solid waste utilization. Mr. Mitchell (W)

273. Soil Behavior. (4) Three hours of lecture per week and 1 hour laboratory per week. Prerequisite: course 272 or consent of instructor. Dynamic properties of soils; behavior of simple continuous systems (tanks, pipelines, cables, beams, columns) by means of matrix methods, computer programming. However, the students need not be experienced programmers. The simple capped oscillator. Mr. Garrison (Sp)

274. Introduction to Soil Dynamics. (3) Two 1-hour lectures plus two 1/2-hour computational laboratories per week. Prerequisite: knowledge of FORTRAN programming. However, the students need not be experienced programmers. The simple capped oscillator. Mr. Garrison (Sp)

275. Soil Dynamics—Earthquake Engineering. (3) Three 1-hour lectures and one 1/2-hour computational laboratory per week. Prerequisite: course 274 or consent of instructor. Dynamic properties of soils; behavior of simple continuous systems (tanks, pipelines, cables, beams, columns) by means of matrix methods, computer programming. Analysis of soil behavior during earthquakes; soil liquefaction; soil-structure interaction; lateral pressures during earthquakes; slope stability problems. Mr. Seed (Sp)

276. Earth Dams. (2) Two 1-hour lectures per week. Prerequisite: course 271 and 276B or consent of instructor. Design and construction of earth dams; design procedures; practical considerations in design and construction. Mr. Monismith (Sp)

277. Theoretical Soil Mechanics. (4) Three 1/2-hour lectures per week. Prerequisite: knowledge of FORTRAN programming. Graduating standing in geological engineering. Mr. Lyamor (F)

280A. Principles of Rock Mechanics. (3) Three hours of lecture plus two 3-hour laboratory demonstrate. Rock properties and behavior; theory of failure of rock; key phenomena of rock failure; dynamic determination of in-situ stresses. Mr. Goodman (W)

280B. Applied Rock Mechanics. (3) Three hours of lecture plus one 3-hour laboratory per week. Prerequisite: course 280A. Methods of analysis including physical models, stereographic projection, and finite-element methods used to solve field problems. Mr. Goodman (Sp)

281. Engineering Geology. (3) Two hours of lecture and three hours of laboratory per week. Prerequisite: Principles of Engineering Geology or consent of instructor. Field and laboratory studies of rocks and soil suitable for engineering purposes. Mr. Brekke (F)

282. Geological Engineering of Underground Openings. (3) Three hours of lecture plus an hour of laboratory per week. Prerequisite: engineering geology or general geology. Geological exploration for underground openings; methods of excavation, rock reinforcement, support and lining; stability problems in underground plants; factors influencing underground instrumentation; large openings for special purposes; case histories. Field trip to tunneling site. Mr. Brekke (W)

287A–287B. Analytic Photogrammetry. (4–4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 101 or equivalent. Computation and interpretation of photogrammetric matrices; analytic solutions for strips and blocks using coplanarity and collinearity conditions; constraints on ground control; analysis of systematic and random errors. Mr. Mollen (beginning W)

288A–288B. Analogie Stereostructure Instruments and Stereotriangulation. (4–4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 101 or equivalent. Design of components of first-and second-order stereostructure instruments; interior, relative, absolute orientation; map compilation; control extension in first-order instruments; independent model extension; adjustment to ground control; analysis of systematic and random errors. Mr. Mollen (F)

289. Adjustment Computations. (4) Four-hour lecture per week. Prerequisite: course 10. Brief review of matrix algebra and computer programming. Introduction to the problem of propagation of the method of least squares adjustment with application to surveying and photogrammetry problems. Mr. Anderson (F)

290A. Methods of Analysis of Structural Systems. (3) Three 1/2-hour lectures plus two 1/2-hour laboratory per week. Prerequisite: course 130, Mechanical Engineering 104A. Introduction to analysis of equilibrium of bending and vibration of discrete and simple continuous systems (stiffeners, girders, cables, beams, columns) by means of matrix methods, calculus of variations, differential equations, Fourier series, and other mathematical techniques. Mr. Taylor (F)

290G. Applications of Digital Computers to Structural Problems. (3) Three hours of lecture per week. Prerequisite: course 290A and a course in FORTRAN programming, computer programming techniques for the static and dynamic analysis of structural systems. Solution of equations, step-by-step integration of equations, and computer programs appropriate for solution of structural equilibrium equations are given. Application to the computer analysis of truss systems. Mr. Mollen (W)

290L. Water Resources Development. (2) One 2-hour lecture per week. Prerequisite: graduate standing. The engineering, economic, legal, social and political factors underlying major decisions in water resources development. Mr. Todd (Sp)

290M. Limnology and Plankton Ecology. (3) Three hours of lecture and one three-hour laboratory per week. Prerequisite: knowledge of aquatic biology. Fresh and practical study of the physical/chemical dynamics of lake ecosystems with an examination of plankton populations. Mr. Wittig (W)

290U. Individual Study for Master's Students. (1–8) Prerequisite: consent of instructor. To be graded on a satisfactory/unsatisfactory basis. Must be taken on a satisfactory/unsatisfactory basis. Mr. Monismith (F, W, Sp)

601. Individual Study for Doctoral Students. (1–8) Individual study in the comprehensive examination and comprehensive examination 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. Mr. Monismith (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 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. Mr. Monismith (F, W, Sp)

IDS 211. Geologial and Environmental Engineering. (4) See Interdepartmental Studies for complete description. Mr. Kanafani (F)

IDS 218A–218B. Multidisciplinary Design. (3–4) See Interdepartmental Studies for the complete description of this course.
activities of professionals in this field.

The Staff (F, W, Sp)

UPPER DIVISION COURSES

100A–100B. Electric Circuits, Electronics, and Instrumentation. (3–3) Two hours of lecture and one 3-hour laboratory per week. Prerequisite: Mathematics 1C, Physics 5C. (Students who have taken Engineering 17 should not take 100A.) Course 100A is prerequisite to 100B. This course is not for students in Engineering Electrical Science.

100A. Transient and steady-state analysis of circuits; network theorems; analog and duality; introduction to electronic circuits; basic laboratory experiments.

Mr. Schwarz, Mr. Whinnery (W, F)

100B. Electronic circuits and models; amplifiers, feedback, and oscillators; analog and digital instrumentation and systems; associated laboratory experiments.

Mr. Schwarz, Mr. Whinnery (W, F)

104A–104B. Electronic Circuits. (4–4) Three hours of lecture and two hours of discussion per week. Prerequisites: Mathematics 51A, Mathematics 51C, Physics 5D recommended; course 104A is prerequisite to 104B.

104A. Network elements (including operation amps) and circuits; response of simple circuits to capacitive and resonant excitations. Simple nonlinear and time-varying circuits. Three hours of lecture and one hour of discussion per week. Prerequisite: Mathematics 51A, Mathematics 51C. 117A is prerequisite to 117B. 117B is prerequisite to 117C. Transmission lines. Maxwell's equations. Plane waves in uniform media. The relation of lumped circuits to field concepts. Static electrified circuits (current and voltage); AC circuits; Calculation of resistance, capacitance and inductance. Waveguides, resonant cavities, periodic structures. Introduction to distributed (in homogeneous and anisotropic media). Mr. Whinnery, Mr. White, Mr. Van Duzer 117F (F, W); 117G (F, W); 117H (F, W); 117I (F, F); 117J (F, F); 117K (F, F); 117L (F, F).

119. Linear Systems Analysis. (4) Two 1 1/2-hour lectures and one 1-hour recitation per week. Prerequisite: course 104A. Analysis of linear electrical, mechanical, and electromechanical systems. Determination of transfer functions, frequency responses, and characteristic mode solutions. The concept of state. Fourier and Laplace transform methods. Introduction to wavelet analysis. Consider the concept of linear systems in the time domain. Mr. Polak, Mr. Wong, Mr. Aralaya (F, W, Sp).

123. Circuit Theory and Design. (4) Four hours of lecture per week. Prerequisite: course 104A. Selected topics on network analysis, approximation, simulation, and design. Passivity and positive real functions. Controllable and observable systems. Mr. Gray, Mr. Meyer, Mr. Pederson (F, W, Sp).

128A–128B. Feedback Control. (4–4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 128A. Time-lag and bandwidth expansion and threshold phenomena. Design of positive real systems. The design of digital controllers for discrete-time systems. Mr. Hopkin, Mr. Litwin, Mr. Wu (F, W, Sp).

130. Electromagnetics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 128A. Applied mathematics; wave propagation under geometric optics. The design of linear integrated circuits. Mr. Hopkin, Mr. Lin, Mr. Wu (F, W, Sp).

132A–132B. Communications Systems Laboratory. (2) Three 1-hour laboratory periods per week. Prerequisite: course 128A. Microwave electronic and communications systems. Microwave communications systems. Mr. Angelopulos (Sp).

133A. Microwave Transmission and Antennas. (4) Three hours of lecture per week. Prerequisite: course 128A. Microwave electronic and communications systems. Microwave transmission and antennas. Mr. van Duzer, Mr. Wei (W, W, Sp).

135. Microwave Laboratory. (2) One 4-hour laboratory period per week. Prerequisite: course 128A. Microwave propagation and communication. Fourier series and Fourier transforms; thorough discussion of Transform Properties. Mr. Polak, Mr. Watanabe, Mr. stitching and control theory. Mr. Mitter, Mr. Gray (F, F, W).

137A–137B. Solid-State Device Laboratory. (2) One 2-hour laboratory period per week. Prerequisite: course 128A. Solid-state device structure and characterization, parasitic effects. Mr. Meyer, Mr. Gray (F, W, Sp).


141. Linear Integrated Circuits. (3) Three hours of lecture and one hour of discussion per week. Prerequisite: courses 104B and 105. Integrated circuit elements and devices; electronic circuit design techniques; the design of digital integrated circuits. Mr. Meyer, Mr. Gray (F, W, Sp).

145. Digital Integrated Circuits. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: courses 104B, 105, 105L. The design of digital integrated circuits. Computer algorithms; design for speed, power, density; implementing complex digital circuits using bipolar and MOS integrated circuits. Mr. Meyer, Mr. Meyer, Mr. Gray (F, W, Sp).

147. Processing and Design of Integrated Circuits. (4) Three hours of lecture and one 3-hour laboratory period per week. Prerequisite: courses 104B, 105, 105L. 13A. Fabrication of integrated circuits, mask layout and diffusion processing. Integrated circuit components, device structure and characterization, parasitic effects. Mr. Jackson, Mr. Meyer, Mr. Gray (F, W, Sp).
Design of integrated circuits with emphasis on device-circuit interaction. Bipolar and MOS transistors will be fabricated and evaluated in the laboratory.

Mr. Naureuther, Mr. Hodges (Fall, Winter, Spring)

180. 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 126. Coverage of convolution over wide noise channels: optimum demodulators and signal sets. Pulse modulation: geometric interpretation of binary transmission over an additive white Gaussian noise channel; channel capacity for signal-to-noise ratio. Optimum linear filtering.

Mr. Sakrison, Mr. Turin, (Fall, Winter, Spring)

170. Plasma and Beam Dynamics. (3) Three hours of lecture per week. Emphasis on physical and chemical mechanisms in the interaction of beams with neutral and charged particles. Topics include plasma generation, plasma heating, plasma confinement, beam focusing, electron and ion guns. Fluid approximations; applications to fusion. Waves in magnetized plasmas. Mr. Birdsell, Mr. Lieberman, Mr. Lichtenberg (Winter)

171. Properties of Plasmas. (2) One hour of lecture and four hours of laboratory per week. Prerequisite: course 120A and 120B. This is an introduction to the plasma physics of ionized gases, techniques of measurement of these properties, and measurement of some of the macroscopic properties of plasmas.

Mr. Birdsell, Mr. Lieberman, Mr. Lichtenberg (Spring)

175. Applied Electron and Ion Optics. (4) Three hours of lecture per week. Prerequisite: Physics 5 series, Math 112-116. Course 117A recommended. Electron and ion sources. Formation, focussing and deflection of electron and ion beams. Beam interactions with matter; information-gathering (scanning, secondary emission, backscattered electrons and ions), material processing (resist exposure, Ion implantation, controlled ion-beam etching, small computer systems to biological and medical applications. Biomedical amplifiers, signal processing circuits, noise, and artifact considerations in the measurement of the cellular or subcellular to the organism levels. Signal extraction and artifact reduction by analog and digital methods.

Mr. Susskind (Winter)

180. Computer Applications in Biology and Medicine. (4) Three hours of lecture and one hour of discussion per week. Prerequisites: courses 105 and 105L. Introduction to the use of digital computers in biological and medical research. Applications of digital computers to medical data and to useful compact representations. Applications to medical diagnosis and medical systems management.

Mr. Singer (Winter)

184. Introduction to Ecological Systems. (4) Three hours of lecture per week. Prerequisite: course 113A. Course 117A recommended. An introduction to the theoretical and experimental aspects of the study of ecosystems, the relationship between ecosystems and their physical environment, modeling and analysis of ecosystems, focusing on dynamics and control of animal and plant populations. Mr. M. Graham, Mr. Singer (Winter)

185. Electrical Hazards and Safety. (2) Two hours of lecture. Prerequisite: course 104A-104B. Occupational and environmental hazards associated with electrical equipment, measurement of electrical shock andfire, electrical safety and organizational administrative and technical measures for minimizing dangers.

Mr. Suskin (Spring)

186. Neural Integration of Sensory Information. (3) Three hours of lecture per week. Prerequisite: a course in fundamentals of cell physiology or neurophysiology, such as EECS 181, 183A or Physiology 101A or 101B. An introduction to mathematical models that abstract sensory information and encode for neural transmission to the higher centers. Focus on neurophysiological interconnections and on potential mechanisms, iterative processing, and the relation to surface potentials, concluding in system modeling and simulation.

Mr. Werbin (Sp)

187. Signals and Transducers in Biology and Medicine. (3) Three hours of lecture per week. Prerequisites: courses 105 and 105L. Psychophysical parameters and variables, the fundamentals of signal measurement, acoustics, and detection and measurement. Passive measurement of physiological signals. Active measurement of physiological parameters and physical parameters of the human body. Applications to bioelectric, biomechanical, bioacoustical, and bio-optical phenomena. Mr. Keller, Mr. Lewis (Fall)

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 electronic devices for measuring and processing biomedical physiological signals, for example, connecting and deflection of electron and ion beams. Beam interactions with matter; information-gathering (scanning, secondary emission, backscattered electrons and ions), material processing (resist exposure, Ion implantation, controlled ion-beam etching, small computer systems to biological and medical applications. Biomedical amplifiers, signal processing circuits, noise, and artifact considerations in the measurement of the cellular or subcellular to the organism levels. Signal extraction and artifact reduction by analog and digital methods.

Mr. Susskind (Winter)

212A-212B. Physics of the Upper Atmosphere. (4-4) Four hours of lecture per week. Prerequisite: Physics 121 or 137A, course 117A-117B or Physics 110A-110B. A study of photochemical processes, deflection and mass transmission phenomena of the ionosphere as an equilib-
methods, dual methods, methods of feasible directions and gradient projection. Mr. Polak (Sp)

**126B. Optimization Techniques in Mathematical Programming and Control. (4)** Three hours of lecture per week. Prerequisite: courses 222 and 227A. Course 226A and Mathematics 104A are recommended. A unified study of necessary and sufficient conditions of optimality including Kuhn-Tucker and F. John Theory. Computational methods: steepest descent, quasi-Newton, generation of families of feasible directions algorithms. Miscellaneous topics in optimal control. Mr. Polak

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. Fifteen-dimensional optimization techniques including linear and nonlinear programming with applications to design problems. Duality. Sensitivity. Optimal control including Maximum principle. Dynamic Programming. Mr. Polak, Mr. Varalaya (W)

227B. Identification and Optimization. (3) Three hour lecture per week. Prerequisite: course 126 and 222. Analysis, synthesis and critical study of digital control systems. General survey of both the z-transform and the state-space approach for discrete systems. Study of various nonlinearities in digital control systems, including hysteresis. Application of Lyapunov and Liapunov stability methods to PWM and PFM feedback systems. Application of discrete theory of biocontrol systems. Mr. Polak, Mr. Varalaya (Sp)

228. Digital Control. (3) Three 1-hour lectures per week. Prerequisite: courses 126 and 222. Analysis, synthesis and critical study of digital control systems. General survey of both the z-transform and the state-space approach for discrete systems. Study of various nonlinearities in digital control systems, including hysteresis. Application of Lyapunov and Liapunov stability methods to PWM and PFM feedback systems. Application of discrete theory of biocontrol systems. Mr. Polak, Mr. Varalaya (Sp)

229. Nonlinear Control. (3) Three hours of lecture per week. Prerequisite: course 222 (may be taken concurrently). Analysis and design of nonlinear and time-varying feedback systems. Behavior near equilibrium points and input-output behavior are studied by Liapunov and functional analysis methods. Mr. Bergen, Mr. Murray (F)

230. Solid-State Electronics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 150; Physics 137B. Crystal structure and symmetries. Energy-band theory. Cyclotron resonance. Tensor effective mass. Statistics of electronic state population. Recombination theory. Derivation and application of Boltzmann transport equation. Optical processes and properties. Mr. Muller, Mr. Oldham, Mr. Van Duzer (F)

231. Solid-State Devices. (4) Three hours of lecture per week. Prerequisite: courses 117A–117B, 131A or 131B; 130 or equivalents. Physical principles and operational characteristics of semiconductor diodes and transistors. Techniques of carrier transport in solids and at interfaces, high-field and hot carrier effects. Advanced discussion of bipolar and field-effect transistors. Applications of fields of quantum wells and strained quantum wells are studied by present and probable future technologies. Mr. Oldham, Mr. Muller (W)

235. High-Frequency Solid-State Devices. (4) Three hours of lecture per week. Prerequisite: courses 117A–117B; 130. Interactions between electromagnetic fields and charged particles in solids. Coupled mode theory, parametric interactions, carrier waves in semiconductors, transferred electron effect, avalanche multiplication of carriers. Applications to high-frequency solid-state devices including microwave oscillators, avalanche diode, and acoustic amplifiers. Mr. Muller, Mr. White (Sp)

236A–236B. Quantum and Optical Electronics. (3–3) Three hours of lecture per week. Prerequisite: course 117A–117B, Physics 115 or equivalent. The laser principle. Analysis of specific laser systems such as gas lasers, ion lasers and solid-state lasers of the ruby type; laser dynamics; optical resonators and transmission systems; selected applications of coherent optics. Mr. Gustafson, Mr. Schwarz 236A (F); 236B (W)

237. Quantum Electronics of Solids. (3) Three hours of lecture per week. Prerequisite: course 117A–117B, Physics 115 or equivalent. Properties of optical solids; electro-optic and magneto-optic effects; energy-band structures; optical properties of semiconductors; semiconductor lasers; recent developments in integrated optics and distributed lasers. Mr. Oldham, Mr. White (Sp)


240. Nonlinear Analog Integrated Circuits. (3) Three hours of lecture per week. Prerequisite: course 141. Analysis and optimized design of monolithic operational amplifiers and wide-band amplifiers; methods of achieving wide-band amplifiers; gain-bandwidth considerations; analysis of noise in integrated circuits and low noise design. Mr. Meyer, Mr. Pederson (Sp)

241. Linear Integrated Circuits. (3) Three hours of lecture per week. Prerequisite: course 145. Study of integrated circuits; emphasis on high-speed high-frequency amplifiers and computer-aided design, discrete component and integrated circuit realization. Mr. Meyer, Mr. Pederson (Sp)

245. Digital Integrated Circuits. (3) Three hours of lecture per week. Prerequisite: course 141. Advanced studies of digital circuit design and performance with emphasis on integrated logic families and their characteristics. Noise, transmission delays, speed and reliability. The design of A/D and D/A conversion circuits and semiconductor memory cells. Mr. Pederson (Sp)


261. Statistical Communication Theory. (4) Four hours of lecture per week. Prerequisite: course 260A. Communication over the gaussian channel with and without feedback. Radar ranging. Parameter modulation; analog communication over the gaussian channel. Rate distortion bounds. Mr. Sakrison, Mr. Turin, Mr. Wong (Sp)

265A. Introduction to Information Theory. (3) Three hours of lecture per week. Prerequisite: Statistics 134A or 204 or 205F. Fundamental concepts and results in Shannon information theory. Information rate of stochastic sources; capacity and proof of coding theorems for noisy memoryless channels, both discrete and gaussian; introduction to parity check codes and source coding with a fidelity criterion. Mr. Sakrison, Mr. Thomasian (W)

270A–270B–270C. Plasmas. (3–3–3) Two 1 1/2-hour lectures per week. Prerequisite: course 117A–117B or Physics 110A–110B. 270A is prerequisite to 270B, and 270B to 270C. Theory and applications of plasmas including particle orbit theory, oscillations and waves, radiation, stability and containment, diffusion, imaging of viva diagnostics; new generation controlled fusion experiments. Mr. Birdsell, Mr. Lieberman, Mr. Lichtenberg. Sequence beginning (F)

*281. Dynamic Systems in Biology. (3) Formerly 290J. Three hours of lecture per week. Prerequisites: courses 119, 181. Advanced application of linear and nonlinear systems techniques to the modeling and analysis of biological phenomena. Frequency analysis; threshold, oscillations, and other stability considerations; spectral analysis and systems identification. Applications to biological feedback control systems. Mr. Keller, Mr. Lewis (W)

282. Biomedical Instrumentation. (3) Formerly 290K. Three hours of lecture per week. Prerequisites: courses 182A–182B recommended. State-of-the-art techniques in medical instrumentation to measure parameters of direct clinical significance, nuclear magnetic resonance, electron spin resonance, viscosity determinations, etc. Transducers, amplifiers, and computers necessary for implementation of these techniques. The human as an element within instrumentation feedback systems. Mr. Singer (F)

286. Neurophysiology of the Visual System. (3) Three hours of lecture per week. Prerequisite: ECES 181 or 185 or 186A; Physiology 110, 201; Zoology 225. Recent developments in analysis of visual function through physiological techniques, processing of visual information with regard to form, color, and movement.
temporal sequences, abstraction and coding of visual information through the retina, and at progressively higher neural centers.

Mr. Worbin (F)

290. Advanced Graduate Study in Electrical Engineering. Topics in noise and signal processing, primarily for advanced graduate students. Examples of courses which may or may not be offered during 1977-78.

290A. System Theory. (2) Two hours lecture per week. The lectures are oriented towards advanced students and deal with recent developments in system theory and related areas. Mr. Polak, Mr. Thomas, Mr. Vanral (Sp)

290B. Multivariable Feedback Systems. (3) Three hours of lecture per week. Prerequisite: one undergraduate course in electrical engineering. An introduction to the behavior of multivariable systems with emphasis on multiple-input multiple-output case. Convolution systems. Linearization of nonlinear systems. Slowly-varying systems. Small gain and passivity. Mr. Desoer (Sp)

290C. Advanced Circuit Theory. (2-3) Two to three hours of lecture per week. Prerequisite: course 225; may be repeated for credit. Current research topics in electrical circuits, network, and systems. Typical subjects include feedback theory and sensitivity, computer-aided analysis of nonlinear devices and systems, large-scale systems, nonlinear problems, and synthesis of nonlinear networks. To be taken on a satisfactory/unsatisfactory basis.

Mr. Desoer (Sp)

290D. Nonlinear Feedback Systems. (3) Three hours of lecture per week. Prerequisite: courses 222 and 229A. Input-output linear feedback systems with emphasis on multiple-input multiple-output case. Convolution systems. Linearization of nonlinear systems. Slowly-varying systems. Small gain and passivity. Mr. Desoer, Mr. Polak (W)

290E. Mathematical Methods in Electromagnetic Theory. (4) Three hours of lecture per week. Prerequisite: 210A–210B–210C. Current techniques for solving boundary value problems which apply to electromagnetic theory. Mr. Meil (W)

290G. Direct Energy Conversion. (4) Three hours of lecture per week. Prerequisite: Electr 117A and Elect 123. Unconventional fuel sources including photovoltaic, thermoelectric, thermionic, magnetohydrodynamic, and fuel cell. Schemes offering unusual research opportunities may be emphasized. Electricity demand characteristics; energy storage methods; relevant semiconductor properties; selective surfaces for solar energy converters.

Mr. Pederson (W)

290J. Image Processing. (3) Prerequisite: EE124 or EE 189 or consent of instructor. Theory and practical application of two and three dimensional photon and acoustic image processing. Course topics include: pattern recognition, image manipulation, noise filtering, Fourier and iterative image reconstruction and aspects of crystallography. Applications are presented for biological and medical sciences. Mr. Budinger (W)

290M. Plasma Computational Physics (Introduction) (3) Three hours of lecture per week. Prerequisite: course 177, some computer experience. An introduction to plasma simulation, using many-particle models on a computer. Projects on cold plasma oscillations, waves and instabilities in 1 dimension. Mr. Birdsell

290P. Topics in Solid-State Electronics. (3) Three hours of lecture per week. Prerequisites: courses 130, 230 or 231, or consent of instructor. Advanced treatment of topics chosen from microwave electrodynamics, quantum mechanics, quantum wave interactions, surface effects on semiconductors. Mr. Brodersen, Mr. Oldham (Sp)

290Q. Plasma Computational Physics. (Advanced). (3) Three hours of lecture per week. Prerequisite: course 290M. Theory and design of plasma simulation, using many-particle and fluid models on computers. Applications to controlled nuclear fusion, computer experiments on plasma parameters, computer experiments to laboratory experiments on oscillations, waves, instabilities, heating, and diffusion in 1, 2, and 3 dimensions. Mr. Birdsell

290R. Microwave Acoustics. (4) Three hours of lecture per week. Prerequisite: courses 117B, 130. Introduction to the propagation of elastic waves in crystals at microwave and terahertz frequencies and in solitonic media. Transduction, attenuation and amplification of elastic waves. Mr. White (Sp)

290S. Topics in Quantum Electronics. (3) Three hours of lecture per week. Prerequisite: course 117A and Physics 115, or the equivalent, and graduate standing.

290T. Methods of Modern Physics. (2) Two hours lecture per week.

290W. Pattern Classification. (2) Two hours lecture per week. Prerequisite: Statistics 200A or course 229A or equivalent. Adaptive, control and measurement systems responsive to changes in commands, disturbances, components and models. Time-varying systems. Identification of unknown systems by use of adaption control and Instrumentation. May be repeated for credit.

Mr. Wong

290X. Radio Telescopes. (4) Three hours lecture per week. Prerequisite: course 117A. Synthesis of celestial brightness distributions on the ground. Parabolic, spherical, cruciform and interferometric antennas. Occlusion and scintillation measures. Devices for the study of atmospheres. Microwave spin, radio interferometric techniques and intensity interferometers. Mr. Welch

298. Group Studies, Seminar, or Group Research. (1/2–5) Advanced study in various subjects through special seminars on topics to be selected each year, informal group study of special problems, group participation in comprehensive design problems, or group research on complete projects. (5) Three hours for analysis and experimentation. The Staff (F, W, Sp)


602. Individual Study for Doctoral Students. (1–8) Individual study in consultation with the major field and 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 resident requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (F, W, Sp)

IDS 111. Introduction to Neurobiology. (3) See Interdepartmental Studies for a complete description of this course.

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

IDS 201. Cellular Mechanisms Underlying Nervous Activity. (4) See Interdepartmental Studies for the complete description of this course.

IDS 201L Laboratory in Cellular Mechanisms Underlying Nervous Activity. (5) See Interdepartmental Studies for the complete description of this course.

IDS 202. Neural Integration and Coordination. (4) See Interdepartmental Studies for the complete description of this course.

IDS 202L. Advanced Laboratory in Neural Integration and Coordination. (3) See Interdepartmental Studies for the complete description of this course.


IDS 211. Introduction to Programming. (4) Three hours of lecture and one hour of discussion per week and scheduled consulting. Prerequisite: none. Only one of the courses 1, 15, 3, 35, 101, 101S, 103, 103S can be taken for credit. Open not to students in engineering, introduction to the Pascal programming language. May be repeated for a total of 4 units.

Mr. White, Ms. McEntyre (F, W, Sp)

3S. Self-Paced Introduction to Programming. (1–4) Two hours of discussion per week and scheduled consulting. Prerequisite: none. Only one of the courses 1, 15, 3, 35, 101, 101S, 103, 103S can be taken for credit. Open not to students in engineering. Introduction to the Pascal programming language. May be repeated for a total of 4 units.

Ms. McEntyre (F, W, Sp)

40. Programming Style. (3) Two 1-hour lectures per week and scheduled consulting. Prerequisites: course 2 and either 1, 15, 3, or 3S. A systematic approach to the design and construction of computer programs. Course objective: to teach the student to write clear, reliable, efficient and easily modifiable programs. Introduction to the PASCAL programming language. Programming exercises illustrating advanced programming techniques. Mr. Fadem, Mr. Rowe

41. Machine Structures. (4) Three hours of lecture and one hour of discussion per week. Prerequisites: one of course 103, Electrical Engineering and Computer Science 106, Electrical Engineering and Computer Science 153 prior to September 1973 or course 103. May not receive credit for this course. Characteristics of stored-program computers, number representation, instruction sets, computer-organized assembly languages, macros, loaders, use of operating systems.

Mr. Gill, Mr. Stonebraker (F, W, Sp)

99. Individual Study and Research for Undergraduates. (1–8) Prerequisites: 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 will be convinced that the student is able to profit by the program. Must be taken on a passed/not passed basis.

Mr. Bertokamp 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 and scheduled computer laboratory. Prerequisite: Mathematics 1C or 5A. Formerly course 113A. One of the courses 15, 35, 37, 101, 103, 103A can be taken for credit. Only one of the courses 1, 35, 37, 101, 103, 103A can be taken for credit. Not open to students in engineering. Units assigned depend on number of study units and programming effort per week. Mr. White, Ms. McEntyre (F, W, Sp).

101S. Self-Paced Introduction to Computing for Engineering and Physical Sciences. (1-2) Three to four hours of discussion per week. Prerequisite: Mathematics 1C or 5A. Formerly course 151S. Three to four hours of discussion per week. Prerequisite: course 1 or equivalent, and course 40. An Introduction to systems analysis by simulation, Nomenclature, Generation of pseudo-random numbers. Fortran as a simulation language. Study of one discrete (CPSS) and one continuous (CSMP) simulation language. Validation of simulation results. At least one extensive complex simulation example. Mr. Stonebraker (W, Sp).

111. System Architecture. (3) Three hours of lecture per week. prerequisite: course 1 or equivalent, and course 40. An introduction to computer organization. The central processing unit. Memory and storage systems. Including integrated-circuit memories, and solid-state storage devices. Microprocessors. Mr. Ramamoorthy (F, W).

111A. Computer Memory and Storage Devices. (3) Three hours of lecture and one three-hour laboratory per week. Prerequisite: Mathematics 110. Formerly course 140. Computer memory and storage systems, including integrated-circuit memories, microprocessors, magnetic disk drives, and other storage devices. Mr. Ramamoorthy (F, W).

118. Introduction to Theoretical Computer Science. (3) Replaces Electrical Engineering and Computer Science 118. Three hours of lecture per week. Prerequisite: course 1 or equivalent, and course 40. A study of the principles of computation and their mathematical foundations. Mr. Stonebraker (W, Sp).

120A-120B. Computers in the Humanities. (4-4) Three hours of lecture and one 1-hour problem session per week. Prerequisite: upper division standing or consent of instructor. Not acceptable as a technical elective in engineering. Introductory course for students in the humanities who wish to learn computer-based natural language processing. There will be sufficient instruction in a programming language to enable students to program without prior knowledge of computer science. Mr. Despain (W, Sp).


149. Information Processing Techniques. (3) Three hours of lecture per week. Prerequisite: course 148 or equivalent. Formerly course 149. An introduction to more advanced topics in language processing. Paralinguistic algorithms for sublanguages of context-free languages (LR(k), SLR(k), LL(k), etc.). Transformational techniques in processing of natural languages. Mr. Zadeh (Sp).

150. Logic Design and Components of Digital Systems. (4) Formerly Electrical Engineering and Computer Science 150. Three hours of lecture and three hours of laboratory per week. Prerequisite: course 1, and either 103 or concurrent enrollment in 111. Formerly course 116. Only one of the courses 150, 152, 155, 172, 173 can be taken for credit. Not open to students in engineering. Introductory programming course for upper division non-engineering, non-physical science students. Mr. Blum (F, W).

150S. Logic Design and Components of Digital Systems. (4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 1 or equivalent, and course 40. An Introduction to computer organization. The central processing unit. Memory and storage systems. Including integrated-circuit memories, microprocessors, magnetic disk drives, and other storage devices. Mr. Blum (Sp).

150A. Programming Languages and Compilers. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 153 and either course 107 or 152A. Formerly course 148. A survey of programming languages and compiler techniques. Use of local and global variables, data processing, string processing, programming using an ALGOL-like language. Mr. Fateman, Ms. Graham (F, W).

154. Programming Languages and Compilers. (4) Replaces course 150 and course 115. Three hours of lecture and one hour problem session per week. Prerequisite: course 153 and either course 107 or 152A. A survey of programming languages and compiler techniques. Use of local and global variables, data processing, string processing, programming using an ALGOL-like language. Mr. Fateman, Ms. Graham (F, 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. The organization of computer systems. The storage of programs and data. The scheduling of computing resources. Ms. Graham, Mr. Prenter, Mr. Fateman (F, W, Sp).


158. Graph Theory. (3) Formerly course 142. Three hours of lecture per week. Prerequisite: Mathematics 113A or course 111. Algorithms and their applications. Turing machines. Recursion theory. Markov algorithms, register machines, and other models equivalent to Turing machines. The halting problem: unsolvable and other unsolvable problems. Computational complexity. Relevance of abstract models to digital computing. Mr. Lawler, Mr. Gill, Mr. Harrison (F, W).

159. Introduction to Combinatorics. (3) Formerly course 143. Three hours of lecture per week. Prerequisite: Mathematics 113A or course 111. Algorithms and their applications. Turing machines. Recursion theory. Markov algorithms, register machines, and other models equivalent to Turing machines. The halting problem: unsolvable and other unsolvable problems. Computational complexity. Relevance of abstract models to digital computing. Mr. Lawler, Mr. Gill, Mr. Harrison (F, W).


161. Data Structures. (4) Three hours of lecture and one 3-hour laboratory session per week. Prerequisite: Mathematics 113A. Formerly course 141. Design of large programs. Mr. Blum (Sp).


163. Computer Organization. (3) Formerly Electrical Engineering and Computer Science 163B. Three hours of lecture per week. Prerequisite: course 152 or 152A. Advanced topics in computer systems organization from a designer's viewpoint. Techniques for increasing computer memory and speed. System interconnection, accessing memory, cache memories. Bus structures, memory hierarchies and virtual memory systems. Multiprocessing, pipelining, array processors, associational processors. Mr. Basik, Mr. Ferrari (F, W, Sp).

164. Computer Organization. (3) Formerly Electrical Engineering and Computer Science 163B. Three hours of lecture per week. Prerequisite: course 152 or 152A. Advanced topics in computer systems organization from a designer's viewpoint. Techniques for increasing computer memory and speed. System interconnection, accessing memory, cache memories. Bus structures, memory hierarchies and virtual memory systems. Multiprocessing, pipelining, array processors, associational processors. Mr. Basik, Mr. Ferrari (F, W, Sp).

165. 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. A survey of computer systems. The organization of computing resources. Ms. Graham, Mr. Prenter, Mr. Fateman (F, W, Sp).

166. Special Topics in Computer Science for Honor Students. (3) One or two 3-hour meetings per week. Prerequisite: courses 154 and either 183 or 164. For honor students only. Study in depth of several topics of current interest. Students will assess current literature in the topics and present critiques to the class. Each student will carry out a project, which may be taken for credit. Must be taken on a passed/not passed basis.

167. Directed Group Studies for Advanced Undergraduate Students. (2-6) Prerequisite: course 154 or 183. Group study of selected topics in Computer Science. Mr. Karp (F, W, Sp).

168. Special Topics in Computer Science for Honor Students. (3) One or two 3-hour meetings per week. Prerequisite: courses 154 and either 183 or 164. For honor students only. Study in depth of several topics of current interest. Students will assess current literature in the topics and present critiques to the class. Each student will carry out a project, which may be taken for credit. Must be taken on a passed/not passed basis.

169. Supervised Independent Study and Research. (1-9) One or two 3-hour meetings per week. Prerequisite: consent of instructor. Must be taken on a passed/not passed basis.

NOTE: For key to symbols, see page 36.
GRADUATE COURSES

**254. Techniques for Security and Privacy in Computer Systems.** (3) Formerly Electrical Engineering and Computer Science 250-C. Three hours of lecture per week. Prerequisite: course 153 Techniques for increasing security and protecting privacy of data in computer systems; authentication methods; threat modeling; denial of service; social engineering; cryptography; and security protocols. Cost tradeoffs among various countermeasures. Related topics such as public key and administrative rules. (W)

**266. System Support for Scientific Computation.** (3) Formerly course 246F. Three hours of lecture per week. Prerequisite: Mathematics 113A or 125A. Discusses the implementation of computer languages for scientific computation. Emphasis on finite difference techniques, basic concepts and the methodology used in addressing applied problems, and the case study of the development of a computer system for scientific computation. The course is tailored to the specific needs of students interested in scientific computation. (W)

**267. Theory of Formal Languages.** (3) Replaces course 234 and Electrical Engineering and Computer Science 267B. Three hours of lecture per week. Prerequisite: course 153 or course 157A. Formal description of syntax and semantical concepts, context-free grammars, applications to programming, e.g., preprocessor language grammars, finite memory property, control structures, and context-free languages to pushdown automata. Iteration theorems and properties of context-free languages. Identification of unsolvable problems of language theory. Ms. S. Graham, Mr. Harrison (W)

**268A. Effective Computability.** (3-3) Replaces courses 268A and 268B. Effective Computation, the study of the inherent complexity of specific computational problems; algebraic complexity theory; fast Fourier transform; algorithms to manipulate integers; canonical forms and universality. Canonical forms and universality. Decision problems. Recursion and flowchartability of computability. Recursion theorem. Priority argument. Ms. Blum (W, Sp)

**269. Combinatorial Computing.** (3) Replaces course 200B and Electrical Engineering and Computer Science 290Y. Three hours of lecture per week. Prerequisite: course 153 or other equivalent. Emphasis on combinatorial problems, especially those arising in the analysis and design of systems. Methods of combinatorial enumeration, such as branch-and-bound, network flows, monotone programming. Analysis of relative complexities of algorithms. Mr. Lawler (W)

**272. Formal Models of Programs.** (3) Three hours of lecture per week. Prerequisite: course 169 recommended but not required. Trees, Huffman codes, entropy; sorting with minimum number of comparisons and maximum number of moves. Priority selection; optimal tape sorting; disk sorting; sorting networks; address calculation sorting and hashing. Trees and other data structures. Maintenance. Mr. Karp (Sp)

**282. Artificial Intelligence.** (4) Replaces course 220. Three hours of lecture per week. Prerequisite: course 254, Mathematics 125A, consent of instructor. An introduction to artificial intelligence, covering topics such as machine learning, natural language processing, and computer vision. Mr. Karp, Mr. Smith (W)

**290T. Three hours of lecture per week. Prerequisite:** course 254; 257 recommended. Three hours of lecture per week. Students will be expected to do projects of their own devising. Mr. Karp (F)

**375. Computer System Analysis.** (3) Three hours of lecture per week. Prerequisite: course 254. Mathematics 125A, consent of instructor. A research-oriented course aimed at solving the general problem of obtaining correct computer programs. A variety of methods will be considered including: (a) formal and informal correctness proofs, (b) automatic verification and type-checking systems, (c) proof-producing programming languages, (d) formalizing correctness proofs, (e) computer-aided correctness proofs. Mr. Karp (Sp)

**386. Advanced Programming Language Design.** (2-8) Formerly course 280. Three hours of lecture per week. Prerequisite: course 254, Mathematics 125A, consent of instructor. An in-depth study of programming languages. Mr. S. Graham, Mr. Rowe (F, Sp)

**70 / ENGINEERING: Computer Science**
Prerequisite: course 282 is strongly recommended. Design of machines capable of exhibiting intelligent behavior. Applications of modeling of three dimensional scenes. Computer control of external manipulators. Robot command languages. Navigation algorithms. Robotic sensors and their application. A detailed study will be made of one or more experimental systems which intimately involve the use of digital computers. The specific systems will be chosen according to the interests of the class from such fields as biology, physics, psychology. Mr. M. Graham (F)


**292M. Computer Speech Processing.** (4) Three hours of lecture and one course one-three-hour laboratory per week. Prerequisites: Math 51C and one of Electrical Engineering and Computer Sciences 124, Computer Science 153, or Linguistics 115. This course presents the acoustic and computational foundations and the current research in speech synthesis and recognition. Topics include: continuous and discrete models of speech production, linear predictive analysis, acoustic features and their models, speech source filters, prosodic rules and pattern recognition techniques. 

**292S. Introduction to Operations Research.** (1-5) Enrollment is restricted by registration to graduate students. May not be used for unit or resident credit. (Cy) (Cy)*M71. Work Systems and Organization.** (4) NOTE: For key to symbols, see page 36. Three hours of lecture and one 2-hour project session per week. Prerequisite: Math 51A required. A course 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 resident requirements for the doctoral degree. Must be taken on a satisfactory/un satisfactory basis.

The Staff (F, W, Sp)

Industrial Engineering and Operations Research

**UPPER DIVISION COURSES**

130. **Modeling and Simulation of Dynamic Systems.** (4) Three hours of lecture and one hour discussion per week. Prerequisites: Mathematics 5 1A, 5 1B, 5 1C, or 150 and one of course 162, 167, or Mechanical Engineering 102A. Application of systems analysis techniques to the analysis, planning, and/or design of industrial or governmental systems. Consideration of technical and economic aspects of equipment and process design. Students work in teams under faculty supervision. Topics vary yearly. The Staff (Sp)

180. **Synthesis and Design of Industrial Systems.** (4) Three hours of lecture and one three-hour laboratory per week. Prerequisites: course 170, Statistics 134A, or permission of instructor. Process, operation, and work systems analysis and design. System layout, motion-time systems, work sampling, and statistical quality control. The Staff (Sp)

190. **Supervised Independent Study and Research.** (1-6) Enrollment is restricted by regulations to students who wish to undertake a program of individual inquiry initiated jointly by the student and a supervisor. The student and either faculty member must be convinced that 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. Jewell in charge (F, W, Sp)

**GRADUATE COURSES**

220. **Economic Models of Production.** (4) Two 1 1/2-hour lectures and one 1 1/2-hour discussion per week. Prerequisites: Mathematics 51A, 51B, and 51C. An introduction to operations research. Unconstrained and constrained optimization. Equality, inequality and integer constrained linear programming. Resource allocation, equipment replacement, inventory control, production planning. Mr. Golovin (F)

221. **Financial Investment and Decision Theory.** (3) Three hours of lecture per week. Prerequisites: Statistics 134A or 134B. Probabilistic methods and techniques for the measurement of economic risks. Optimization and sequential decisions under risk. Estimation and updating. Stochastic modeling; renewal theory and Markov chains. Maintenance, inventory, queuing and congestion. Mr. Grassi (W)

222. **Advanced Computer Architecture.** (3) Three hours of lecture per week. Prerequisite: course 152A. Non-Van Neumann machines, high level language architecture, parallelism, cascaded organization, computer arrays, dynamic organization, term project or paper will be required. Mr. Despain (Sp)

260. **Group Studies, Seminars, or Group Research.** (1-6) Advanced study in various subjects through special seminars on topics selected each year. Informal group studies of special problems, group participation in comprehensive design problem seminars. Self-contained study in a chosen area. A project course on a topic in computer science. Analysis and experiment. The Staff (F, W, Sp)

261. **Individual Research.** (1-12) Investigation of problems in computer science. The Staff (F, W, Sp)

262. **Individual Study for Doctoral Students.** (1-6) Independent 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. (and other doctoral degrees). May not be used for unit or resident requirements for the doctoral degree. Must be taken on a satisfactory/un satisfactory basis.

The Staff (F, W, Sp)

150. **Production Systems Analysis.** (4) Three hours of lecture and two hours of laboratory per week. Prerequisite: Engineering 102, courses 120 and 150 and one of course 162, 167, or Mechanical Engineering 102A. Application of systems analysis techniques to the analysis, planning, and/or design of industrial or governmental systems. Consideration of technical and economic aspects of equipment and process design. Students work in teams under faculty supervision. Topics vary yearly. The Staff (Sp)

220. **Economic Models of Production.** (4) Two 1 1/2-hour lectures and one 1 1/2-hour discussion per week. Prerequisites: Mathematics 51A, 51B, and 51C. An introduction to operations research. Unconstrained and constrained optimization. Equality, inequality and integer constrained linear programming. Resource allocation, equipment replacement, inventory control, production planning. Mr. Golovin (F)

221. **Financial Investment and Decision Theory.** (3) Three hours of lecture per week. Prerequisites: Statistics 134A or 134B. Probabilistic methods and techniques for the measurement of economic risks. Optimization and sequential decisions under risk. Estimation and updating. Stochastic modeling; renewal theory and Markov chains. Maintenance, inventory, queuing and congestion. Mr. Grassi (W)

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261. **Individual Research.** (1-12) Investigation of problems in computer science. The Staff (F, W, Sp)

262. **Individual Study for Doctoral Students.** (1-6) Independent 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. (and other doctoral degrees). May not be used for unit or resident requirements for the doctoral degree. Must be taken on a satisfactory/un satisfactory basis.

The Staff (F, W, Sp)
hours of lecture and 1 1/2 hours of laboratory per week. Prerequisite: course 264-4. Statistics 147, knowledge of Fortran programming. Mathematical and computer methods for planning, control, and evaluation of production and service systems; statistical techniques in forecast. Optimization of facilities utilization. Mr. Golovin (Sp)

260A. Introduction to Mathematical Optimization. (3) Three hours of lecture and one 2-hour laboratory per week. Prerequisite: Statistics 101, Mathematical Statistics 51A or 111. Linear programming: simplex method, duality theorem, post-optimization analysis. Network flows; shortest path,PERT, flow problem and transportation programming. Mr. Adler, Mr. Glassy (F)

260B. Introduction to Mathematical Optimization. (4) Three hours of lecture and 1 1/2 hours of discussion per week. Prerequisite: Mathematical Statistics 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, linear quadratic models. Mr. Glassy, Mr. Adler (W)

261A. Stochastic Models of Operations Research I. (4) Two 1 1/2-hour lectures and one hour of laboratory per week. Prerequisite: Statistics 200F. Review of conditional probabilities and expectation. The Poisson process. The renewal argument and elementary renewal theorems. Introduction to discrete and continuous time Markov chains. Study of Markovian queues and the M/G/1 queue. Applications to transportation and computer systems. Mr. Wolff, Mr. Barlow, Mr. Ross (W)

261B. Stochastic Models of Operations Research II. (4) Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisite: course 261A or 263A. Imbedded renewal processes and generalizations, cost functions, Markovian activity networks, Markov processes. Sequential decision models including an introduction to stochastic dynamic programming; applications to inventory, replacement models. Reliability models for multi-component systems. Mr. Wolff, Mr. Barlow, Mr. Ross (Sp)

262A. Linear Programming. (4) Two 1 1/2-hour lectures and one hour of laboratory per week. Prerequisite: Mathematics 111. Basic graduate course in linear programming. The simplex method and its variants. Convexity and duality and theory of linear programs. Parametric programming. Stochastic structures such as decomposition and upper-bounded variables. Introduction to matrix games and quadratic programming. Mr. Adler, Mr. Gale, Mr. Glassy (F, W)

262B. Nonlinear Programming. (4) Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisite: course 262A or 162 and a course in linear algebra. Math 104A recommended. Basic graduate course in nonlinear programming. Properties of sets and functions, unconstrained minimization, Kuhn-Tucker theorem, Lagrange multipliers, saddle-point problems and dual problems. Polynomial and non-polynomial models, with emphasis on methods for which convergence proofs exist and computational experience has been favorable. Mr. Gale, Mr. Glassy (F, W)

263A. Applied Stochastic Processes. (4) Four 1 1/2-hour lectures and one 1-hour discussion per week. Prerequisite: course 262A or 162 and course 263A or 268 or 266. Course 266 is usually taken before 269, but it is not a strict prerequisite for students who have taken course 263A. Typical applications of dynamic programming; convergent dual and primal cutting-plane algorithms; graph-theoretic methods; branch and bound methods; total unimodularity of transportation problem; matching theory; introduction to matroid theory; applications of matroids to graph theory and mathematical programming. Mr. Adler (Sp)

267. Advanced Queuing Theory. (4) Two 1 1/2 hour lectures and one 1-hour discussion per week. Prerequisite: course 263A. Review of elementary queuing models; Markovian and M/G/1 queues. Poisson process and GI/G/1 queues. Approximations and bounds for single and multiple channel queues. Mr. Dreyfus (Sp)

268. Applied Dynamic Programming. (4) Two 1 1/2-hour lectures and one 1-hour discussion per week. Prerequisite: graduate standing. Dynamic programming and decision analysis models of discrete event; optimization model problems; dynamic programming; sequential decision problems; applications to equipment replacement, resource allocation, scheduling, search and routing. Brief introduction to decision-making under risk and uncertainty. Mr. Dreyfus (F)

269. Integer Programming And Combinatorial Optimization. (4) Two 1 1/2-hour lectures and one 1-hour discussion per week. Prerequisite: course 262A or 268. Course 266 is usually taken before 269, but it is not a strict prerequisite for students who have taken course 263A. Typical applications of integer linear programming and resource allocation methods. Geometric and/or design projects will be undertaken. Mr. Grossman (Sp)

270. Engineering Psychology. (4) Two 1 1/2-hour lectures and one 2-hour discussion per week. Prerequisite: course 134 or Electrical Engineering and Computer Sciences 140. Analysis of human information-processing and skilled performance, with emphasis on quantitative models for use in man-machine system design. Laboratory projects as appropriate. Mr. Crossman (W)

271. Advanced Topics In Work Systems Design. (4) Two 1 1/2-hour lectures and one 2-hour discussion per week. Prerequisite: course 262A or equivalent. Impacts of technology on task performance, supervision, coordination, and control in sociotechnical systems. Dynamics of task analysis and of environment. Design of organizational models to enhance emergence of stable cohesive and productive social structures. Students will undertake individual projects. Mr. Rosenh (W)

274. Manual Control and Manned Systems Design. (4) Two 1 1/2-hour lectures and one 2-hour discussion per week. Prerequisite: course 134 or Electrical Engineering and Computer Sciences 140. Task dynamics and man-task interaction; man-machine interfaces and interaction; face design; simulation and allied techniques. Experimental and/or design projects will be undertaken. Mr. Grossman (Sp)

290A. Theory of Production. (3) Three hours of lecture per week. Prerequisite: Mathematics 104A. Review of Theory of Steady State Models of Production: Automatic development, special structures, energy. Surveys of solution techniques and problems that have formulations in terms of flows in networks. Max-flow min-cut theorem. Minimum spanning tree and multicommodity flows. Relationship with linear programming, transportation problems, electrical networks and critical path scheduling. The Staff (F, W)

290E. Large-Scale Programming. (3) Three hours of lecture per week. Prerequisite: course 264A or 268 or 290G (latter may be taken concurrently). Techniques for solving large-scale linear and non-linear programming problems. Quadratic programming, duality, and resource allocation methods. Generalized upper bound and compact inverse methods. Mr. Adler (F)

290F. Risk Theory. (3) Two 1 1/2-hour lectures per week. Prerequisite: any course in stochastic process. Introduction to mathematical risk theory, with emphasis on various models of insurance operations: utility theory, insurance enterprise, reserve formulation, premium models, claims; fair premiums; credibility theory; risk reserves; risk-sharing; objectives of the firm. Mr. Jewell (W)

290G. Modeling and Analysis of Environmental Quality. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 264A (may be taken concurrently with other course in stochastic process). Introduction to mathematical risk theory, with emphasis on various models of insurance operations: utility theory, insurance enterprise, reserve formulation, premium models, claims; fair premiums; credibility theory; risk reserves; risk-sharing; objectives of the firm. Mr. Glasse (Sp)

290K. Financial Planning and Investment. (4) Three hours of lecture and 1 1/2 hours of laboratory per week. Prerequisite: course 260A or any course in stochastic models or Business Administration 291. Study of financial planning and investment models including capital budgeting, replacement, cash flow management, theory and data analysis of option pricing formulas, bond redemption and amortization schedules, models of capital structure and of capital constraints. Mr. Oliver (Sp)

292. Group Studies, Seminars, or Group Research. (1-9) Advanced seminars in industrial engineering and operations research. Mr. Jewell (in charge) (F, W, Sp)

299. Individual Study or Research. (1-12) Individual study in consultation with the major field advisor, intended to provide an opportunity for qualified students to prepare themselves for the various examinations and oral 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. Mr. Jewell (in charge) (F, W, Sp)

299D. 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 and oral 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. Mr. Jewell (in charge) (F, W, Sp)

Materials Science and Mineral Engineering

Materials Science

UPPER DIVISION COURSES

100. Field Trips. (2) One 4-hour laboratory per week. Prerequisite: junior standing in ceramics or metallurgy. Selected plant visits, lectures, by practicing metallurgical and ceramic engineers, and reports on industrial 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. Prerequisite: Chemistry 1B. Introduction to crystal structures and properties on the basis of atomic sizes and bonding characteristics. Introduction to the theory of crystal structures, bond distances, and bond energies by using models and focusing on the characteristics for the characterization of crystalline materials. Mr. Fuerstenau (W)

101L. Crystal Chemistry and Diffraction Laboratory, (1) One 3-hour laboratory per week. Preparation of specimens for optical and electron microscopy; metallographic equipment; alteration of microstructures to control properties; effects of microstructural changes on mechanical, electrical, and chemical properties; microstructures and properties of commercial alloys: textured and cast materials. Mr. Fuerstenau (W)

102. Thermodynamics, (4) Four hours of lecture per week. Prerequisite: Chemistry 1B. Course introduces thermodynamics with emphasis in thermodynamic principles important in materials science. Mr. Searcy (Sp)

103. Phase Equilibria and Transformations, (4) Three hours of lecture and two 1-hour laboratory periods per week. Prerequisite: course 102 or Chemistry 1A. Principles and mechanisms determining material microstructure. Multiphase equilibria and phase diagrams. Phase transformations: nucleation; diffusion and diffusionless growth processes. Mr. Zackay (F)

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


109. Physical Metallurgy, (3) Three hours of lecture per week. Prerequisite: Engineering 45; senior standing in engineering or a physical science. Conductive and insulating materials of practical importance. Permanent magnets, soft magnetic materials for electronic and magnetic devices. Magnetic materials and their physical principles. Control of electric and magnetic properties by processing. Economic factors, engineering applications. Mr. Bragg (W)

109L. Physical Metallurgy Laboratory, (1) One 3-hour laboratory per week. Prerequisite: Engineering 45. Laboratory exercises to supplement lectures. Conducting and melting, softening points and annealing of metals. Strength of glass, glass-ceramics, and aluminas ceramics. Electronic ceramics. Adhesive properties of metals. Mr. Parker (Sp)

121. Glass and Crystalline Ceramic Materials, (3) Three hours of lecture per week. Prerequisite: Engineering 45. Chemistry of glass with emphasis on structure, strength, and processing of glass with discussion of strengthening of glass; glass coating of metals; and ceramic-metal joining. Properties of ceramic materials for structural application. Special ceramics for electronic, nuclear and aerospace applications. Mr. Fuerstenau, Mr. Pask (W)

121L. Glass and Crystalline Ceramic Materials Laboratory, (1) One 3-hour laboratory per week. Prerequisite: course 121 is a prerequisite and can be taken concurrently. Laboratory for course 121. Laboratory exercises to supplement lectures. Conducting and melting, softening points and annealing of metals. Strength of glass, glass-ceramics, and aluminas ceramics. Electronic ceramics. Adhesive properties of metals. Mr. Fuerstenau (W)

122. Ceramic and Metal Powder Processing, (3) Three hours of lecture per week. Principles of forming metal and ceramic powders; density, deformation, hot pressing, extrusion, dry pressing, etc. Behavior of slurries and plastic masses. 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 of specimens by slip casting, extrusion and dry pressing forming methods. Sintering and vitrification. Control 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: Chemistry 1A, and Physics 5A. Students who have passed Material Science and Engineering 205 are eligible for credit for course 130. Structure and properties of metallic, ceramic, and polymeric materials; application of materials to technology. Properties of materials include hardness, treatment of steel, design limitations of structures with respect to fatigue and fracture, and influence of chemical environment on mechanical properties of materials. Mr. McConnell (F)

141. Particulate Materials, (3) Three 1-hour lectures per week. Prerequisite: senior standing in engineering or a physical science. Characterization of particulates and particulate systems. Particles in suspensions, various detection methods, particle size distributions, rheology of particle-fluid systems, surface properties of particulates, principles of agglomeration, size separations, unit operations in solid-liquid and solid-solid separations, mixing, agglomeration of particulates. Mr. Sastri (F)

141L. Particulate Materials Laboratory, (1) One 3-hour laboratory per week. Prerequisite: course 141 is a prerequisite and can be taken concurrently. Experiments in the measurement of particle size, surface area, size distributions, mixing, and agglomeration. Mr. Zuckay (F)

142. Materials Process Engineering, (4) Four hours of lecture per week. Prerequisite: Material and energy balances, fuels and combustion; fluid flow and heat transfer in metallurgical and ceramic systems. Mr. Evans (F)

160. Materials Problems In Energy Systems, (3) Three hours of lecture per week. Prerequisite: E-45 and completion of lower division engineering curriculum. Selection of structural materials for advanced energy conversion technology. Foundation for realistic simulations of representation of components in systems characterized by hostile operating environments including those of high temperatures, corrosion, and radiation damage. Mr. Zuckay (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) Prerequisite: student must be in good standing who has passed course 205 and 207. This prerequisite will be waived for students with undergraduate degrees in physics or chemistry. Applied solid-state physics of materials and materials phenomena of engineering importance, especially non-conventional materials. Conducting, semi-conducting, and insulating materials. Mr. Fuerstenau (W)

199L. Materials Science and Engineering Laboratory. (2) Six hours of laboratory per week. Prerequisite: 213A. 213A continued. Dynamical and statical methods, solidification, many beam effects, non-conventional techniques; lattice defects, dislocations, and plastic masses. Sintering and vitrification. Relation of processing steps to microstructure development. Mr. Thomas (F, W)

200A-200B. Principles of Materials Science and Engineering, (4-4) Three hours of lecture and one 1-hour laboratory per week. Prerequisite: graduate standing in Engineering or Natural Sciences. Crystallography, lattice defects, modern imaging and diffraction methods. Principles of thermodynamics, kinetics, transport phenomena, phase transformations, alloy theory, mechanical behavior, failure, fracture, and deformation of polycrystals, phase diagrams, and environmental effects. Mr. Thomas (F, W)

200L. Diffraction and Crystallography Laboratory. (2) One hour of lecture and three hours of laboratory per week. Prerequisite: graduate standing in Engineering. Laboratory for course 200A. Experiments on applications of powder and single crystal diffraction techniques. Debye-Scherrer, diffractometer, and Laue methods: x-ray quantitative and qualitative analysis, orientation of single crystals, electron diffraction, indexing of patterns, crystallography. Mr. Pask (F)

201. Applications of Chemical Thermodynamics. (4) Four hours of lecture per week. Prerequisite: course 102 or equivalent. Thermodynamics is used to predict reactions and phase equilibria in inorganic materials; thermodynamics of solid solutions, non-stoichiometric solids, and aqueous and non-aqueous electrolytes; estimation of missing data. Mr. Fuerstenau (F)

202. Bonding and Crystal Structures. (4) Four hours of lecture per week. Prerequisite: course 101 or equivalent. Bonding models and semi-empirical correlation schemes are applied to analyzing and predicting bond energies in inorganic compounds and alloys. Limitations of the models are discussed. Mr. Searcy (F)

203. Classical Thermodynamics. (4) Four hours of lecture per week. Prerequisite: linear vector calculus and partial differential equations. Principles of the thermodynamics of equilibrium, with emphasis on the equilibrium of phases in condensed multifac- tomy system components. Mr. Morris (Sp)

204. Statistical Thermodynamics. (4) Four hours of lecture per week. Prerequisite: familiarity with vector calculus and partial differential equations. Principles of statistical thermodynamics, emphasizing principles of statistical thermodynamics: macroscopic and microscopic theories, atom transformation in crystals. Mr. Morris (Sp)

205. Diffusion In Solids. (4) Four hours of lecture per week. Prerequisite: senior standing in engineering or a physical science. Characterization of solid particulates and particulate systems. Particles in suspensions, various detection methods, particle size distributions, rheology of particle-fluid systems, surface properties of particulates, principles of agglomeration, size separations, unit operations in solid-liquid and solid-solid separations, mixing, agglomeration of particulates. Mr. Sastri (F)

207. Dislocation Theory, (3) Three hours of lecture per week. Concept and properties of perfect and imperfect dislocations, theory of dislocation motion and its relation to plasticity and dislocation stacking faults, theories of glide and climb motion, dislocation multiplication, and cross-slip. Emphasis on the quantitative treatment of dislocations in important crystal structures. Mr. Washburn (F)

212A. Electron Diffraction and Microscopy. (3) Three hours of lecture per week. Prerequisite: course 101 or equivalent. Electron microscopy, reciprocal lattice concepts and kinematical theory of diffraction and imaging: contrast from perfect and imperfect crystals, Kikuchi diffraction high resolution; scanning electron microscopy; applications to modern research projects in Materials Science and Engineering. Mr. Fuerstenau (W)

213A. Electron Diffraction and Microscopy. (3) Two hours of lecture and three hours of laboratory per week. Prerequisite: General Physics or Equivalent. Laboratory and microscopic techniques, specimen preparation, replicas foils, photographic procedures, analytic exercises, identification of crystalline, second phase, etc.; electron microscopy. Mr. Thomas (W)

213B. Electron Diffraction and Microscopy. (3) Two hours of lecture and three hours of laboratory per week. Prerequisite: 213A. 213A continued. Dynamical and statical methods of electron diffraction, contrast strain analysis, e.g., small defects (radiation damage), precipitates; special topics; high voltage E.M., many beam effects, microdiffraction, Kikuchi, high voltage E.M., lattice imaging; spectroscopy. Laboratory: advanced research topics; analysis of defects. Mr. Thomas (Sp)

213L. Electron Microscopy and Diffraction Laboratory. (1) One 3-hour laboratory per week. Prerequisite: course 213A or equivalent. Bonding models and semi-empirical correlation schemes are applied to analyzing and predicting bond energies in inorganic compounds and alloys. Limitations of the models are discussed. Mr. Searcy (F)

214. X-Ray Diffraction. (3) Three hours of lecture and three hours of laboratory per week. Prerequisite:
281. Applied Colloidal Phenomena. (3) Formerly numbered 223. Three hours of lecture per week. The characterization of colloidal materials and the physical chemistry of colloid systems. Primary emphasis on the interaction of colloid particles, particularly in aqueous environment. Mr. Sastry (Sp)

282. Metallurgical and Transport Phenomena. (4) Four hours of lecture per week. Significance of crystallography, thermal, fluid, and electrical properties of metals and other structured materials. Mr. Fuerstenau (Sp)

283. Modelling of Metallurgical and Ceramic Processes. (3) Formerly numbered 225. Four hours of lecture per week. The steady-state and unsteady-state behavior of continuous and ceramic processes. Emphasis on the formulation of mathematical models, and numerical analyses and simulation in the interpretation of the relation between transport and kinetic phenomena. Mr. Sastry (W)

284. Processing of Particulate Materials. (3) Formerly numbered 227. Three hours of lecture per week. Prerequisite: course 223. The treatment of particulate systems in industrial processes: identification and characterization of particulate materials and the basic properties of particulate matter. Mr. Evans (F)

285. Ceramics. (3) Formerly numbered 275. Three hours of lecture per week. Materials, structures, mechanical properties, and applications of ceramics. Mr. Evans (F)

286. Ceramography. (3) Three hours of lecture per week. Prerequisite: course 223. Three hours of lecture per week. Mr. Evans (F)

287. Ceramography. (3) Three hours of lecture per week. Treatment of particulate materials, rheology of the solid-fluid systems in relation to ceramic forming processes: densification mechanisms. Control of process parameters to develop desired characteristics (structures) of materials. Mr. Noyes (F)

288. Advanced Extractive Metallurgy. (3) Three hours of lecture per week. Prerequisite: course 223. Three hours of lecture per week. The extraction of valuable metals from ores. Mr. Searcy (F)

289. Optimal Design of Metallurgical and Mineral Processes. (3) Three hours of lecture per week. Discontinuous and continuous processes; optimal design of metallurgical and mineral processes; evaluation of process alternatives; economic optimization of a design. Mr. Evans (F)

290. Numerical Methods in Materials Science and Engineering. (3) Three hours of lecture per week. Prerequisite: graduate standing in engineering, mathematics, or related area. The numerical methods used to calculate the properties of materials. Mr. Evans (F)

291. Design of Alloys for Advanced Engineering Systems. (3) Three hours of lecture per week. Prerequisite: Graduate standing in Materials Science and Engineering. The design of new materials for advanced applications. Mr. Evans (Sp)

292. Extractive Metallurgy Field Trip. (1) One hour of lecture per week. Prerequisite: graduate status in Department of Materials Science and Engineering. An introduction to the field of extractive metallurgy facilities in Western U.S. Field trip at end of quarter. Mr. Washburn (W)

293. Extractive Metallurgy Field Trip. (1) One hour of lecture per week. Prerequisite: graduate status in Department of Materials Science and Engineering. An introduction to the field of extractive metallurgy facilities in Western U.S. Field trip at end of quarter. Mr. Washburn (W)

294. Dispersions and Composites. (3) Three hours of lecture per week. Prerequisite: graduate standing in engineering, materials science, or related area. Characteristics of disperse systems; formulation and optimization of composite materials. Mr. Fuerstenau (W)

295. Nuclear Materials. (4) Four hours of lecture per week. Prerequisite: Engineering 110A or equivalent. Three hours of lecture per week. Mr. Platzky (Sp)

296. Chemistry of High-Temperature Materials. (3) Three hours of lecture per week. Prerequisite: Engineering 110A or equivalent. Mr. Searcy (W)

297. Ceramic Processing. (3) Three hours of lecture per week. Mr. Sastry (Sp)

298. Chemical Vapor Deposition. (2) Three hours of lecture per week. Mr. Searcy (Sp)

299. Solid State Phase Transformations. (3) Formerly numbered 222. Four hours of lecture per week. Prerequisite: vector analysis, partial differential equations. Kinetics of phase transformations in condensed systems. Morphology, Rate, and morphology of precipitate growth. Metastability. Mr. Morris (W)

300. Advanced Graduate Study in Materials Science and Engineering. (3) Three hours of lecture per week. Prerequisite: graduate standing in Engineering. Three hours of lecture per week. Mr. Sastry (Sp)

301. Metallurgical and Transport Phenomena. (4) Four hours of lecture per week. Prerequisite: Engineering 112 or equivalent. The modeling of metallurgical and transport phenomena. Mr. Sastry (W)

302. Ceramics. (2) Two hours of lecture per week. Composition and forming methods of special glasses and glass ceramics. Mr. Fuerstenau (Sp)

303. Decomposition. (2) Two hours of lecture per week. The chemical reactions of high-temperature materials. Mr. Fuerstenau (Sp)

304. Particle Size Characterization. (2) One 2-hour lecture per week. The determination of size and shape of particles in industrial processes. Mr. Sastry (F)

305. Surface Chemistry of Flotation. (2) Two hours of lecture per week. The analysis of surface active agents in flotation systems. Mr. Fuerstenau (Sp)

306. Ceramic-Metal Interfaces. (2) Three hours of lecture per week. The interaction of ceramic and metal interfaces during welding, spraying, and chemical interactions. Mr. Noyes (Sp)

307. Kinetics of Vaporization and Endothermic Decomposition. (2) Two hours of lecture per week. Prerequisite: Engineering 230A or equivalent. Analysis of kinetic models and rates of vaporization. Mr. Fuerstenau (Sp)

308. Kinetics of Phase Transformations. (4) For-
Geophysics. (4-4) Three hours of lecture and one hour of discussion per week. Prerequisites: Physics 110A–110B or equivalent, upper division course in partial differential equations. The physical principles, methods, and techniques of analysis of gravity and magnetic data. Theoretical anomalies of common models; estimation of parameters of disturbing bodies; special techniques for derivatives, continuation, and fields reduced to the pole.

The Staff (W, Sp, even years)

202A–202B. Electromagnetic Methods in Applied Geophysics. (4-4) Formerly 206A–206B. Three hours of lecture and one hour discussion per week. Prerequisites: Engineering 200. Theory of dc current flow in isotropic, layered and homogeneous earth models with a discussion of the use of dipole sources and interpretation of electromagnetic surveys in mineral prospecting and geological mapping. Plane wave and cylindrical wave propagation and diffraction and polarization of waves in layered earth models; fields scattered from inhomogeneities in dispersive half spaces. Mr. Morrison (W, Sp, odd years)

203A–203B. Electrical Methods In Applied Geophysics. (4–4) Formerly 207A–207B. Three hours of lecture and one hour of discussion per week. Prerequisites: An introduction to geology, upper division course in applied mathematics. 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 and pulsed mode is treated as well as the processing methods used to elucidate geological structure from the seismic data. Mr. Farrell (W, Sp)

205. Electronic Instrumentation in Applied Geophysics. (4–4) Formerly 208A. Three hours of lecture and two hours of laboratory per week. Prerequisites: Electrical Engineering and Computer Sciences 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 digitalconverters and elementary digital logic. Mr. Farrell (F)


207. Geophysics. (4-4) Three hours of lecture and one hour of discussion per week. Prerequisite: Physics 110A–110B, or equivalent. Spectral analysis; design of filters for derivatives, convolution, and interpretation of electromagnetic surveys in mineral prospecting and geological mapping. Mr. Leitmann, Mr. Carroll, Mr. Willis, Mr. Bogy (F, W, Sp)

208A. Geophysical Transducers Laboratory. Three hours of lecture per week. Prerequisites: An introductory course in seismology, upper division course in applied mathematics. The course follows 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 and pulsed mode is treated as well as the processing methods used to elucidate geological structure from the seismic data. Mr. Farrell (W, Sp)

209. Group Studies, Seminars, or Group Research. (1–12) Advanced study in various subjects through special seminars on topics to be selected each year, formal group studies of special problems, group research projects, comprehensive examinations, or group research on complete problems for analysis and experimentation. The Staff (F, W, Sp)

210. Individual Study or Research. (1–12) The Staff (W, Sp)

601. Individual Study for Master's Students. (1–9) Prerequisite: graduate standing in the individual study for the comprehensive or language requirement in consultation with the field advisor. May not be used to satisfy comprehensive examinations for a master's degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (W, Sp)

602. Individual Study for Doctoral Students. (1–9) Prerequisite: graduate standing in the individual study in consultation with the major field advisor, intended to provide an opportunity for qualified students to conduct original investigations 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, Sp)

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**Mechanical Engineering**

**UPPER DIVISION COURSES**

101. Manufacturing Processes and Systems. (4) Four hours of lecture and four hours of discussions 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. White (W)

102A. Mechanical Behavior and Processing of Materials. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: Engineering 36. Stress analysis, properties of materials, testing and evaluation of properties and performance relationships. Mr. Goldsmith (F, W)

102B. Mechanical Engineering Design. (4) Three hours of lecture and two hours of laboratory per week. Prerequisite: Engineering 45. Advanced design techniques of mechanical engineering, including the formulation of design specifications and the design of components and complete machines which must meet prescribed functional requirements. Mr. Hauser (F), Mr. Lieber (F, W)

103. Dynamics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: Physics 5A, or equivalent. Principles of mechanics. Mr. Wilson (F), Mr. Frisch (W)

104A. Engineering Mechanics–II. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: Engineering 45. Statics and dynamics of particles, systems of particles, and rigid bodies, with applications especially to one-dimensional and two-dimensional problems. Mr. Lieber (F, W)

104B. Engineering Mechanics–III. (3) Three hours of lecture per week. Prerequisite: course 104A. Three-dimensional kinematics and dynamics of rigid bodies. Mr. Brown (F), Mr. Willis (F, Sp), Mr. Bogy (F, W)

105A–105B. Thermodynamics. (4–3) Four and one-half hours of lecture per week for 105A and three hours of lecture per week for 105B. Prerequisite: Chemistry 10A or equivalent. First and second laws of thermodynamics; thermodynamic properties, kinetic theory and microscopic properties, energy conversion systems. Mr. Trezek, Mr. Pagni, Mr. Seban, Mr. Miller, Mr. Laird for 105A (F, Sp), Mr. Oppenheim, Mr. Trezek for 105B (F, W)

106A–106B. Fluid Mechanics and Transport Processes. (4–3) Four and one-half hours of lecture per week for 106A and three hours of lecture per week for 105B. Prerequisite: Chemistry 51C, Physics 5B. Fluid and compressible flow. Incompressible and compressible fluid behavior in engineering systems. Mr. Lalitone, Mr. Bogy, Mr. Millett, Mr. Bogy (F, W, Sp)

106C. Conductive and convective transport of materials and energy in the single phase; thermal radiation and heat exchange. Mr. McGinn, Mr. Hurbut, Mr. Grell (F, W)

107A–107B. Mechanical Engineering Laboratory. Three hours of laboratory per week. Prerequisite: courses 104B, 105B, 106A. Experimental investigation and analysis of the steady-state and transient behavior of mechanical energy systems and of their thermal and dynamic processes. The Staff (Mr. Hurbut in charge) 107A (W, Sp) and 107B (F, W, Sp)

110. Mechanical Engineering Project Engineering. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: courses 102B, 107A (may be taken concurrently). The course is intended to introduce concepts of project engineering in mechanical engineering systems by having students complete a preliminary design for a mechanical engineering system and by design seminars and conferences. Mr. Steidel (Sp)

111. Elements of Thermodynamics and Heat Transfer. (3) Three hours of lecture per week. Prerequisite: Mathematics 5 1C, Physics 5B, Chemistry 1B. Not open to students in Mechanical Engineering. Prerequisites: MATH 51C and PHYSICS 5B. First and second laws of thermodynamics, thermodynamic properties and relations; applications of the first and second laws; elements of heat transfer. Mr. Dalry (W)

112. Plasticity and Metal Forming. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 205A. Review of elastic, plastic, and creep behavior of materials and introduction to low-cycle and multiaxial stress fatigue. Mr. Hauser (F, Sp, even years)

117. Advanced Methods in Mechanical Design. (3) Three hours of lecture per week. Prerequisite: course 102B. Application of engineering principles to the synthesis and analysis of complete machines. Conceptual and detailed design of mechanical systems, including stress analysis, and functional requirements. Introduction to optimization and reliability considerations in machine analysis. Mr. Schmit (F)

120. Applied Stress Analysis. (4) Four and one-half hours of lecture per week. Prerequisite: Mechanical Engineering 130, Mathematics 51C. Solution of practical problems concerning 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)

121. Plasticity and Metal Forming. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: course 103 or 104A. Advanced kinematic and dynamic analysis of rigid body mechanisms and general force systems. Mr. Radcliffe (F)

122. Dynamics of Machinery. (3) Three hours of lecture per week. Prerequisite: course 103A or 104A. Kinematic and dynamic analysis of rigid body mechanisms using graphical and analytical-computer methods. Dynamics of cam driven mechanisms and rotors. Balancing of rotors. Dynamic response of rigid body systems. Mr. Radcliffe (W)

123. Mechanical Vibrations. (3) Three hours of lecture 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 random excitation. Mr. Steidel, Mr. Mote (F, Sp)

124. Automatic Control Systems. (4) Four hours of lecture and four one-hour lectures and synthesis of typical elements of mechanical systems. Velocity and acceleration analysis of linkages, gearing, and cams. Mr. Radcliffe (F)

130. Control System Theory. (4) Four hours of lecture and four one-hour lectures. Introduction to automation: the problems of control and feedback. Stability control and servomechanisms. Mr. Radcliffe (F)

133. Mechanical Vibrations. (3) Three hours of lecture 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 random excitation. Mr. Steidel, Mr. Mote (F, Sp)

135. Control Instrumentation and Switching Logic. (3) Three hours of lecture per week. Prerequisite: Mathematics 51C, Physics 5B. Study of the principles of digital computers and analog computers. Mr. Radcliffe (F)

137. Control System Synthesis and Switching Logic. (3) Three hours of lecture per week. Prerequisite: Mathematics 51C, Physics 5B. Study of the principles of digital computers and analog computers. Mr. Radcliffe (F)

142. Atmoopheric and Thermal Environmental Control. (4) Four and one-half hours of lecture per week. Prerequisite: courses 105B, 106A. Production and control of humidity and thermal environments for human habitation. Topics covered include air-conditioning and psychrometric processes and air pollution. Mr. Miller (W)

145. Energy Conversion Principles. (4) Four and

NOTE: For key to symbols, see page 36.
one-half hours of lecture per week. Prerequisite: courses 105B, 106B. Thermodynamic principles of energy conversion systems. Emphasis on direct energy conversion processes: electric, electronic devices for logic operations, fluidic, electric, electronic devices for logic operations, and human locomotion and elasticity applied to modeling and simulation. Mr. Spiegler (Sp).

188. Viscous Flow. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 106A, Mathematics 51C. Prerequisite: course 106A, Mathematics 51C. Theoretical and empirical bases of laminar and turbulent flows. Mr. Laird (Sp).

189. An Introduction to the Ocean. (4) Three hours of lecture per week. Prerequisite: none; can be taken as technical elective by engineering students by arrangement with the instructor. Practical and theoretical aspects of the physical, dynamical, chemical, climatological, and biological aspects of the oceans, their floors and their shores. Students in any department. The dynamics are dealt with on two technical levels to accommodate students of differing scientific backgrounds.

192. Elementary Hydrodynamics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: Mathematics 51C; Engineering 116 recommended. Kinematics of plane and spatial mechanisms to guide a rigid body. Mr. Trapani (Sp).

194. 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, in order to be able to evaluate the power required, the stability, and the control forces for various maneuvers. Mr. Lattone (Sp).

197. Application of Analog Computers. (3) Two hours of lecture and three hours of laboratory per week. Prerequisite: Mathematics 51C. Introductory level course for advanced studies on the use of analog and digital computers in engineering analysis. In particular, the solution of linear and nonlinear ordinary differential equations and the design and analysis of control systems. Mr. Fisch (Sp).


199. Acoustical Environment Control. (3) Two hours of lecture and three hours of laboratory per week. 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 and reverberation, communication interference, and effects on man. Interactions between noise and vibration. Noise control in mechanical systems. Mr. Carroll (Sp).

200. Intermediates Dynamics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 105A. Basic principles of heat transfer and their application. Subject areas include steady-state and transient system analyses for conduction, forced and convective convection, condensation, and thermal radiation. Mr. Pagni, Mr. Greif (F, W).

201. Heat Transfer. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 105B, 106B. Basic principles of heat transfer and their application. Subject areas include steady-state and transient system analyses for conduction, forced and convective convection, condensation, and thermal radiation. Mr. Falt (W).

202. Introduction to Bioengineering. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 105B. Basic characteristics of biological systems and an overview of the dynamic properties of gases, liquids and solids. Elementary kinetic theory of gases and evaluation of transport equation solutions. Mr. Sargent (W).

203. Fresh Water from the Sea. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: none; can be taken as technical elective by engineering students. Mr. Furtado (W).

204. Graduate Independent Study and Research. (1-5) Enrolment is restricted by regulations of the department. May be repeated for credit. Mr. Talbot (Sp).

205. Biological Control Laboratory. (2) Six hours per week. Mr. Hagan (F).

206. Biological Control Systems. (2) Two hours of lecture and one hour of discussion per week. Mr. Watanabe (W).

207. Environmental System Analysis. (3) Three hours of lecture per week. Applications of systems analysis techniques to complex systems. Emphasis on biological examples. Mr. Blum (W).

208. Applications of Theory of Plasticity. (3) Three hours of lecture per week. Prerequisite: courses 121 or 228A. Application of the theory of plasticity to plastic deformation problems. Solutions given for methods of characteristics, the bounding method, and the general approximation method. Mr. Firtch (Sp).


210. Bioengineering. (4) Three lecture hours and one hour of discussion per week. Prerequisite: none. Treatment of fluid mechanics from engineering point of view. Topics covered will include: linear elastic fracture mechanics, crack propagation in brittle solids, fracture mechanics of composite materials which enable the prediction of service performance from simple tests. Failure due to fatigue, creep, fracture, and plastic instability will be discussed. Mr. Sinanan (F).

211. Advanced Kinematics and Mechanisms. (4) Three hours of lecture per week. Kinematic and dynamic analysis and synthesis of plane and spatial mechanisms. Emphasis on computer-aided design using computer-aided design of mechanical and mechanical engineering. Mr. Fung (W).

212. Applications of Theory of Plasticity. (3) Three lecture hours per week. Prerequisite: consent of instructor. Mr. Blum (W).

213. Elements of Control Theory. (3) Three lecture hours per week. Prerequisite: Courses 121 or 228A. Review of dynamical system theory and control theory. Design and analysis of critical systems. Mr. Ruttman (F).

214. Graduate Independent Study and Research. (1-5) Enrolment is restricted by regulations of the department. May be repeated for credit. Mr. Furtado (W).

215. Dynamic Systems in State Space. (3) Three lecture hours and one hour of discussion per week. Prerequisite: none. Modelling of dynamic systems based upon real causality. Dynamic behavior, controllability, observability, and stability of linear deterministic systems. Examples are chosen from mechanical, electrical, biological, and environmental systems. Mr. Tomizuka (F).

216. Dynamic Systems and Control. (4) Three lecture hours and one hour of discussion per week. Prerequisite: consent of instructor. Design and analysis of direct digital control systems, probabilistic systems, nonlinear systems, adaptive and optimal control systems, with emphasis on realization by closed and open loop configuration. Mr. Ruttman (F).

217. Switching Control. (4) Four and one-half lecture hours per week. Design and analysis of control systems utilizing switching elements. Mechanical, fluidic, electric, electronic devices for logic operations.
equations in the theory of elastic-plastic solids including the mechanics of, and certain properties of, elastic and plastic solids. General theorems. Application to torsion and plane problems of plasticity. Mr. Bogy (W)

287. Impact. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 185. Collision of solid objects and discontinuous processes produced in elastic, plastic, and visco-elastic media by impulsive or impact loading. Penetration, perforation, flattening, and crushing of structures. Design of materials to impact. Application to spheres, rods, bars, beams, plates and semi-infinite solids. Mr. Goldsmith (W)

288. Theory of Elastic Stability. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 282A. General concept of stability of elastic systems under load and with geometric nonlinearity. Stiffening of thin-walled columns, buckling of elbows, plate girders, and other geometrically nonlinear systems. The influence of geometric nonlinearity on the load-carrying capacity of systems. Mr. Bissell (F)

290A. Topics in Nonlinear Oscillations. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 277. Oscillations in nonlinear systems having many degrees of freedom. The geometrical methods of dynamics applied to nonlinear vibrations. Analysis of free and forced oscillations in many player games. Necessary and sufficient conditions for Nash equilibrium strategies, including saddle points of two-person zero-sum games, and Pareto-optimal solutions for systems governed by ordinary differential equations. Applications to design, economics, biology, etc. Mr. Hsu (Sp)

290B. Topics in Nonlinear Continuum Mechanics. (3) Three hours of lecture per week. Prerequisite: course 285. Special topics on recent developments in continuum mechanics, e.g., a general theory of oriented (or directed) media, non-linear theory of diffusion, theory of electrical and magnetic continuum. Mr. Pickus (Sp)

290C. Relativistic Mechanics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: courses 172 and 185. Critical examination of principles of relativity with an emphasis on the conceptual foundation of the special theory of relativity and the treatment of time dilation and length contraction. Mr. Leifer, Pearson, Hill and others. Mr. Hsu (Sp)

290D. Powder Metallurgy. (2 or 3) Two to three hours of lecture per week. A study of the consolidation of powders into useful materials and products from both the technical and scientific viewpoints. Mr. Pickus (Sp)

290E. Fluid Dynamics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 277. Qualitative development of modern understanding of fluid mechanics. Applications to flows in pipes and channels, aerodynamics, and geophysical fluid dynamics. Mr. Whitehead, Hamada-Levy and Civita. Study basic in bridging micromechanics and macromechanics, also to ergodic theory, statistical thermodynamics, and many other dynamic processes, information handling, control and automation. The problem of three bodies examined in depth. Mr. Pickus (Sp)

290F. Variational Principles of Fluid Dynamics and Thermodynamics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 175. Development of the modern theory of the irreversible processes in gases and liquids. The development of the modern theory of the irreversible processes in gases and liquids. Mr. Whitaker, Hadamard and Levi-Civita. Study basic in bridging micromechanics and macromechanics, also to ergodic theory, statistical thermodynamics, and many other dynamic processes, information handling, control and automation. The problem of three bodies examined in depth. Mr. Pickus (Sp)

291. I. Topics in Linear Continuum Theorists. (3) Three hours of lecture per week. Prerequisite: course 282A. Selected topics from recent developments in linear continuum theories, for example, linear elasticity and linear viscoelasticity and others which bear on modern developments in mechanical behavior. Topic may change from year to year. (Sp)

292. II. Turbulence. (3) Three hours of lecture per week. Prerequisite: course 262A. An introduction to turbulence for graduate students. Emphasis on the development of modern turbulence theory. Mr. F. W. Rosati (F)


290 O. Boiling Heat Transfer. (3) Three hours of lecture per week. Prerequisite: course 151 and Engineering 2304. Study of two phase flow bubble growth models and analysis methods in boilers. Heat transfer analogs. Research problems. Mr. Seban (W)

290Q. Numerical Methods for Heat and Mass Transfer Calculations. (3) Three hours of lecture per week. Prerequisite: courses 151 and 152. Study of numerical methods for boundary layer calculation, for boundary layer flows such as layers on surfaces, plume rise, and layer flows derived from radiative, rotation, and chemical reaction. Some consideration of the numerical calculation of eddy problems. Mr. Austlander (W)

290R. Engineering Applications of On-Line Mini-Computers. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: graduate standing. Small computers, operating in real time, have some important components in many engineering systems. The purpose of this course is to build competence in the engineering use of such systems through lectures stressing mini-computer structure, programming and input/output operations, and through laboratory work with mini-computer systems. Mr. Auslander (W)

290S. Advanced Natural Gas Engineering. (3) Three hours of lecture 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 transmission lines, and storage of natural gas. Mr. Somerton (Sp)

290V. Advanced Topics in Mechanics Design. (4) Three hours of lecture per week. Prerequisite: ME 251 or ME 252. Computer-aided design of such systems as aircraft wings and plane and spatial mechanisms. Differential geometry of spatial motion. Curve theory. Dynamics of spatial mechanisms. Numerical methods for spatial mechanisms. Mr. Sadegh (W)

290W. Group Studies, Seminars, or Group Research. (1-8) Advanced studies 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, or group research on complete problems for analysis and experimentation. The Staff (F, W, Sp)

290X. Individual Study or Research. (1-12) Prerequisite: graduate standing in engineering, physics or mathematics. Intensive study of advanced problems in mechanical engineering. To be graded on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

290Y. Individual Study for Doctoral Students. (1-8) Prerequisite: consent of major field advisor, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required prior to the doctorate (and other doctoral degrees). May not be used for credit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

295. Advanced Ship Design. (3) One 1-hour lecture per week. Prerequisite: course 152A. Design and performance of ship structures using rational methods. Predictions of force and moment systems applied to the structure; distributions of forces and moments on structures; displacements; and interpretation of large-scale experimental motion data. Mr. Pauling (sequence beginning F)

296. Advanced Ship Design. (3) One 1-hour lecture per week. Prerequisite: course 242A-242B-242C. Computer methods for the design of ships. Mr. Paulling (sequence beginning F)

297. Advanced Ship Design. (3) One 1-hour lecture per week. Prerequisite: course 242A-242B-242C. Computer methods for the design of ships. Mr. Paulling (sequence beginning F)

298. Advanced Ship Design. (3) One 1-hour lecture per week. Prerequisite: course 242A-242B-242C. Computer methods for the design of ships. Mr. Paulling (sequence beginning F)

299. Advanced Ship Design. (3) One 1-hour lecture per week. Prerequisite: course 242A-242B-242C. Computer methods for the design of ships. Mr. Paulling (sequence beginning F)

300. Advanced Ship Design. (3) One 1-hour lecture per week. Prerequisite: course 242A-242B-242C. Computer methods for the design of ships. Mr. Paulling (sequence beginning F)

301. Advanced Ship Design. (3) One 1-hour lecture per week. Prerequisite: course 242A-242B-242C. Computer methods for the design of ships. Mr. Paulling (sequence beginning F)
in waves, steering and control of surface ships and submarines, behavior of moored and towed bodies. Mr. Pauling (Sp)

290D. Analysis of Ship Systems. (3) Three hours of lecture per week. Prerequisite: course 154A–154B (or consent of instructor). Introduction to ship systems analysis including cost, reliability, and optimization. Applications of techniques to problems of ship routing, construction cost, fleet selection, and steering problems. 

Mr. Webster (Sp)

290E. Vehicles for Ocean Engineering. (3) Three hours of lecture per week. Prerequisite: graduate standing in Engineering. Design and analysis of vehicles for performing engineering functions in the ocean. Topics include environment, deep ocean tasks, vehicle types, design requirements, motion stabilization, structural problems. Mr. Pauling (Sp)

288. Group Studies, Seminars, and Group Research. (1–8) Advanced study in various subjects through small groups on topics to be selected each year. Informal group studies of special problems, group participation in comprehensive design problems, or group research on complete problems for analysis and experimentation. 

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

299. Individual Research. (1–12) Investigation of selected advanced naval architecture subjects. To be graded on a satisfactory/unsatisfactory basis. 

The Staff (Mr. Wehausen 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. May not be used for unit or residence requirements for a master’s degree. Must be taken on a satisfactory/unsatisfactory basis. 

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

Nuclear Engineering

UPPER DIVISION COURSES


Mr. Prussin (Sp)

101. Nuclear Reactions and Radiation. (4) Four hours of lecture and one hour of discussion per week. Prerequisite: Physics 25E. Nuclear properties, elements of nuclear structure, radioactivity, interactions of radiation in matter, neutron reactions, fission, fusion, practical consequences and applications. Mr. Prussin (F)

102. Nuclear Instrumentation Laboratory. (3) One hour of lecture and four hours of laboratory per week. Prerequisites: courses 102 and 150A–150B. Calibration of control rods, pre-operational checkout, reactor pulsing, neutron noise measurements, and power determination; dosimeter calibration, characteristics of compensated ion chambers, flux shape and relaxation length in an expanding sphere. Mr. Prussin (F, W)

103. Experimental Neutronics Laboratory. (2) Hours lecture laboratory per week. Prerequisites: courses 102 and 150A–150B. Calibration of radiation detectors, dosimeter units and measurement, somatic and genetic effects of radiation on man, regulation of occupational exposure, calculation of absorbed and ingested dose, atmospheric dispersion of radioactivity, attenuation of radiation in shields. Mr. Kaplan (W)

158. Group Study for Advanced Undergraduates. (1–8) Prerequisite: upper division standing. Group studies of selected topics. The Staff (F)

198. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations listed on page 36. For students who wish to undertake a program of independent inquiry initiated jointly by the student and a professor. 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. The Staff (F, W, Sp)

122. Thermal and Irradiation Behavior of Crystalline Solids. (4) Four hours of lecture per week. Prerequisites: Engineering 45 and upper division course in thermodynamics. Fundamental aspects of the thermal, structural, and irradiation properties of materials, statistical thermodynamics, thermal and cohesive properties of solids, chemical equilibrium and atomic mobility, collision dynamics and energy transfer; the collision cascade; effect of fast neutrons; computer simulation. Mr. Olander (F)

150A–150B. Introduction to Nuclear Reactor Theory. (4–4) Three hours of lecture and 1 hour of discussion per week. Prerequisites: Mathematics 51C, and either course 101 or 103. Upper division course in nuclear physics. Neutron interactions, nuclear fission and chain reaction systems in thermal and fast nuclear reactors. Diffusion and slowing down of neutrons. Criticality calculations. Nuclear reactor dynamics and reactivity feedbacks. Fuel cycles and fuel management. Production of radioisotopes in nuclear reactors. Mr. Pigford (Sp)

160A–160B. Nuclear Power Engineering. (4–4) Three hours of lecture and one hour of discussion per week. Prerequisites: Mechanical Engineering 105B or a junior-level course in thermodynamics; Mechanical Engineering 106A or Civil Engineering 165A or a junior-level course in fluid mechanics. Mechanical Engineering 111 is also recommended. Computer programs for nuclear power reactor analysis in the design of nuclear fission power reactors and systems. Emphasizes thermal and structural design of reactor cores and plant components. Energy conversion. Safety evaluation, design of engineered safeguards. Introduction to economics of nuclear power. Mr. Chambré (F, W)

240. Biological Effects of Radiation and Radiation Safety. (4) Four hours of lecture per week. Prerequisite: consent of instructor. Safety criteria. Effects of charged particle and gamma radiation on cells and cell growth. Mr. Gossman (W, Sp)

250A–250B. Nuclear Reactor Theory. (4–4) Four hours of lecture per week. Prerequisite: Engineering 117, course 101. Neutron transport theory; diffusion theory; slowing down of neutrons; thermal spectra; multigroup theory; perturbation theory and adjoint functions; heterogeneous reactors; reactivity coefficients; reactor kinetics; fuel depletion and cycling. Mr. Wallace (F)


256A–256B. Advanced Reactor Theory and Transport Theory. (3–3) Three hours of lecture per week. Prerequisite: course 250A–250B; Mathematics 220A–220B recommended. The theory of the distribution of neutrons in space, direction, and energy. Formulations of neutron Boltzmann equation, exact solutions of neutron transport equations in various geometries and approximations. Mr. Amster (Sp)

NOTE: For key to symbols, see page 36.
Environmental Design

LOWER DIVISION COURSES

3. Introduction to Environmental Design. (8) Two 1-1/2 hour lectures per week.
Prerequisite: course 152 and consent of instructor. Problems in design and applied problems of graphic communication.

4. Man and Environment. (3) Five 1-1/2 hour lectures per week. Prerequisite: course 152.

5. Energy, Resource and Environmental Design. (8) Two 1-1/2 hour lectures per week.
Prerequisite: course 152 and consent of instructor. An introduction and overview of environmental design for the applications in environmental design, including its relation to other disciplines.

6. Graphical Communication Media and Techniques for Environmental Design. (8) Two 1-1/2 hour lectures per week. Prerequisite: course 152.

7. History of the Environment. (3) Three 1-hour lectures per week, and six 1-hour laboratory per week.
Prerequisite: upper division course in history.

UPPER DIVISION COURSES

169A. History of the Man-Made Environment of the United States, 1900-1970. (4) Four hours of lecture and discussion per week.
Prerequisite: upper division standing and consent of instructor.

169B. History of the Man-Made Environment of the United States, 1900-1970. (4) Four hours of lecture and discussion per week.
Prerequisite: E.D. 169A or Geography 152 and consent of instructor. Enrollment limited. Evolution of the American landscape 1800-1970, with emphasis on American landscape 1800-1970, with emphasis on American landscape?

170. Architecture and Urbanism of Ancient and the Middle Ages. (4) Three hours of lecture and one 1-hour discussion per week.
Prerequisite: upper division standing and consent of instructor. Ancient and medieval archeological study in its social and historical context. A selective survey of major building types and a few specific sites and monuments treated in detail.

171. Architecture and Urbanism from the Renaissance to the Modern Period. (3) Three hours of lecture and one 1-hour discussion per week.
Prerequisite: upper division standing and consent of instructor. Ancient and medieval archeological study in its social and historical context. A selective survey of major building types and a few specific sites and monuments treated in detail.

172. History of the Environment. (4) 1-1/2 hour lectures per week. Prerequisite: course 152.

173. Great Cities. (3) Five 1-1/2 hour lectures per week.
Prerequisite: courses 170 and 171.

College of Environmental Design

Office of the Dean, 230 Wurster Hall
Dean: Richard Bender, M.Arch.

Assistant Deans:
Gary R. Brown, M.Arch.
Russell Ellis, Jr. Ph.D.

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 College are designed to provide immediately following the listing of Environmental Design courses.

The College of Environmental Design offers a wide range of courses covering the fundamentals of design and the practical applications of environmental design. It includes courses in environmental design, urban design, urban planning, and environmental planning.

The College of Environmental Design offers undergraduate and graduate degrees in environmental design and planning. Undergraduate programs lead to the Bachelor of Environmental Design (BED) degree, while graduate programs lead to the Master of Environmental Design (M.E.D.) degree.

The College of Environmental Design also offers a number of interdisciplinary programs, including Environmental Design, Urban Planning, and Environmental Studies.

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or consent of the 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.

**177. Survey of Urban Design.** (4) Two 1 1/2-hour lectures 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.

**178. The Architecture of the Far East.** (4) Two 1 1/2-hour lectures per week. Prerequisite: ED 170 or consent of instructor. Selected topics in the history of Far Eastern architecture. Incudes the building and landscape traditions of Japan, China, India, or Southeast Asia. Emphasis is on design as a product of environment, task, and values, and the cultural constraints. Course may be repeated for credit.

Mr. Treib (W)

**191A. Roles for Professionals in Community Self-Help Projects.** (4) One 2-hour and one 1-hour lecture per week. Exploration of self-help grassroots activities in housing and community development, documenting the significance of decentralized, user-initiated projects. Intended to sensitize design professionals to special needs and potentials of self-help endeavors, suggesting positive technical assistance models.

Mr. Terner (F)

**Architecture**

**Department Office, 232 Wurster Hall**

**Professors:**
- Richard Bender, M.Arch.
- Joseph Esherick, B.Arch.
- Norma D. Evenson, Ph.D.
- Sanford Hirshen,* B.Arch.
- Roger Montgomery, M.Arch.
- Jesse Relchek
- Korst W.J. Ritte P
- Galen Cranz,* Ph.D.
- Claude Stellar, M.Arch.
- Michael A. Goodman, M.A.
- Raymond W. Jeans, M.A.
- James L. Prestini, B.S.
- George P. Simonds, M.A.
- Eduardo M. Martinez, M.Arch.
- Stephen O. Tobriner, Ph.D.
- Ms. Ishikawa (F, W, Sp)

**Assistant Professors:**
- Gary R. Brown, M.Arch.
- Kenneth H. Carr, B.Arch.
- B. W. Russell Ellis, Jr., Ph.D.
- Jena-Pierre Petran, Dipl. Arch.
- EPUL

**Associate Professor:**
- Sara S. Ishikawa,' B.Arch.

**Architecture**

**Undergraduate Programs**

The four-year program leading to the degree of Bachelor of Arts in Architecture requires the completion of 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.

Master of Architecture.

The professional degree, Master of Architecture, will be awarded to students who successfully complete a program of studies of from one to three years duration depending upon previous education and experience. The department makes no restriction as to undergraduate preparation. However, the length of the three-year period, the number of required quarter course units, and the specific list of required courses will vary depending upon under-graduate 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 with undergraduate degrees in Architecture or Environmental Design with a major in architecture may receive 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 first registers for graduate study in the department. Persons holding the five-year, professional undergraduate degree, Bachelor of Architecture from an accredited school, or completing five-year degrees from accredited architecture and technical institutions, 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 in Architecture**

The Doctor of Philosophy in Architecture program is open to exceptionally qualified persons who present outstanding academic records along with clear evidence of commitment and ability in architectural research. Emphasis is on Graduate Division requirements with respect to admission, the language requirement, candidacy, and the dissertation under Plan A (see Index). Applicants must hold a bachel-oral or master's degree, but the department makes no restriction as to the discipline of their undergraduate preparation. Additional information is available from the departmental graduate secretary.

**Joint Program with the Department of City and Regional Planning.** The two departments offer a joint program for exceptionally qualified students who hold the five-year Bachelor of Architecture degree, or its equivalent. After a minimum of three quarters and 36 units in the Department of Architecture, and four quarters and 48 units in the Department of City and Regional Planning, the candidate may receive both the M.Arch. and the M.C.P. degrees. Applicants should seek admission to the Department of Architecture and indicate on their application that they wish to be con-sidered for the Joint Program.

**Study Area A—Design Problems**

**101. Social and Behavioral Considerations as Architectural Design Determinants.** (1) One 1-hour lecture and two 1-hour laboratory per week. Prerequisite: Environmental Design courses 3, 4, and 6. Origin, rationale, and implementation of architectural design problems. Investigation of behavioral, social and cultural considerations as form determinants. Study of functional and circulation patterns, hierarchy and choice in architectural spaces through design exercises. Case studies and seminars.

Mr. Lúchez (W, Sp)

**102A. Structure and Production as Architectural Design Determinants.** (3) One 1-hour lecture, one 2-hour and two 3-hour laboratories per week. Prerequisite: course 101. Introduction to the design of architectural systems by loading bearing systems, structural mechanics, standardization of parts, materials, handling, and assembly.

Mr. Lúchez (W, Sp)

**102B. The Physical Environment as an Architectural Design Determinant.** (3) One 1-hour lecture, one 2-hour and two 3-hour laboratories per week. Prerequisite: completion of Architectural Design Determinant 102A and 102B. An introduction to aesthetics and style as design determinants will also be included.

Mr. Brown (W, Sp)

**102C—102D—102E. Synthesis of Determinants of Architectural Design.** (5—5—5) One 1-hour lecture, one 2-hour and two 3-hour laboratories per week. Prerequisite: Architectural Design Determinants 102A and 102B. An introduction to aesthetics and style as design determinants will also be included.

Mr. Brown (W, Sp)

**103A. Introduction to Urban Design.** (3) Three 1-hour lectures and one 1/2-hour discussion per week. Prerequisite: upper division standing. Concepts, methods, context of urban design including professional and other work experience. Topics include neighborhood design, new towns, central development, city scale design and planning principles. Problem sets, readings, and exercises. Field trips.

Mr. Anthony (W)

**103B. Laboratory Problems in Urban Design.** (5) Two 4-hour laboratories per week. Prerequisite: course 103A or consent of instructor. Application of urban design concepts and methods introduced in 103A, with a professional perspective including surveys, analysis, graphic communication, spatial composition, environmental quality. Topics selected from real situations dealt with through field-trips, program development, and design.

Ms. Ishikawa (F, W, Sp)

**104A—104B—104C. Community Design.** (4—4—4) Three 1-hour lectures per week. Prerequisite: consent of instructor. Projects dealing with community issues: the social, political, and technological determinants, problems formulation, design, and implementation.

Ms. Ishikawa (F, W, Sp)

**105A—105B. Theory and Application in Architectural Design.** (5—5) Four hours of lecture and thirteen hours of laboratory per week. 105B: four hours of lecture and twenty-six hours of laboratory per week. Prerequisite: consent of instructor. A course providing a mechanism for the physical construction and testing of theoretical solutions to architectural design problems. Emphasis will be on the construction of theoretical models and the systematic evaluation of their performance.

**200A—200B—200C. Graduate Introduction to the Field.** (2—2—2) Three 2-hour laboratory-seminars per week. Prerequisite: graduate standing. An integrated course including introductory study of social, technological, and institutional factors rele-vant to architectural design, study and practice in methodologies of communication and architectural de-sign, and study of role of the architect and the profes-sion. Field trips.

Mr. Anthony (W, Sp)

**Course Series: Design Group I—Architectural Design.** Two 4-hour laboratory-seminars per week. Prerequisite: graduate standing, completion of two years of graduate design laboratory courses, or consent of instructor. Graduate introduction to the field, including an individual reading program and short design project exercises.

Mr. Anthony (W, Sp)

**201. Housing Facilities.** (4)

**202. Educational Facilities.** (4)

**203. Commercial Facilities.** (4)

**204. Civic Facilities.** (4)

**205. Multi-Level Real Estate.** (4)

**206A. Introduction to Urban Design.** (4)

**208. Topics in Urban Design.** Two 2-hour lectures per week. Prerequisite: graduate standing, completion of two years of graduate design laboratory courses, or consent of instructor. Graduate introduction to the field, including an individual reading program and short design project exercises.

Mr. Anthony (W, Sp)

**207. Special problems.** (4) Can be repeated for credit.

Mr. Anthony (W, Sp)

**208. Combined Course.** (4) Two 4-hour laboratories per week. Prerequisite: three courses from Design Group I series. Architectural Design Determinant 102A, Architecture 211 and 212 (or equivalent), and Civil Engineering 126C (or equivalent). Course 208 must be taken concurrently. (4) 212 and 222. Recommended as last course of Design Options Group I series.

Mr. Lúchez (W, Sp)

**209. Environmental Design.** (4)

**Course Series: Design Group II—Architectural Design and Research.** Two 4-hour laboratory-seminars per week. Prerequisite: enrollment in Option I or completion of required courses. D.E.R. Group I and completion of all required courses and 6 units of professional electives in the particular study area of the course offering. Design and research in special study
Study Area C—Structure and Production

120. Structural Systems for Buildings. (5) Two 1/2-hour lectures and one 1-hour discussion, laboratory, or design seminar per week. Prerequisite: ECE 125, 126, upper division standing or consent of instructor. Introduction to the study of structure. Structural constraints and the forces which act on buildings. (F, Sp)

121. Principles of Construction. (4) Two 1/2-hour lectures per week. Prerequisite: Architecture 120 or consent of instructor. Study of the building process: systems, their requirements, construction, and interaction. (W)

122. Building Materials. (4) One 4-hour laboratory per week. Provides a study of the properties and application of building materials. Specification sources, presentation and information retrieval. (W)

129. Undergraduate Seminars in Structure and Production, Two 1-1/2-hour seminars per week. Prerequisite: Course 121 or consent of instructor. 129B. Undergraduate seminars exploring special topics in structure and production. (Sp)

128. Introduction to Building Production. (4) Two 1-hour seminars per week. Prerequisite: course 121 or consent of instructor. Integration of environmental phenomena, needs, control, and countermeasures. Consideration of digital computers in design. Survey of existing literature and current advances. Methods of scientific research and the use of computerized information. (Sp)

127. Seminar in Architectural Research. (4) Two 1-hour seminars per week. Prerequisite: consent of instructor. Advanced study in architectural research. (F, Sp)

Study Area D—Design Theories and Methods

130. Design Theories and Methods. (5) Two 1/2-hour lectures and one 1-hour seminar per week. Exploration of the relationship between theory and practice. Emphasis on critical analysis. (F)

132. Seminar in Architectural Research. (4) Two 1-hour seminars per week. Prerequisite: consent of instructor. Advanced study in architectural research. (F, Sp)

135. Advanced Graphics for Architecture. (4) One 1-hour lecture and two 3-hour laboratories per week. Prerequisite: Environmental Design 8. Advanced practice of computer graphic design. Emphasis on graphic communication of ideas. (F)

136. Theory and Methods of Graphic Communication in Architecture. (4) Two 1-1/2-hour lectures and two 2-hour laboratories per week. Prerequisite: upper division standing or consent of instructor. Theses and methods of organizing two-dimensional visual information. Emphasis on visual communication and its relationship to architectural space, volume, and mass. Studio practice in methods of graphic presentation. Graduate seminar in computer graphics. (W)

137. Watercolor Painting in Architecture. (4) One 1-hour lecture and two 3-hour laboratories per week. Prerequisite: Architectural Science 136 and upper division standing, or consent of instructor. Theory of color, color composition, and the use of color in interior design. Design of color concepts. (F, Sp)

230. Advanced Design Methods. (4) Two 1-1/2-hour lectures and two 2-hour laboratories per week. Prerequisite: course 130 or consent of instructor. Intensive study of a particular area of design methodology. Theoretical explorations and applications to problems of environmental design. (W)

232. Seminar in Architectural Research. (4) Two 1-hour seminars per week. Prerequisite: graduate standing. Advanced studies in architectural theory and research in environmental design. Every participant develops and carries out a small-scale research project. (F, Sp)

233A. Methods of Quantitative Analysis in Design I: Cost Feasibility Analysis. (4) Two 1-hour seminars per week. Prerequisite: graduate standing, Computer Science 101 or equivalent. Course 233A is recommended. Workshop on operational methods for analysis of large-scale architectural and urban design projects. Emphasis on practical application of theoretical concepts to real-life projects. Topics include engineering economy, taxation, and financial analysis. (W)

233B. Methods of Quantitative Analysis in Design II: Simulation. (4) Two 1-hour seminars per week. Prerequisite: graduate standing. Computer Science 101 or equivalent. Course 233A is recommended. Workshop on operational methods for analysis of large-scale architectural and urban design projects. Emphasis on practical application of theoretical concepts to real-life projects. Topics include engineering economy, taxation, and financial analysis. (F)

233C. Methods of Quantitative Analysis in Design III: Project Planning and Control. (4) Two 1-hour seminars per week. Prerequisite: course 233B. Workshop on operational methods for analysis of large-scale architectural and urban design projects. Emphasis on practical application of theoretical concepts to real-life projects. Topics include engineering economy, taxation, and financial analysis. (W)

237. Architectural Research Methods and Documentation. (4) Two 1-hour seminars per week. Prerequisite: Architectural Science 101 or equivalent, and consent of instructor. Research in architectural theory and practice. Topics include research methodology, historical research and documentation, and research in theoretical and practical areas. (F)

239. Seminar in Design Theories and Methods. (4) Two 1-hour seminars per week. Prerequisite: consent of instructor. Advanced study in architectural research. (W)

Study Area E—Social and Behavioral Factors in Architectural and Urban Design

140. Social and Cultural Factors in Architectural and Urban Design. (3) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: Architectural Science 6. Advanced study in social, cultural, and behavioral factors associated with architectural and urban design. Emphasis on the development of design strategies. (W)

141. Social and Behavioral Factors in Architectural and Urban Design. (3) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: Architectural Science 6. Advanced study in social, cultural, and behavioral factors associated with architectural and urban design. Emphasis on the development of design strategies. (F, Sp)

142. Seminar in Architectural Research. (4) Two 1-hour seminars per week. Prerequisite: consent of instructor. Advanced study in architectural research. (F, Sp)

143. Seminar in Architectural Research. (4) Two 1-hour seminars per week. Prerequisite: consent of instructor. Advanced study in architectural research. (F, Sp)
141. Form Determinants of the Dwelling. (3) Three 1-hour lectures per week. Interaction of technological and environmental 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: upper division standing or consent of the instructor. Introduction to study of property investment and development process and their relation to the real estate finance on development decisions; economic analysis and decision making. Case method is used to examine various types of development projects.

166. Technical Graphic Communications. (4) Two 1-hour lectures and two 2-hour laboratories per week. Prerequisite: upper division standing or consent of the instructor. Development and theory of technical graphic communication as an architectural language related to drawings and construction documents. Laboratory projects in graphic forms as an expression of architectural concepts, architectural detailing, and materials.

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 relationship 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 architecture: 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 the instructor. Relation of architectural research to the discipline of architecture. Team investigation of topics relating to the theory and practice of architecture.

243. A Sociology of Space. (4) Two 1 1/2-hour seminars per week. Prerequisite: graduate standing or consent of instructor. Consideration of the role played by social and economic forces in the design, allocation, and utilization of space.

244. Architectural and Environmental Programming and Evaluation. (4) One 1 1/2-hour lecture and one 1/2-hour seminar per week. Prerequisite: courses 130, 140 or 240 and/or consent of instructor. Formulation of pre-design decisions affecting architectural forms. Topics include the nature of institutional issues of 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 Design. (4) Two 1 1/2-hour seminars per week. Prerequisite: consent of instructor based on the interview and study of group relations and organizational processes in the design of human and non-human environments. Participants will study and experience their own group processes and apply what is learned to a variety of environmental design situations and problems.

249. Seminar, Social and Behavioral Factors in Architectural and Urban Design. (4) Two 1 1/2-hour seminars per week. Prerequisite: course 140 or consent of the instructor. Advanced study in social and economic factors in architectural and urban design.

249A. Social and Cultural Factors. Mr. Lerup, Mr. Reichek (F), Ms. Lindheim (Sp)

249B. Behavioral Factors. (W)

249C. Technological Factors. (W)

263. Land Development and Real Estate Economics Seminar. (4) Three hours of seminar per week. Prerequisite: course 162 or consent of instructor. Detailed examination of the roles of various decision-makers in the real estate development process. Advanced study of the implications of market research and financial planning techniques for architectural administration. Investigation of opportunities resulting from forces stimulating changes in traditional relationships.

277B. Architectural Preservation and Conservation: Implementation. (4) One 2-hour seminar per week. Prerequisite: course 267A, or consent of instructor. Survey of existing laws and economic factors promoting or hindering architectural preservation, or conservation of buildings, neighborhoods, or districts. Class members will be expected to work on a group project involving preservation or rehabilitation.

268. Seminar in Architectural Administration. Two 1 1/2-hour seminars per week. Prerequisite: course 160 or consent of the instructor.

269A. Construction Law. (4)

269B. Architectural Practice. (4) (F)

269C. Architectural Administration. (4) Mr. Friedman (Sp)

269D. Specifications. (4) Mr. Lagorio (W)

Study Area G—History of the Environment

See Environmental Design 169 through 177.

2173. American Architecture. (4) Two 1 1/2-hour lectures per week and other meetings as scheduled. Prerequisite: Environmental Design 170 and 171 or consent of the instructor. The architecture of America from Colonial times to the present.

2174. Modern Architecture. (4) Two 1 1/2-hour lectures and one 1/2-hour discussion per week. Prerequisite: Environmental Design 170 and 171 or consent of the instructor. Development of architecture in Europe and the Americas, 1900-1950.

176. The Art of Islam. (4) Two 1 1/2-hour lectures/discussions per week. Prerequisite: Environmental Design 170 and 171 or consent of the instructor. Selected monuments in Muslim lands from the seventh century to the present with emphasis on the early period and on developments in the Near East. Independent student research under faculty guidance.

176A. Baroque Architecture and Urbanism. (4) Two 1 1/2-hour seminars per week. Prerequisite: Environmental Design 170 and 171 or consent of the instructor. A study of architecture and urban design in Europe and the Americas, 1600-1750.

176B. The Architect and the Profession. (4) Formerly 179. Two 1 1/2-hour lectures per week. Prerequisite: Environmental Design 170 and 171. A history of the architectural profession dealing with the education and training of the architect through the ages, the structure and social standing of the profession and the process of architectural practice. Mr. Kostof (W)

271. History of Architecture Theory. (4) Two 1 1/2-hour seminars per week. Prerequisite: Environmental Design 170 and 171. Examination of theories of architecture from Vitruvius to present.

272. Seminar in the Architecture of Antiquity. (4) Two 1 1/2-hour seminars. Prerequisite: Environmental Design 170 and 171, plus one course from Environmental Design 173 to 178 or consent of instructor. Special problems selected from the history of past and recent architecture in the United States, and especially in the physical environment of the West Coast.

273. Seminar in Modern Architecture. (4) Two 1 1/2-hour seminars per week. Prerequisite: Environmental Design 170 and 171 plus Environmental Design 174 or consent of instructor. Consideration in depth of selected aspects of modern architecture.

277. Seminar in History of Urban Design. (4) Two 1 1/2-hour seminars per week and other meetings to be arranged. Prerequisite: consent of instructor. Consideration of specific methods of research and of the history of urban design. Case method is used to study and research.

278A–278B. Methods of Historical Research and Criticism in Architecture. (4–4) One 3-hour seminar per week and other meetings to be arranged. Prerequisite: consent of instructor. Consideration of basic tools and methods of research in the history of the environment, the urbanization of the field since 1900, and the relevance of allied disciplines like archaeology, preservation and restoration, anthropology, etc. Mr. Kostof (F), Mr. Tobriner (W)

279. Seminar in Technology and Architecture. (4) Two 1 1/2-hour seminars per week. Prerequisite: Environmental Design 170 and 171 or consent of instructor. A study of selected aspects of the influence of technology on architecture and urbanism during given historical periods.

281A. Problems in Baroque Architecture and Urbanism. (4) One 3-hour seminar per week. Prerequisite: consent of instructor. Consideration of specific problems of research and of the history of urban design. Analysis of 17th and 18th century movements and writings about them. Class will attempt to expose students to diverse influences, including reading and Individual research. To be offered 1977/78 only.

Special Studies

187. Field Study in Architecture. (1–5) Prerequisite: consent of instructor. Supervised experience relevant to specific aspects of architecture in off-campus organizations. Regular individual conferences with faculty sponsor and written reports required.

198. Special Group Study. (1–5) To be arranged. Studies developed to meet needs. No more than 5 units are allowed in any one quarter.

199. Supervised Independent Study and Research. (1–5) Enrollment is restricted as regulated by the student's background in areas related to the quarter's study. To be offered 1977/78 only.

200. Individual Study and Research for Master's and Doctoral Students. (1–9) Independent study and research under the supervision of a faculty adviser and designed to reinforce the student's background in an area of special interest to the student. To be offered each quarter. Candidates for the master's program are limited to 4 units each quarter.

401. Field Study. (3–9) Thirty-six hours of field work per year. Prerequisite: course 160, enrollment in Option 1 or 2, or 2nd or 3rd year of Option 3. Undergraduate seniors pending invitation with instructor. All students

NOTE: For key to symbols, see page 36.
City and Regional Planning

Department Office, 228 Wurster Hall

Professors: Donald Appleyard, M.C.P., A.A.S.P.; Leonard D. Ruiz, A.B., M.D.; Donald L. Price, M.C.P., A.A.S.P.; I. Michael Heyman, B.A., M.c.P.; Allan B. Jacobs, M.C.P.; Richard L. Meier, Ph.D.; Roger Montgomery, Arch.; Melvin W. Webber, M.A.; Michael Tetz, B.A.; Judith T. Kent, J. M.C.P.; Corwin R. Mocine, B.S.; Frederick C. Coleman, Jr., Ph.D.; David E. Dowall, Ph.D.; Michael B. Teltz, B.Ph.D.; Judith I. deNeuMlle, Ph.D.; Leonard J. Duhl, A.B., M.D.; I. Michael Heyman, B.A.; Judith L. Keating, Ph.D.; Mrs. Friedman (F. W. Sp); Mr. Keating (F); Mr. Siderovski (F); Mr. Meier (Sp); Mr. Duhler (W); Mr. Appleyard (W); Mr. Dodson (W); Mr. Sidenor (F)

Assistant Professors: Stephen S. Cohen, Ph.D.; Horst Rittel; Frederick C. Cottrogno, Ph.D.; Judith L. Keating; Thomas G. Dickert, M.L.A.; Roger Montgomery; Corwin R. Mocine, B.S.; I. Michael Heyman, B.A.; Richard B. Dodson, M.A.; Judith L. Keating

Associate Professors: Judith I. deNeuMlle, Ph.D.; Judith L. Keating; Stephen S. Cohen, Ph.D.; Mr. Duhler (W); Richard B. Dodson, M.A.

(Acting)

The planning of cities is as old as urban civilization, but the present-day planning profession has emerged in response to the rapid growth, changing character, and critical problems of twentieth-century urban development. Planning has become an accepted function of government, both local and central, and is practiced with particular programs while planning techniques are likewise employed by large-scale private developers.

Theorists and researchers in other disciplines have become increasingly interested in urban problems, and their work, often in partnership with planners, is contributing to greater knowledge and more sophisticated methods in planning practice. City and regional planning is a rapidly expanding field, with some 12,000 professionals in the United States, most of them members of the American Institute of Planners.

Characteristically, city, county, and metropolitan regional planning agencies are responsible for recommending guidelines for channeling the urban physical development of their respective jurisdictions. City planners are also relied upon in other types of public agencies—including local, state and federal agencies dealing with highways, transportation, housing, urban renewal, public works, economic development, human and natural 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 in professional education in the field of city and regional planning leading to the degree, Master of City Planning. 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 Design 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 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 undergraduates and graduate students in related fields. For more detailed information about these courses, consult the Announcement of the College of Environmental Design or contact 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 for the current academic year.

107. The Urban Planning Process. (4) Four hours of lecture and two hours of discussion per week. Prerequisite: general background in urban planning. An introduction to the study of urban planning, through a series of problems designed especially for this purpose. Lectures and readings supplement and extend the concepts introduced in the course. Weekly problems and final examination required. Professor: Mr. Dowall (W). Mr. Montgomerv (W)

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 1820. Emphasis on social, economic, and political problems; major concepts and processes used by city planners and local governments to improve the urban environment. Professor: Mr. Jacobs (Sp)

111. Introduction to Housing. (5) Three 1-hour lectures or discussion sections per week; tutorial sessions; two-half day field trips. Prerequisite: open to majors in all fields. The housing problem and government housing policy especially in the United States, selected aspects of design and planning, critical current issues and the future of housing. Professor: Mr. Keating (F)

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 societal crises. Thus, nature and criticism of the planning idea, appropriateness of planning, sources of legitimacy and for justification of planning, styles of planning, and future directions of the planning idea are examined. Professor: Mr. Keating (F)

113. Urbanization and Community. (4) Three hours of lectures/meetings per week. Prerequisite: CP 110 or permission of instructor. The process of urbanization and its social consequences. The search for identity and expression of the new urban and community organizing in the contemporary large American city. Professor: Mr. Keating (F)

112. The Black Ghetto in Urban Structure. (4) Three 1 1/2-hour lectures per week. Prerequisite: consent of instructor. A survey of the process of the ghetto formation in the metropolitan structure, focusing on housing, jobs, and transportation. It will also consider the processes of education, health, business and economic development within their sociocultural patterns, and social, economic, and ideological elements of current thinking on these issues. Professor: Mr. Meier (Sp)

127. Urbanism and the Future of Cities. (3) Three 1-hour lectures/discussions per week. Prerequisite: Field Studies in Urbanism and the Future of Cities or consent of instructor. Recommended accompaniment. Structural change in urban settlements—physical, social, economic, political, cultural, behavioral. Continuation of planning the development of cities and maturing metropolises. Designs for resource-conserving communities. Models for future urban development and land use planning, and feasible futures. Short problems for evaluating progress. Professor: Mr. Meier (Sp)

109. Special Study for Advanced Undergraduates. (1-5) Prerequisite: consent of instructor. Must be taken on a passed or not passed basis. Professor: (W. Sp)

200A-200B. The Evolution of Cities. (4) Three hours of meetings per week. The role of cities in civilization and historical origins of their institutions and physical forms. The structures and functions of cities in developed and developing countries. Professor: (W, Sp)

201. Introduction to City Planning. (4) Two 1 1/2-hour lectures and one 2-hour seminar per week. Origins and evolution of city planning, influences of urban growth, legal and institutional framework, and scientific and technological premises. Major principles of current practice; roles of analysis, projection, public, and private policy. Alternative approaches. Professor: Mr. Wheaton (W)

202. Introduction Studio-Laboratory: Plan Preparation. (8) Formerly course 213. Three projects. One 1-hour meeting per week. An introductory laboratory experience in urban plan preparation, including the use of graphic, typographical techniques, and佩rsonal computer in urban planning and involving individual and collaborative student-group efforts in formulating planning policies and programs for an urban area. Professor: Mr. Sideor (F)

203. Planning and Governmental Decision Making. (4) Two 1 1/2-hour lectures per week. Prerequisites: graduate standing or permission of instructor, or consent of instructor. Origins and evolution of the idea of planning. Values hierarchies, ends-means continuities, consequences of urban form and governmental intervention in self-regulating social systems. Problems of prediction and choice under conditions of uncertainty. Alternative strategies. Professor: Mr. Webber, Mr. Pittel (Sp)

204. Introduction to Planning Analysis. (4) One 1 1/2-hour laboratory per week. Prerequisite: consent of instructor. Survey of techniques and the use of computer in the formulation and interpretation of urban questions. Problems. Professor: Mr. Stone (W)

204C. Planning Theory and Quantitative Method. (6) One 1-hour lecture per week. Prerequisite: consent of the instructor. The use of computer in the formulation and interpretation of urban planning process and the use of quantitative analysis, planning and discussion. Professor: Mr. Dodson (F)

204D. Introduction to Computer Programming. (1) One 1-hour laboratory per week. Beginning computer programming in the FORTRAN computer language, with applications in matrix techniques and urban data processes. Professor: Mr. Dodson (F)

205. Methods of Planning Analysis. (4) Four hours of lecture per week. Prerequisite: courses 204B and 204C or equivalent. The course emphasizes simple methodology applicable to a range of policy problems, rather than advanced techniques. Topics may include index numbers, measurement, time series, migration estimation, population, projection, multiplier models, multivariate analysis, financial analysis, and others. Professor: Mr. Meier (Sp)

206. City Planning Legislation and Governmental Organization. (4) Three Organized discussions per week. Prerequisite: CP 201 or consent of instructor. The role and role of the physical planning agency in municipal and regional government planning, the process of city planning; relationship of local government planning to the physical plan of urban development agencies; significant planning legislation in development and planning in local government. Professor: Mr. Jacobs (W)

207. Economic Analysis for Social Planning. (4) Three hours of meetings per week; tutorial sessions. Concepts, methods and modes of analysis for examining the processes through which changes in economic activities generate changes in social structures and in political systems. Professor: Mr. Cohen (F)

208. Studio: Urban District and Physical System Plans. (5) Twenty hours of studio per week. Preparation of detailed physical development plans for municipal and regional city districts, e.g., a central district, or physical systems; construction and documentation of vital components; development policies, timing, implementing techniques; introduction to survey and analysis techniques for urban districts. Professor: Mr. Appleyard (W)

209. Introduction to Housing, Renewal, and Development. (4) Two 1 1/2-hour lectures per week. Prerequisite: consent of instructor. Structure of the housing industry, functions of local and national agencies, financing of urban development, impacts on the market, public action, design and building processes. Social consequences of planning policies and decision-making. Professor: Mr. Wheaton (W)

210. The Analysis of Urban Livability. (3) Three hours of meetings per week. Prerequisite: consent of instructor. Analysis of the adequacy of urban environments for human satisfaction-disatisfaction with urban conditions and services. Methodological emphasis is on the use of systems analysis, secondarily on certain relevant approaches. Professor: Mr. Foley (F)

211. Location Theory and Spatial Interaction Mod-
212. Introduction to Economics of Public Enterprise. (8) Three hours of lectures and one 1.5-hour discussion session per week. Prerequisite: Economics 100A or equivalent. Roles of governmental agencies as producers of urban services in nonmarket setting. Analysis of market failure in urban services; development of criteria and procedures for investment decisions concerning types and qualities of services and facilities.

213. Studio: Community General Plan and Developmental Studies. (4) Formerly CP 202. Two 4-hour studios and one 2-hour studio per week. Prerequisite: CP 202 or consent of instructor. Introduction to laboratory experience in analysis, policy-advising and general-plan preparation for a small urban community; emphasis is on planning for physical development. Mr. Dolan (Sp).

214. Zoning, Subdivision Control, Capital Improvement Programming. (4) One 2-hour seminar and one 3-hour studio per week. Methods of effectuating urban development policies and proposals requires the study of current trends in planning. Mr. Phillips (F).

215. Transportation and Land Use. (4) Four lecture periods per week. Prerequisite: Economics 200A and 200B, courses 205A, 211, and 212, or the equivalent. Industrial survey of transportation policies and current theory and practice in traffic control. Mr. Montgomery (Sp).

216A. Workshop-Studio in Metropolitan Planning. (10) Ten hours of studio work per week. Field problems in major phases of city and metropolitan planning are emphasized. A collaborative student-group effort is formulated to study recommendations within specific governmental framework. Mr. Dowell (Sp).

217A. Community Development. (3) Three hours lecture-discussions and two hours workshop per week. Prerequisite: consent of instructor. Description and analysis of public planning and community development action in housing, urban redevelopment and rehabilitation in particular as older centers. Mr. Montgomery (W).

217B. Community Development. (4) One 1 1/2-hour lecture-discussion session and four hours workshop per week. Prerequisite: CP 203 or consent of instructor. Workshop on community development planning. This is to provide opportunity for field work in the planning and community development covered in course 217A. Mr. Montgomery (Sp).

218. The Urban Economy. (4) Two 1 1/2-hour sessions per week. Prerequisite: Economics 100A-100B or equivalent, or consent of instructor. Analysis of the urban and metropolitan economy for planning. Economic base and other urban macro-economic models. Impact analysis and projection of changing labor force and industrial structure. Demographic-economic interactions are described in growth, income distribution, and planning controls. Mr. Phillips (F).

219. Comparative Urbanization. (3) Three hours of meetings per week. Prerequisite: consent of instructor. Structure and current urbanization, migration, slums or squatter settlements and marginal groups in the Third World, the United States, and the Socialist countries. Historical, economic, and social dimensions of the problems are considered in relation to policy alternatives and future scenarios. Mr. Phillips (Sp).

224. Housing and Urban Development. (4) Two 1 1/2-hour lecture periods per week. Prerequisite: courses 205 and 212, or consent of instructor. Housing and related development in urban fringe areas; social, economic and political implications. Effects of urbanization on community development requirements, regulatory policies. New towns, land assembly, open space, and other problems. Mr. Phillips (Sp).

225. Workshop in Metropolitan Planning. (10) Ten hours of studio work per week. Prerequisite: CP 203 or equivalent; CP 212 or equivalent; consent of instructor. Methods and procedures of intervention; and processes and access to services. The use of the budget to implement urban plans. Mr. Phillips (Sp).

226. Seminar on Urban Planning in Latin America. (2) Two 2-hour lectures per week. Prerequisite: knowledge of city planning field or of Latin American development; a reading knowledge of Spanish is desirable. Problems of urban development in Latin America; policies and programs to alleviate them: regional urbanization forces and their impact on cities; governmental framework for urban planning; underlying concepts and current methods and further evolution of the field. Mr. Teltz (Sp).

231. Topics in City and Metropolitan Planning. (4) Three hours of meetings per week. Prerequisite: governmental framework for urban planning; underlying concepts and current methods and further evolution of the field. Mr. Teltz (Sp).

232. Urban Politics and Planning. (4) Three hours of meetings per week. Prerequisite: governmental framework for urban planning; underlying concepts and current methods and further evolution of the field. Mr. Teltz (Sp).

233. Introduction to Regional Analysis and Planning. (4) Two 1 1/2-hour seminars per week. Prerequisite: CP 202 or consent of instructor. The concept of region and methods of regionalization and objectives; emerging views of regional planning. Regional models as planning tools. Intra- and interregional interaction. Allo- and effluxion; processes and regional development. Mr. Cohen (W).

234. Social Indicators. (3) One 2-hour seminar per week; tutorial sessions. Prerequisite: advanced graduate or consent of instructor. Techniques and problems of evaluation and analysis of social programs and policies. Course explores the use of analysis to assess and explain program impact, the role of the analyst's values, and program evaluation as a vehicle for organizational change and policy reform. Mr. Collignon (F).

236A. Policy Analysis and Program Evaluation for Social Planning. (8) Four hours of meetings per week. Prerequisite: CP 205 or equivalent; CP 212 or equivalent; consent of instructor. Techniques and problems of evaluation and analysis of social programs and policies. Mr. Duhl (Sp).

236B. Workshop in Social Program Evaluation and Policy Analysis. (6) One 3-hour seminar and six hours of work project per week. Prerequisite: course 236A or equivalent. In-progrss piece of student research; and consent of instructor. A close examination of social policy issues and the search for new indicators, models, values and paradigms. Prospects for new indicators and analysis of evaluation and social programs and policies. Mr. Duhl (Sp).

247. Methods of Program Planning. (4) Two 2-hour lectures per week. Prerequisite: CP 202 and 212, or consent of instructor. Techniques for simulating and evaluating alternative sequences of government actions; designing community-development programs within a setting of mixed public-private enterprise. Benefits-cost analysis; cost effectiveness bases for budgeting and programming; the politics of program planning. Mr. Mr. Duhl (Sp).

260. Theories of the Planning Process. (3) Three hours of meetings per week. Prerequisite: courses 203 and 212, or consent of instructor. Planning as a special type of problem-solving activity in guiding urban spatial development. Mr. Cohen (W).

261. The Logics of Planning. (4) Two 1 1/2-hour meetings per week. Prerequisite: course 203 or consent of instructor. An advanced course, primarily for doctoral students, focusing upon the conceptual and methodological bases of planning; an analysis of the planning processes, especially those deriving from value theory, decision theory, and the new policy sciences. Mr. Rittei (Sp).

263. Deliberate Social Change in the City. (3) One 2-hour seminar per week. Prerequisite: course 203 or consent of instructor. Theories of the behavioral, technical and institutional change will be considered as decision of a series of case studies of efforts to effect social change in the city. The case studies will be prepared and presented by students. Mr. Duhl (Sp).

291C. Urban Social Movement and Metropolitan Development. (4) One 3-hour seminar per week. Prerequisite: consent of instructor. Advanced interdisciplinary seminar on grassroots movements and urban struggles in post-war U.S. Focus on issues, and outcomes of tenant groups, cities, and on present and potential impact on social change. The Staff (F, W, Sp).

291D. Foundations of Planning Analysis. (4) Two 1 1/2-hour sessions per week. Prerequisite: consent of instructor. A seminar to examine critically the methodologies and epistemology combined with examples and exercises in evaluating and explaining urban form and development processes. Mr. Collignon (F).

292. Urban Density Measurement. Implications and Uses in City Planning. (4) Three hours of lecture per week. Prerequisite: Consent of instructor. The measurement of urban density and city planning process. Field measurements directed to perceptions, ideas, and applications of physical density related to city planning. Lectures, discussions, cine films produced by alternative building types, basis of standards, relationship to urban livability, service needs, costs and ideas of optimum city size. Mr. Jacobs (Sp).

NOTE: For key to symbols, see page 35.
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 with a major in Landscape Architecture is structured to give the student an opportunity for a broad general education as well as an introduction to the fundamental principles of professional practice. Required core courses represent a minimum basic core coverage in theory, design, history, 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 Announcement.

Graduate Program

The Master of Landscape Architecture Degree. The program is designed to offer advanced work in Landscape Design and Environmental Planning. The curriculum offers these two subfields as options for students to select in consultation with the student's adviser. Because of the increasing complexity of the problems, Landscape Architects collaborate with Architects, City Planners, Ecologists, and Sociologists.

Landscape Architecture

Department Office, 202 Wurster Hall

Professors:
Donald Appleward, M.C.P., (Chairman)
Garret Eckbo, M.A., M.L.A.
Russell A. Beatty, M.L.A.
Robert T. Tolley, M.L.A.
Robert H. Twiss, Ph.D.
Pamela Verhoek, B.S. (Emeritus)
Willard Rosenquist, M.A. (Emeritus)
Edward C. Stone, Ph.D.

Assistant Professors:
Michael M. Laurie, M.L.A. (Chaplain)
Clare Cooper Marcus, M.A., M.C.P.

Assistant Professor:
Thomas G. Dicket, M.L.A., M.C.P.

Professor:
J. B. Jackson, B.A. (Adjunct)

Associate Professor:
Clare Cooper Marcus, M.A., M.C.P.

Lecturer:
Russell A. Beatty, M.L.A.

Robert J. Tolley, M.L.A.
Robert H. Twiss, Ph.D.
Pamela Verhoek, B.S. (Emeritus)
William Rosenquist, M.A. (Emeritus)

Joes McBride, Ph.D.

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 towards the education of teachers, researchers, and advanced professionals in the fields of landscape architecture and environmental planning. Applicants may be from landscape architecture or other fields. They must present outstanding academic records. It is anticipated that most applicants 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 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 advisers 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, program requirements, and curriculum. Must be taken on a satisfactory/unsatisfactory basis.

10. Ecological Analysis. (3) Three 1-hour lectures and six 2-hour field 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.

11. Introduction to Plant Materials. (3) Four 2-hour laboratories and field study per week. Plant identification and classification. Common plant species available for California. Mr. Beatty (F)

30. Introductory Graphics for Landscape Architects. (2) Four 2-hour laboratories per week. Introduction to professional graphics, blueprint reading and drafting, drafting techniques, computer-aided drafting, materials, design, rendering, and sketching. Tools, methods, standards. Line drawings for reproduction in pencil and ink.

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.

101. Landscape Design. (4) Four 2-hour studies per week. Prerequisite: Landscape Architecture 100. Process-oriented approach to community setting. Landscape projects of limited scale, streets, parks, recreation areas, housing, and community facilities. Mr. Gates, Mr. Beatty (W)

102. The Urban Landscape. (4) Two 4-hour studies per week. Prerequisite: Landscape Architecture 100. Design in the urban context; urban open spaces, plazas and public squares, landscape rehabilitation and improvement.

103. Landscape Planning. (4) Two 4-hour studies per week. Prerequisite: Landscape Architecture 100 and Landscape Architecture 103. The relationship of physical factors, cultural factors, and landscape analysis; use planning and development.

104. Site Planning. (4) Four 2-hour studies per week. Prerequisite: Landscape Architecture 104 or Advanced Standing in Architecture. Integration of landscape site and architectural context. Placement on problems of the landscape context.

105. Intensive Design. (4) Two 4-hour studies per week. Prerequisite: Landscape Architecture 100 and Landscape Architecture 103. One-semester intensive treatment of landscape projects of limited scale, such as gardens, small parks, or plazas, including details of construction, and improvement.

106. Community Participation in Design and Neighborhood Recreation Projects. (4) Two 4-hour laboratories per week. Prerequisite: consent of instructor. Development of plans and construction techniques for specific projects in collaboration with neighborhoods.
110. Regional Plant Materials. (4) Two 4-hour laboratories per week. Prerequisite: course 11 or consent of instructor. Identification of introduced and indigenous plants, and their impact in the landscape. Mr. Beatty (Sp)

111. Planting Design. (4) Two 4-hour laboratories per week. Prerequisite: course 11 or equivalent. Application of fundamental, technical, and aesthetic principles of planting 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. Prerequisite: Landscape Architecture 11, Botany 10, Biology 11A, or other basic botany course. Horticultural factors in landscape design, installation and management, propagation, plant culture, microclimatic conditions, pruning, planting techniques and other plant maintenance factors. Mr. Beatty (F)

120. Topographic Form and Design. (4) Two 4-hour laboratories per week. Prerequisite: Civil Engineering 21 recommended. Topographic and grading problems in landscape construction. Design and structural relationships; graphic and computational exercises; technical drawings. Mr. Litton (W)

121. Landscape Structures and Materials. (4) Two 4-hour laboratories per week. Prerequisite: course 120. Materials and structures in landscape construction; design criteria for structural relationships; graphic and computational exercises; technical graphics. Mr. Tellow (F)

122. Landscape Site Engineering. (4) Two 4-hour laboratories per week. Prerequisite: course 11 or equivalent. Surveying, locating, and construction of site utilities. Engineering of irrigation, drainage, and soil structures used in the site development. Graphic exercises, technical drawings. Mr. Arbogast, Mr. Razzano (Sp)

130. Survey of Landscape Architecture. (3) Two 1 1/2-hour lectures per week. An introduction to the history, theory, and materials of landscape architecture. Contemporary application and practice. Open to non-majors. Mr. Laurie (W)

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. Mr. Laurie (W)

132. Recreation and Open Space Systems. (4) Two 2-hour lecture and visitor-presentation sessions; plus one discussion meeting per week. Prerequisite: consent of instructor. Recreation as a socio-ecological system in time and space. Environmental systems. Planning issues and design criteria. Student-selected field studies. (Sp)

133. Design Implications in Forestry and Resource Management. (3) Two 1 1/2-hour laboratories and one 3-hour laboratory per week. Prerequisite: upper division standing and consent of instructor. An exploration of wildlands as a landscape resource, stressing visual composition as a basis to which forestry and resource management decisions may be given form and relationships through design. Mr. Litton (Sp)

134. Presentation Graphics for Landscape Architects. (4) Two 4-hour laboratories per week. Prerequisite: Landscape Architecture 30 or Environmental Design 30. Computer-intensive exercises to graphic representation of design concepts. Pen, ink, and color media. Mr. Tellow (Sp)

140. Geospatial and Ecological Foundations. (4) Two 1 1/2-hour classes and 3 hours of field observation per week. Theories of home, neighborhood, territory, community, public behavior and play. Feedback research on user-behavior in existing housing developments, parks, urban squares, plazas, parks, streets and plazas. Visualization of evaluation of local open spaces; programs for redesign. Mrs. Marcus (F)

160. Professional Practice Seminar. (3) One 2-hour seminar with active participation from public agencies and private offices. Consideration of the present state and future potential of the public practice arena. Mr. Razzano (Sp)

170. History and Literature of Landscape Architecture. (4) Two 2-hour lectures per week. Developmental history of landscape design practice; relationships to society, climate, and topology. Mr. Brown (Sp)

197. Field Study in Landscape Architecture. (1-4) To be arranged with faculty. Consent of instructor and sponsor. See departmental information sheet for limitations. Supervised experience and field study aspects of landscape architecture. Regular individual meetings with faculty and outside sponsors. Reports required. Must be taken on a pass/credit basis only. (Staff, F, W, Sp)

198. Directed Group Study. (1-5) To be arranged. Prerequisite: consent of the instructor. (Staff, F, W, Sp)

200A. Landscape Design and Graphics. (4) Two 4-hour studios per week. Prerequisite: Landscape Architecture 103 or 104. Investigation of the design process and sources of form in landscape architecture. Development of professional graphic techniques. Mr. Litton (W)

200B. Site Planning and Topographic Form. (4) Two 4-hour studios per week. Prerequisite: Landscape Architecture 11. Landscape Analysis and Evaluation 200A. Problems in landscape design and site planning, grading and drainage on topographically complexed sites. (Sp)

201. Problems in Environmental Planning. (4) Two 4-hour studios per week. Prerequisite: Landscape Architecture 103 or consent of instructor. Problems in planning and design of natural and physical landscape of urbanizing regions. Mr. Litton (F, 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 program and the site. To be taken in conjunction with Landscape Architecture 202B. 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 perceptive form, application to a design program. To be taken in conjunction with Landscape Architecture 202A. Mr. Beck (F)

203A. Landscape Design Construction. (4) Two 4-hour studios per week. Prerequisite: Landscape Architecture 202A and 202B. Advanced problems in design investigation, design and execution, and working drawings for a project selected by the student with faculty approval. Mr. Tellow (W)

203B. Landscape Design and Planning. (4) Two 4-hour studios per week. Prerequisite: Landscape Architecture 202A and 202B. Advanced problems in design investigation in terms of plant selection, planting design, and implementation on specific sites. To be taken in conjunction with Landscape Architecture 203A. Mr. Beatty (W)

204. Advanced Problems in Landscape Design. (4) Two 4-hour studios per week. Prerequisite: Landscape Architecture 203A and 203B. Preparation of design and working drawings for a project selected by the student with faculty approval. Mr. Tellow (Sp)

205. Environmental Simulation. (Variable 2-4). Six hours of lecture and laboratory per week. Prerequisite: open to 2nd year graduate students in Landscape Architecture, or consent of instructor. Discussion of the concept of the environmental simulator. Model-making for movie and simulation techniques; comparative behavioral studies of simulations and the real world; new methods of urban planning policy on design and of design criteria on planning policy. Participation by invited guests from the profession. Mr. Meier (F)

206. Thesis and Comprehensive Examination. (2-4) Two to three hours per week. Prerequisite: completion of the first graduate year. Consideration of alternative methods and strategies for written and design thesis research and for the comprehensive examination. Mr. Meier (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. Visual analyses of wildlands landscapes. Inventory procedures, problems in landscape evaluation and design. Mr. Leisman (F)

234. Introduction to Computer Graphics and Mapping. (4) Two 1 1/2-hour lectures and one 1-hour discussion per week. Prerequisite: basic computer programming course may be taken concurrently. Introduction and exercises using programs for symbolic two-dimensional mapping, three-dimensional plotting, and graphic subroutines, with data from student's area of interest. Individual problem sessions to be included, as necessary. Mr. Leisman (W)

236. Introduction to Landscape Design and Environmental Planning. (1) One 1-1/2 hour seminar per week. Prerequisite: consent of instructor. Faculty unfamiliar with landscape architecture or environmental planning. Problem identification and solution, values, and the processes involved including the development of the problems drawn from current educational, professional and research projects by faculty. Must be taken on a satisfactory/unsatisfactory basis. Mr. Litton (F)

238. Environmental Policy Planning. (4) Two 2-hour lectures per week. Prerequisite: consent of instructor. Collective decision-making in the planning process and the development of planning policies. Mr. Eckbo (Sp)

239. The Interrelationship Between Landscape Design and Environmental Planning. (1) One 1-1/2 hour seminar 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 policy. Participation by invited guests from the profession. Mr. Laurie (Sp)

NOTE: For key to symbols, see page 35.
Program in Visual Design

Program Office, 235 Wurster Hall

Professors:
Margaret Dhaemers, M.A., M.F.A.
Charles E. Rossbach, M.F.A.
Harwin Schaefer, Ph.D.
William A. Garnett

Assistant Professor:
Anthony Dubovsky, M.A.
(Chairman)

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. 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 this course.

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. Design problems in the various communications media stressing principles of graphic order and expression. Mr. Dubovsky (F, W, Sp)

121A—121B. Printed Textile Design. (4—4)
Six hours of laboratory per week. Prerequisite: Consent of the instructor. 121A is prerequisite to 121B. Principles of structure and pattern in random form relationships and development of techniques. 121B may be repeated once for credit. To be offered 1977—78 only.

122A—122B—122C. Constructed Textiles. (4—4—4)
Six hours of laboratory per week. Prerequisite: consent of instructor. 122A is prerequisite to 122B. Laboratory work in woven and non-woven textile structures, emphasizing the interrelation of techniques and materials in textile design. 122B may be repeated once for credit.

122A. Loom Textiles. Mr. Rossbach (W)
122B. Artistic Non-Tent Textiles. Mr. Rosbach (F)
122C. Non-Loom Textiles. Mr. Rosbach (W)

127. Basic Techniques of Photography. (4)
Six hours of laboratory per week. Prerequisite: course 126B or consent of instructor. Will be given to students in the College of Environmental Design. Assignments testing standard materials, equipment, and processes for optimum performance. Instruction, assignments, and critiques introducing conditions of photo illustration in the field.

Mrs. Dhaemers, Mr. Garnett (F, W, Sp)

128. Documentary Photography. (4)
Two 3-hour laboratories per week. Prerequisite: 127 or consent of instructor. Photography as a working tool for various career disciplines. Advanced techniques, materials, and processes. 128B may be repeated once for credit.

Mr. Garnett (Sp)

129. 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. Design 129 may be repeated once for credit.

Mr. Garnett (W)

130. Introduction to Artificial Lighting Photography. (4)
Two 3-hour laboratories per week. Prerequisite: course 127 or consent of instructor. Introduction to and assignments in the use of artificial light. Design 130 may be repeated once for credit.

Mr. Garnett (W)

133. Experimental Approaches to Visual Communication. (4)
One hour of lecture and six hours laboratory per week. Prerequisite: Consent of instructor. The use of light as a medium for human expression in audiographic form, photographic images and graphics for programmatic contexts.

Ms. Dhaemers (W)

160A—160B. Design Survey. (4—4)
Three 1-hour lectures per week. 160A not prerequisite to 160B. 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)

162A—162B—162C. Antecedents of Industrial Textiles. (4—4—4)
Three hours of lecture per week. Prerequisite: 162A is not prerequisite to 162B. Survey of selected textile constructions and technologies that have led to today's mass produced fabrics. Examples from worldwide geographic areas presented within their historical and cultural contexts.

162A. The Americas, Oceanica, and Africa. Mr. Rossbach
162B. The Orient, Near East, and Europe. Mr. Rossbach

180. Phases in Twentieth-Century Design. (4)
Two 1 1/2 hours of lecture per week. Intensive study of significant phases of design developments and their relation to broader artistic movements in the twentieth century.

Mr. Schaefer (W)

Special Studies

187. Field Studies in Design. (1—5)
Prerequisite: consent of instructor. Supervised experience relevant to specific areas of design 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 needs. No more than 5 units are allowed in any one quarter. The Staff (F, W, Sp)

199. Supervised Individual Study and Research. (1—5) Enrollment is restricted to regulations listed on page 38. Must be taken on a passed/not passed basis. Studies developed to meet individual needs.

The Staff (F, W, Sp)

GRADUATE COURSES

222. Seminar in Experimental Approaches to Media and Methods. (4)
Three hours of seminar per week. Emphasizes on aesthetic problems through development, presentation, and discussion of individual projects. May be repeated once for credit.

Ms. Dhaemers (F)

229. Photography as an Art Form. (4)
Three hours of seminar per week. Prerequisite: course 129. Advanced work in the experimental approach to materials and processes. The visual realization of ideas.

*232. Environmental Photography. (4)
Three hours of lecture per week. Projects related to environmental design and documentation of current history.

*233. Special Problems in Light, Motion, and Form. (4)
One 1-hour lecture and two 3-hour laboratories per week. Prerequisite: course 133. The application of light, movement, and perception 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 (W)

235. Seminar in Photography. (3)
Mr. Schaefer (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

*242. Seminar in Textile Research. (3)
One 2-hour seminar per week. Problems in textile research, utilizing literature sources, analytical techniques, and specimens in University collections.

Mr. Rossbach

Special Studies

288. 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 member. Designed to reinforce the student's background in areas related to his proposed thesis topic.

Mr. Schaefer (Sp)

ENVIROMENTAL DESIGN COURSE

172. History of the Environment. (4) See Environmental Design for the complete description of this course.

Mr. Schaefer (Sp)

School of Journalism

School of Journalism Office, 607 Evans Hall

Professors:
Edwin R. Bayley, B.A. (Dean)
Bernard B. Taper, M.A.
B. A. (Emeritus)
David Lilienfeld, Ph.D.
Robert W. Desmond, Ph.D.
Joseph P. Lyford, B.A.
(Dean)
Alben G. Pickrell, Ph.D.
(Emeritus)
Andrew A. Stem, B.A.
(Emeritus)

Assistant Professor:
Thomas C. Leonard, Ph.D.

Senior Lecturers:
James C. Spaulding, B.A.
Candidates for the M.J. degree shall ordinarily have academic disciplines that constitute the subject matter and related disciplines. They shall have completed 42 units of approved upper division or graduate courses, including not less than 21 units in graduate courses in journalism, and shall have presented an acceptable thesis or reporting project. Students generally will take about two-thirds of their courses in journalism and one-third in a related field of specialization.

An applicant for graduate study should hold a bachelor's degree comparable to that given by the University of California. Requirements and procedures are outlined in the circular Admission to Graduate Study, available at the office of the Dean of the Graduate Division, and in the Announcement of the School of Journalism.

The A.B. program in journalism is limited to undergraduate students simultaneously enrolled in a second bachelor's degree program on the Berkeley campus. The student may declare either major first, but should take courses each quarter that will facilitate progress towards completion of the requirements for both degree programs. No student will be admitted to the A.B. program in journalism who has not completed two years (12 quarter units) of approved college-level work, and who cannot reasonably expect to complete all requirements for the journalism A.B. and a second bachelor's degree within a total of 195 quarter units. The A.B. in journalism will only be awarded when all requirements for both degree programs are completed.

The A.B. program is designed primarily for students who do not expect to continue with graduate work in journalism. Although less professional in its emphasis than the M.J. program, it is based on the same principles: that the true journalist is one who combines a broad general education and superior writing skills with some degree of area specialization, and basic training in the skills, techniques and background of the profession. The dual-degree bachelor's program also represents a broad and demanding liberal arts education in its own right, suitable to students with other career plans.

Further information, application requirements, and copies of the Announcement (Graduate and Undergraduate) are available from the Office of the School of Journalism, 607 Evans Hall.

UPPER DIVISION COURSES

100. Introduction to News Writing. (4) Three hours of lecture and discussion and eight hours of field work per week. An integral part of the program includes tutorial sessions. Survey of journalistic principles and practices, and study and practice of methods of gathering, writing, and editing news. The Staff (F, W, Sp).

101. Advanced Writing for Journalists. (4) Three hours of lecture and discussion and eight hours of fieldwork each week. Prerequisite: course 100. An extension of course 100 for students who seek additional instruction and practice in gathering, writing, and editing news, editors, and features. Individual sections 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. The Staff (F, W, Sp).

110. Undergraduate Colloquium. (1) One and one-half hours of lecture and discussion each week. Introduction to various branches of the journalistic profession, by means of weekly meetings and discussions with the faculty of the School of Journalism and visitors. Can be repeated for credit. Must be taken on a pass/fail basis. Limited to 15 students. Written assignments required. The Staff (F, W, Sp).

110A. History of the American Press. (4) Four hours of lecture and discussion per week. How "news" has been defined, discovered and communicated from Colonial times to the present. Students will research the political, social, economic, or cultural role of the press. Mr. Leonard (F, Sp).

140. 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 media of mass communications. Mr. Lyford (F, W).

151. The Literature of Journalism. (4) Three hours of lecture and discussion per week. Study of the selected works of outstanding writers for the American and European press, from the eighteenth century to the present. Mr. Littlejohn (W).

163. Propaganda and the Mass Media. (4) Three hours lecture and discussion per week. A survey, beginning in the 19th century, of the origins and the effects of attempts at mass persuasion. Shifting concepts of public opinion, propaganda, and public relations will be analyzed. There will be substantial reading and writing assignments on the flow of information to Americans during wartime. Mr. Pickerell (F).

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, contempt, and confidence statutes. Mr. Pickerell (F).

165B. Legal Aspects of the News Media. (4) Three hours lecture and discussion per week. Consideration of contemporary legal problems of the news media including free press-fair trial, obscenity and censorship, licensing and taxation, FCC and the Fairness Doctrine, access to meetings and judicial proceedings, and administrative regulations. (165A is not a prerequisite.) Mr. Pickerell (W).

175. The Critical Review. (4) Three hours of lecture and discussion or editorial, and eight hours of field work per week. Prerequisite: permission of instructor. Limited to 15 students. Written assignments in the field of critical reviewing (books, film, drama, music, art, and architecture). Mr. Littlejohn (F, Sp).

180. Issues in Television Journalism. (4) Four hours of lecture and discussion per week. An evaluation of television news and documentaries from 1950 to the present. Courses will analyze local and network news programs, examine problems of contemporary institutions, 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. Stern, Mr. Shore (Sp).

184. Reporting of Public Affairs. (4) Three hours of lecture and discussion and eight hours of field work per week. Prerequisite: course 180 or equivalent. Study of and practice in reporting news of judicial, legislative, and administrative functions of city, county, and state government. The Staff (F, W, Sp).

185. Advanced Reporting of Public Affairs. (4) Three hours of lecture and discussion and eight hours of field work per week. Prerequisite: course 180 or equivalent. Study of and practice in reporting news of judicial, legislative, and administrative functions of city, county, and state government. The Staff (F, W, Sp).

190. Comparative World Journalism. (4) Three hours of lecture and discussion per week. Examination of international news flow in nations and regions, with attention to sources of information, to media characteristics, and conditions of performances. Mr. Leonard (F, W, Sp).

197. Field Study in Journalism. (1–6) 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).

198. Directed Group Study in Journalism. (1–6) Prerequisite: total grade-point average of not less than 3.0 and consent of committee in charge. Enrollment is restricted by regulations listed on page 199. The Staff (F, W, Sp).

199. Supervised Individual Study and Research. (1–5) Prerequisite: total grade-point average of not less than 3.0 and consent of committee in charge. Enrollment is restricted by regulations listed on page 199. The Staff (F, W, Sp).

GRADUATE COURSES

200. Reporting the News. (6) Five hours of lecture and discussion of newspaper principles, ethics, and practices; periodic tutorial and all day laboratory session. Prerequisite: one year of journalism. The Staff (F, W, Sp).

204. Advanced News Writing. (4) Three hours of seminar and 8 hours of field work in news reporting each week. Prerequisite: course 200. Periodic tutorial sessions. Advanced study of reporting more complex subject areas and more sophisticated writing styles. Mr. Spaulding (W).
205A. News Editing. (3) Three hours of lecture and laboratory each week. Prerequisite: course 200 or equivalent and consent of instructor. Critical study of newsroom decision-making processes. The Staff (W, Sp)

208B. Advanced Editing. (3) Three hours of lecture and laboratory each week, plus outside assignments and reading. Course 205A or 205B is prerequisite. The Staff (W, Sp)

"207. Magazine Editing. (3) Four hours of seminar and laboratory per week. Study of and practice in creative editing of manuscripts. Study and critique of magazine editorial policies, with production processes. The Staff (W, Sp)

210. News Photography. (3) Two hours of lecture and discussion and four hours of laboratory per week. Fundamentals of news photography; fieldwork; assignment in professional magazines and newspapers. Mr. Bayley (F)

225A-228B. Reporting on the American Community and Urban Affairs. (4—4) Three hours of lecture and discussion and six hours of fieldwork each week. Prerequisite: for journalism students, course 200 or equivalent; for others, consent of instructor. Course 225A is prerequisite to 228B. Examination of the social, political, and economic conditions of communities, and practice in reporting on urban problems such as education, health, housing, and transportation. Mr. Lyford, Mr. Taper (W, Sp)

229. Reporting of Crime and the Courts. (4) Three hours of lecture and discussion and eight hours of fieldwork each week. Prerequisite: for journalism students, course 200 or equivalent; for others, consent of instructor. Advanced study of methods of reporting on crime and court cases, with emphasis on practical problems of working with policemen and criminals. Mr. Pickrelle (F)

230. Business Reporting. (4) Three hours of lecture and discussion and eight hours of fieldwork each week. Prerequisite: for journalism students, course 200 or equivalent; for others, consent of instructor. Study of the techniques of writing for magazines, newspapers, and other publications, and laboratory. Mr. Pickrelle (F)

232. Access to Public Documents. (2—4) Three hours of lecture per week. Use of law and tactics to obtain access to public information at local and state levels, from public bodies, courts, and public corporations: fieldwork, research and writing of articles based on findings. Mr. Pickrelle (F)

235. Seminar in the Law of Mass Communications. (3) Three hours of lecture and discussion per week. Study of the mass media and their organization and procedure. Investigation into contemporary controls affecting the news media, especially libel and privacy. Mr. Pickrelle (F)

237. Essential Law for Journalists. (4) Three hours of lecture and discussion per week. Prerequisite: graduate student in Journalism or consent of instructor. Study of legal limits, controls and rights of the news media; emphasis on practical problems of working with newsmen: libel, privacy, access, shield laws, free press, fair trial, court organization and procedure. Mr. Pickrelle (F)

242. The Writing of Profiles, Personality Sketches, and Short Biographies. (4) Three-hour seminar each week. Discussion and editing of emi-

243. Social Aspects of the Mass Media. (4) Two 1 1/2-hour lecture and discussion periods per week. Critical analysis of the mass media; discussion of problems of ethics and responsibility. Mr. Pickrelle (F)

250. Investigative Reporting. (4) Three hours of lecture and discussion and eight hours of fieldwork per week. Prerequisite: course 200. Study of investigative reporting techniques, with outside assignments and laboratory. The Staff

251. Literature of Journalism. (4) Two 1 1/2-hour seminars per week. A study of outstanding men whose journalistic work is of lasting historic and literary worth. Mr. Littlejohn (F, W, Sp)

252. Magazine Article Writing. (3) Three hours of lecture and discussion and eight hours of fieldwork per week. Prerequisite: course 200 or equivalent and consent of instructor. Advanced study of methods of writing for magazines, newspapers, and other publications, and laboratory. Mr. Pickrelle (F)

267. Essential Law for Journalists. (4) Three hours of lecture and discussion per week. Prerequisite: graduate student in Journalism or consent of instructor. Study of legal limits, controls and rights of the news media; emphasis on practical problems of working with newsmen: libel, privacy, access, shield laws, free press, fair trial, court organization and procedure. Mr. Pickrelle (F)

275. Field Study in Journalism. (1—5) Supervised research projects and reports. The Staff (F, W, Sp)

601. Individual Study for Master's Students. (1—8) Individual study for the completion of requirements in consultation with the field adviser. 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)

Ellen Matthews, B.S., J.D.

The School of Law (Boalt Hall) has a three-year curriculum leading to the Juris Doctor (J.D.) degree. In addition to preparing its students to practice law, the School seeks to develop the study of law and to foster legal research. The School is a member of the Association of American Law Schools and is approved by the American Bar Association. Its graduates are qualified to become applicants for admission to practice in any state of the United States.

No single "pre-law" major is required or even recommended. However, these suggestions are made: students should learn to write by taking courses in which their work is vigorously edited; enroll in courses demanding analytical skills; obtain some breadth in humanities and social sciences that will help in understanding the social context within which legal problems arise; and acquire a general understanding of the business world, since a significant portion of legal problems are related to the business community. But they should not be deterred from pursuing the study of law merely because their undergraduate education has not emphasized these areas. Diversity of undergraduate background enhances and enriches the legal experiences of all students.

The School does not offer a part-time or evening program. The work of the first year is prescribed; the second and third years' courses are elective. The School also offers programs leading to the degree of Master of Laws (L.L.M.), or the degree of Doctor of the Science of Law (Juris Scientiae Doctor, J.S.D.).

The following list indicates the courses usually offered each academic year, although changes in instructors and in course offerings are often necessary. After the title of each course is the credit value in semester units in parentheses, a brief description of the subject matter, and the names of the faculty who usually teach the course. The order of teaching for the School of Law is fifteen weeks rather than ten weeks. Therefore, the units in the School of Law, only, are indicated as semester units.

Explanation of Course Numbering System

1. Courses are listed alphabetically, with two exceptions: Prescribed first-year courses are numbered 200, 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 covered. In the list of courses for the School of Law is fifteen weeks rather than ten weeks. Therefore, the units in the School of Law, only, are indicated as semester units.

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 number.

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 School Admissions Office, 220 Boalt Hall, Berkeley, California 94720.

PROFESSIONAL CURRICULUM

First Year

The first-semester program is composed of six prescribed courses. Four of the classes are in large sections, with approximately 110 students each in the fifth and sixth are small sections of 25 to 30 students. In the second semester, five courses are prescribed, and the student chooses one elective course. 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 rule system; motion practice; the trial process; and the jury: sufficiency of evidence, instructions, verdicts, new trials, judgments, appellate procedure. Mr. Enersen, Mr. Stoltz, Mr. Vetter

201A-201B, Contracts. (3-3) The law of contracts, dealing with the problems of formation, operation and termination. Mr. Coons, Mr. Sweet, Mr. Kessler, Ms. Shultz


Mr. Foote, Mr. Johnson, Mr. Kadish, Mr. Ramsey

203A-203B. Property. (3-3) An introduction to the law of real property and personal property. Mr. Sweet

204A-204B, Torts. (3-3) The law of civil injuries, including both intended and unintended interference with personal and property interests as well as liability without fault. Mr. Cole, Mr. Fleming, Mr. Sugarman.

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; applications to specific problems that lawyers encounter when they deal with governmental agencies and their innumerable officers and employees. Mr. Coons.

208. Ancient Law. (2) Discussion will focus on the ancient Orient (including the Bible) and Greece. It will deal with both the problems and how and how we find it: the use of theory, myths and narratives as legal materials. Source and form critical study, the nature of comparison and other methodological problems will receider. Mr. Dauke

209. Antitrust Law. (3) Legal and economic problems in the public control of corporate market power. Topics covered include monopoly, cartels, oligopolistic interdependence, loose-knit cooperation among firms, vertical restraints, and mergers.

210. Appellate Advocacy. (3) Open to second-year students only. Combines evening lecture teaching by faculty, experienced practitioners and judges in the art of written and oral appellate argument, with exercises in that art under the supervision of members of the Moot Court Board and the faculty. Exercises in brief writing and oral argument are followed by analysis by members of the Moot Court Board and, after revision by the student, by faculty. This is followed by the brief and oral arguments. Mr. Mostek

211-2. Business Associations (Corporations). (5) Basic problems in corporation law; formation of the corporation; issuance of shares; corporate control devices; authority of corporate executives; shareholders' derivative suits; obligations of management to corporations and shareholders, and of shareholders to each other; introduction to matters of corporate finance. Mr. Choper

211A-211B, Business Associations (Corporations). (3-3) A brief introduction to non-corporate forms of business organization. Topics include formation of corporations, management-shareholder relations, shareholders' liability for debts, and distribution of profits. Ms. Kay

211A-211B, Business Associations (Corporations). (3-3) A brief introduction to non-corporate forms of business organization. Topics include formation of corporations, management-shareholder relations, shareholders' liability for debts, and distribution of profits. Ms. Kay

211-3A-211-3B. Business Associations (Corporations). (4) The role of law in modernizing non-Western countries generally, with emphasis on the legal systems of China, Japan, and Russia. Mr. Foote, Mr. Johnson, Mr. Kadish, Mr. Ramsey

218. Chinese Law. (2) Introduction to the legal systems of China, past and present, with special emphasis on post-Mao Chinese law, international and extra-judicial institutions, procedures, and sanctions considered. Criminal process, civil procedure, contract, inheritance and succession in the People's Republic of China; attitude toward international law. Comparison with the role of law in modernizing non-Western countries generally. Ms. Chen

218A. Commercial Law I (Sales). (2) Provides substantial familiarity with the Uniform Commercial Code, specifically Article 2 on Sales, Article 5 on Letters of Credit, and Article 7 on Documents of Title, but omitting Article 3 on Commercial Paper and Article 9 on Secured Transactions. (The latter are covered in Law 218B, Commercial Law II.) Its principal object is to explain commercial practices, including financing devices (credit cards, negotiable bills of lading, etc.), both in domestic and international settings. It thus deals not only with the relation between buyer and seller, but also with incidental rights and obligations of creditors protecting buyers and purchasers. Although time limitations prevent specific treatment of consumer protection, the course is near-essential for the prospective commercial lawyer as well as general practitioner (including lawyer poverty. Mr. Fleming

218B. Commercial Law II (Secured Transactions—Documents of Title, Payment Transactions). (2) Law 218A. A principal concern is the treatment of topics governed by the Uniform Commercial Code outside the laws of sales. Principal focus is on secured transactions with personal property as collateral, commercial paper, documents of title and other aspects of payment and security transactions.

219. Community Property. (2) The marital property law of California and other Western states. Contracts governed by the Uniform Commercial Code outside the laws of sales. Contracts specifically involving the rights of creditors, banking, and family law in the People's Republic of China; at

219. Criminal Property. (2) Study of the law of credit and bankruptcy; consumer bankruptcy. Ms. Kay

221. Constitutional Law I. (2) Study of the American Constitution, with special emphasis on the history and theory of the Bill of Rights. Mr. Mishkin

221A-221B, Constitutional Law I. (2) Study of the American Constitution, with special emphasis on the history and theory of the Bill of Rights. Mr. Mishkin

221B. Constitutional Law II. (2) A survey of the applications of computers to legal research and law practice, with an emphasis on the advanced operational systems and with a discussion of implications of legal reasoning, jurisprudence, and future developments in corporate law. Because of rapid development in the field and its considerable breadth, the discipline will concentrate on a few of the topics listed in the outline depending on the special interests and experience of the class. A written critical analysis of a particular system or a specific topic will be required.

223. Conflict of Laws. (3) Jurisdiction, of choice of law and recognition of judgments in cases involving interstate and state-federal conflicts, particularly in the law of procedure, torts, women's compensation, contracts, property, personal relations, estates, and business associations.

224. Constitutional Law. (2) Covers substantially the same topics as Law 224A-224B, only in one semester instead of two.

224A-224B. Constitutional Law. (3-3) Analysis of the judicial process in constitutional cases; the sources and nature of national power; limitations on the power to regulate and tax; application of the Bill of Rights to the states; freedoms of expression, association, and religion; equal protection. Mr. Cole

225. Consumer Protection Seminar. (2) Study of common problems and abuses confronting consumers, and evaluation of the advanced operational and societal responses to these concerns. The substantive coverage includes deceptive and misleading advertising, misleading product information, etc. (e.g., F.T.C., Attorney General) assigned to monitor these areas; problems of consumer credit, including a comparison of the protections offered by the Federal Truth in Lending Act, current state legislation, and the proposed UCC; product safety problems; the unique factors contributing to the plight of ghetto shoppers. Mr. Barton

226. Contract Writing and Analysis. (2) Seminar designed to develop the student's skills in writing con-

NOTE: For key to symbols, see page 36.
the realists: who were they, who influenced them, what seem to have been their main ideas and what were they attacking? Who were the enemies of the realists and what were their ideas? Finally, what seem to have become their ideas? Some effort will be made to take account of features of the intellectual and political context in which the realists worked which may have contributed to shaping the realist movement.

Mr. Vetter

263.5. Legal Reasoning and Legal Theory Seminar. (2) Students will analyze several related problems in judicial reasoning. They will derive principle criteria for fundamental intellectual operations such as describing events, characterizing behavior, making value judgments, and assessing and stating values. Some pervasive features of the legal system that influence these intellectual operations will be discussed. The students will attempt to determine to what extent the interpretive roles of the court's role as an institution with particular government responsibilities control its reasoning? What are the implications of a legal system where the relevant behavior of participants in the system seems simply to be using language? Mr. Cole

264. Legislative Process, The Lawyer in the Twentieth Century. (3) The course will cover the legal, economic, and political rationale for the lawyer in the modern legislative process, including policy development, committee work, and legislative drafting. Students will be expected to present proposals for reform under faculty supervision, are submitted to the class in simulated committee hearings. Mr. Lustig

265. Native American Law and the Law. (2) Introspective survey of laws, legal institutions, and practices affecting Native American peoples. Topics include history, setting contemporary problems, sovereignty, jurisdiction, land and water rights, self-government, treaty-making, urban issues, international, and comparative aspects. Mr. Duke

266. Nonprofit Corporation Seminar. (2) A study of nonprofit corporations and similar nonbusiness organizations as vehicles for their existence; their functions and modes of internal organization; existing and proposed forms of governmental supervision and control. Discussed will be the question of civil liberties struggles. Mr. Witherspoon

267. Professional Ethics. (2) An introduction to ethical principles and the regulation of law practice and judicial activity. Topics include the financing of legal services, ethical conduct of litigants, standards in government service, representing the public interest, advising corporate clients, and the ethical conduct of judges. Mr. Connon

268. Professional Responsibility. (3) The teaching of professional responsibility in law schools. What is being done? What is it? What should be done? Mr. Noonan

269. Psychiatry and the Criminal Law. (2) Legal, philosophical, and social issues related to professional responsibility; historical development of the concept of mens rea; the psychology of punishment and guilt; problems of the criminal responsibility of the mentally ill. Dr. Diamond

270. Remedies. (3) Introduction to the forms of judicial remedies, principles governing their scope and availability, and distinction between alternative remedies. Includes general principles of damage, specific performance, and injunction. Mr. Flache

271. Remedies. (3) Introduction to the forms of judicial remedies, principles governing their scope and availability, and distinction between alternative remedies. Includes general principles of damages, specific performance, and injunction. This course also considers the remedial problems in complex commercial litigation.

Mr. Daube

271.5. Secured Transactions (Real Property). (3) Real property secured transactions, including the procedural, remedial, and economic attributes of various security devices; deficiency and subordination problems; priority and perfection; transfers; and allowance of ultimate location of security interest. Mr. Hetland

272. Securities Regulation. (3) Principles. (2) Prerequisite: Law 211-A. A study of the regulation of corporate securities, the regulation of securities by federal and state authorities, and regulation of investment companies and investment advisors. Mr. Jennings

273. Sex-Based Discrimination. (3) The course will cover the regulation of sex related issues by legal acts of discrimination, family law, and nonfamily law, including title vii, equal pay act, and executive orders. An introduction to the legal theory of sex discrimination in family law, and employment discrimination. Mr. Kay

275. State and Local Government Law. (3) Power allocation, both federal and state and local units, and among local units. Objectives and methods of governmental restructuring in metropolitan areas. Clinical: Experience in the role of educator between the practicing and the academic community. Mr. Solom

276. Statutory Interpretation. (2) An advanced course in statutory interpretation. Topics may include the scope, meaning, and interpretation of substantive provisions and procedure relating to property, taxation, and other local taxes. Attention will be given to interstate conflicts, jurisdiction to tax, and commerce clause restrictions. Mr. Stone

277. Torts II. (2) An advanced course in Torts. Topics will include defamation and invasion of privacy. Mr. Barnett

278. Trial Practice, Elements of. (1) A one-semester introduction to the entire field to legal practice. The course involves actual practice in the techniques and strategies of pleading, settlement, discovery, motion practice, witness examination and how to handle all of these things in a court setting. Includes development of legal case work and client relations, public interest law, setting up an office, and the psychological of persuading a judge. Mr. Heafey

281. Marital Law Theory and the Law. (2) An introduction to the concept of marriage as the nucleus of the capitalist order, and its meaning for legal practice. Specific attention to problems of corporate capitalism (The New Deal) and the women's movement. Includes: Marxist feminism, the" legal status of women" as treatment of women's rights, and the" legal status of men" as treatment of men's rights. Mr. Lenin's original analyses; the problem of the State in current Marxism; classical Liberalism and the dialectics of legal change in Liberal function; legal and political law as command, law as domination (Marx), law as technique (Eliot). Critique of American liberal legal theory (judicial realism) and of New Deal realism: the question of civil liberty struggles. Mr. Lustig

282. Water Resources Law. (3) Study of the use of water as a natural resource. Topics include rights in water, irrigation, water pollution, water development and control, and the use of water in other countries. Mr. Jennings

285.7. Torts II. (2) An advanced course in Torts. Includes general principles of damages, specific performance, and injunction. This course also considers the remedial problems in complex commercial litigation.

Mr. Heafey, Mr. Brosnaham

287. Urban Planning and Land Use Regulation. (3) This course deals with the legal framework within which land use decisions affecting metropolitan areas are made. The roles of state, regional, county and municipal bodies are examined, and attention is paid to the increasing impact of the federal programs. Among the land use techniques studied for special attention are planning, zoning, subdivision regulation, mapping, and eminent domain. The principal legalistic instruments are considered, including federal laws and regulations, enabling acts, and common law and municipal ordinances. In addition, decisions of the state and federal courts examining the legitimacy and role of land use techniques in various contexts are also treated.

288. Water Resources Law. (2) Water taken as the resource to examine allocative regime for use and water discharge and its economic consequences; allocation of water, water and water policy, governmental conflicts; and decision-making concepts for public investment in resource development and for distribution. Mr. Satlo

289. Student Initiated Courses or Projects. (1 or 2) Open to students who have completed the first year of law school. Mr. Lustig

290. Judicial Externships. (2 or 10) Positions as full-time clerks with the justices of the California Supreme Court. Positions as part-time clerks with judges of the California Superior Court and the United States Court of Appeals. Mr. Lustig

291. Clinical Studies. (10) Students placed in relevant legal offices (e.g., law firms, governmental agencies, judicial bodies, legal staffs of various programs). Students engage in ongoing work for the office and participate in the supervision of an intern. A major piece of legal scholarship under the direction of an individual faculty member pursuant to faculty consent. The Staff

292. Self-Tutorial Seminar. (1-2) Open to students who have completed the first-year curriculum. A program to enable individual self-instruction, primarily in subject matter areas not covered by the regular curriculum. Requires the approval of the faculty to serve as supervisor and approval of the Dean. The Staff

293. Group Research Projects. (1-2) Open to students who have completed the first-year curriculum. A program to enable groups of students to study or research special legal topics of common interests, primarily, but not limited to, those covered by the regular curriculum. Requires the consent of a major piece of legal scholarship under the direction of an individual faculty member pursuant to faculty consent. The Staff

294. Law 295 Administrator and Dean. The Staff

295. Practical Aspects of Law Practice. (2) This seminar involves students in the practical aspects of law practice and the problems faced by new lawyers. Subjects covered include the techniques and strategies of pleading, settling, discovery, motion practice, witness examination and how to get paid for doing all these things. Two judges and several practicing lawyers will be guest speakers. Students will hold interview clients, handle individual cases, draft pleadings, appear at administrative hearings, prepare documents, etc. Students will also participate in a simulated litigation designed to teach necessary practice skills. Mr. Kayne, Mr. Sitkin

296. Legal Internships. (1-10) Open to third-year students who have completed a qualifying seminar in the second year. Review and writing looking toward a major piece of legal scholarship under the direction of an individual faculty member pursuant to faculty consent. The Staff

297. Legal Internships. (1-10) Open to students who have completed the first-year curriculum. A program to enable individual self-instruction, primarily in subject matter areas not covered by the regular curriculum. Requires the approval of the faculty to serve as supervisor and approval of the Dean. The Staff

298. Group Research Projects. (1-2) Open to students who have completed the first-year curriculum. A program to enable groups of students to study or research special legal topics of common interests, primarily, but not limited to, those covered by the regular curriculum. Requires the consent of a major piece of legal scholarship under the direction of an individual faculty member pursuant to faculty consent. The Staff

299. Independent Research Projects. (1-2) Open to students who have completed the first-year curriculum. A program to enable groups of students to study or research special legal topics of common interests, primarily, but not limited to, those covered by the regular curriculum. Requires the consent of a major piece of legal scholarship under the direction of an individual faculty member pursuant to faculty consent. The Staff
Law and Society

Center for the Study of Law and Society
Office, 2224 Piedmont Avenue

Professors:
Richard M. Buxbaum, LL.M.
John E. Coons, J.D.
Bernard L. Diamond, M.D.
Melvin A. Eisenberg, LL.B.
Edwin M. Epstein, Ph.D.
Caso Fouts, LL.B.
Sheldon L. Messinger, Ph.D.

Associate Professors:
Willem K. Muir, Ph.D.

Assistant Professors:
Robert A. Kagan, Ph.D.

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 study with tutorial assistance. Tutorials are supplemented by a variety of courses currently offered in the Law School, the several social science departments so that participating law students may receive basic methodological 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 Society are, in principle, a thesis and 30 units of course work or 36 units of course work and a comprehensive final examination. For law students it is possible to pursue the M.A. under a joint degree program which allows the student to take some courses that will count towards both the J.D. and the M.A. degrees. In addition to the Law School courses needed for the J.D., law students do the equivalent of one year of work in law and society, including a thesis, and receive both the J.D. and M.A. degrees at the end of approximately four years of graduate study.

In addition, social science students will be expected to gain adequate literacy in the handling of legal materials, and law students to gain facility in working with social science ideas and research methods. The details of each student's program are arranged in consultation with the student's adviser.

298. Individual Study and Research. (1-8) Individual conferences to be arranged. Prerequisite: primarily for law students and social science graduate students doing advanced work in the area of law and society. Individual research under tutorial supervision.


Law and Society (Sociology 119)
Deviance and Social Control (Sociology 212)
Sociology of Law (Sociology 219).

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 with a grade-point average of C or higher. With the exception of the majors in physical education and paleontology, the subject preparation for majors in the biological sciences is as follows:

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)

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 specific graduation 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.

Broadth Requirements. Each student in the College is required to include 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 communication of ideas and a sensibility 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 and nonliving matter 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, development studies, Dutch studies, environmental studies, film, genetics, neurobiology, political economy of industrial societies, religious studies, social welfare and women’s studies. 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 the support of a College faculty member, pursue an individual major designed to satisfy special academic goals. The ninety-seven students currently enrolled in individual majors have developed major programs ranging from urban planning policy to the history of physics. Thus the number of options available to students outside traditional disciplines are many and varied. At the present time approximately fifteen percent of undergraduates in the College are enrolled in these group, field, and individual major programs.

Special Programs

The Division of Special Programs (formerly the Division of Interdisciplinary and General Studies or D.I.G.S.) was established in 1968. Its mission is to develop and administer innovative and interdisciplinary courses and programs in the College of Letters and Science that do not belong to a single department. At present it administers the field majors in the humanities and the social sciences and the group majors in environmental studies, film, genetics, neurobiology, religious studies and world civilizations. In addition to these majors, it offers special interdisciplinary courses such as Human Sociobiology and Introduction to Western Civilization. It has also been charged with administering the Summer Travel Program. For complete descriptions of the Special Programs majors and major courses, please see the entries listed alphabetically by major.

At the present time the humanities field major is undergoing revision, but it is expected that it will be offering
Afro-American Studies

Department Office, 3335 Dwaine Hall

Professor: Regniat Jones, Ph.D.
(Chairman)

Associate Professor: William M. Banks, II, Ph.D.

Assistant Professors: Barbara Christian, Ph.D.
Hernando Contreraz, Ph.D.
Elnora Peters, Ph.D.

Assistant Professor: Eleanor de Almeida

Lecturer: Margaret Witkerson, Ph.D.

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 particularly 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 concentrating in the social sciences must complete a sequence which provides intensive practice in the techniques of argument and exposition of themes and issues in Afro-American life and culture.

AFRICAN AMERICAN STUDIES 5A-5B. Life and Culture in the United States. (5-5) Four hours of lecture per week. This course is a multi-disciplinary introduction to Afro-American Studies, from a humanities perspective (5A) and a social science perspective (5B).

AFRICAN AMERICAN STUDIES 5A. Life and Culture in the United States. (5) Four hours of lecture per week. This course presents an introduction to Afro-American culture by means of audio-visual media, lectures, and discussion. An examination of selected forms, themes, and individuals with emphasis upon understanding cultural expression, in historical context, as statements of meaning and identity.

AFRICAN AMERICAN STUDIES 5B. Emphasis on the social experience of Afro-Americans: an interdisciplinary approach, designed to help students understand the forces and ideas that have helped shape both the individual and collective experience of black Americans.

UPPER DIVISION COURSES

AFRICAN AMERICAN STUDIES 109A-109B. Black Economic History. (5) Four hours of lecture per week. Prerequisite: Afro-American History; introductory course in economics is strongly recommended. The black experience's economic status in American society; the role of racism in the thwarting of minority group interests. 109A will cover the period from 1619 to 1861, 109B from 1861 to 1919. Mr. Jackson (Sp).

AFRICAN AMERICAN STUDIES 110. Black Community Development: A Historical Perspective. (5) Four hours of lecture per week. This course provides an introduction to the economic, social, and political development of black communities in the United States from slavery to the contemporary era; focus on the spatial, social, and economic conditions of the black mass. Ms. de Almeida (Sp).

AFRICAN AMERICAN STUDIES 111. Minority Groups in the American Economy. (4) Four hours of lecture per week. Prerequisite: lower division economics is strongly recommended. The status of selected racial minority groups with respect to their economic position in society. Special attention to various strategies of economic development. Mr. Jackson (Sp).

AFRICAN AMERICAN STUDIES 112. Selected Topics and Issues in Black Life and Culture. (5) Four hours of lecture per week. Prerequisite: course 5 or introductory course in sociology. Examination of the development, structure, and function of social institutions as they affect and are affected by blacks. The sociology of the Afro-American experience will be studied through analysis of the religious, political, economic, and familial dimensions of black life. Satisfies American History and Institutions requirement. Mr. Banks (Sp).

AFRICAN AMERICAN STUDIES 117A. Black People and Psychology: Historical Development. (5) Four hours of lecture per week. Prerequisite: AAS 5 (Social Science) or introductory sociology. AAS 118A prerequisite for AAS 118B. An introduction to the topic of domination, including principles of oppression, resistance, and liberation. The comparative study of racial and sexual domination in American institutional life, with attention to the interconnectedness of race and sex in the United States. 118A prerequisite for AAS 118B; 118B prerequisite for AAS 118C. Mr. Banks (Sp).
155A-155B. Images of Black Women in Literature. (8–8) Four hours of lecture per week. Prerequisite: completion of the reading and composition requirement. The black woman as portrayed in Western literature and in Afro-American writing. Analysis of the cultural themes that continue to the various images projected. 155A: Slavery to the 20th Century; 155B: Contemporary images. Mr. Peters (W, Sp)

156. Major Afro-American Authors. (4) Four hours of lecture per week. Prerequisite: completion of the reading and composition requirement. An analysis of contributions of major Afro-American authors. Mr. Peters (W, Sp)

158. The Literature of the Black Africa (in English). (5) Four hours of lecture per week. Prerequisite: completion of the reading and composition requirement. The literature of the black people in Africa. Professor Peters (W, Sp)

160. Creative Writing. (5) Four hours of lecture per week. Prerequisite: completion of the reading and composition requirement; consent of instructor. Designed to provide intensive study of craft in Afro-American poetry and fiction, as well as practice in the genre of the student's choice. May be repeated once for credit. Mr. Jones (Sp)

162A. African Dance and Rhythms. (2) Formerly 191C. Three hours of lecture and three hours of rehearsal and research per week. Study of the dance and rhythms of Africa and their role in the daily life of the African culture. Performance and demonstration required. Mr. Lazetzkop (W)

167A. Third World Cinema. (5) Four hours of lecture and 2 hours of discussion per week. A survey of third world films produced by Western and African authors and poets. Mr. Martin (W)

170. Student Activism in the University and Society. (5) Four hours of lecture per week. Prerequisite: instructor's approval. Focuses on student activism in the university and the role of the student as a citizen. Mr. Johnson (W)

171. The Sociology of Black Leadership in American Society. (5) Four hours of lecture per week. Prerequisite: completion of one lower division course in sociology recommended. The leadership phenomenon in the history of Afro-Americans. Mr. Banks (W)

172. Black Revolt: Past and Present. (5) Four hours of lecture per week. Prerequisite: completion of the reading and composition requirement. Analysis of the black revolt in the United States. Mr. Jackson (in charge) (W)

173. Law and the Black Community: The Crime-Prison-Community Nexus. (5) Four hours of lecture per week. Analysis of the roles and responsibilities of the police, district attorney, trial courts, Grand Jury; the interaction of those roles with the black community (as well as the general community). Mr. Johnson (charge) (Sp)

177. Education and Equality. (5) Four hours of lecture per week. Recent research and theory about education and equal opportunity. Areas include the nature of educational inequities and the relationship between educational attainment and socio-economic equality. Mr. Johnson (in charge) (W)

178. The Black Child. (5) Four hours of lecture per week. The growth and development of the Black child through adolescence. Mr. Jones (Sp)

179. Political Development and Socialization of Black Children. (5) Formerly 111. Four and one-half hours of lecture per week. Prerequisite: course 177 or 178; completion of the reading and composition requirement. An analysis of the development and socialization of those who have received credit for 191A, winter quarter 1974. Mr. Jackson (in charge) (W)

180. Black Politics in the United States. (5) Four hours of lecture per week. Prerequisite: History 169A and 169B or comparable course in Afro-American history or consent of instructor. An historical and contemporary analysis of the political role of black people in the United States. Mr. Johnson (in charge) (W)

181. Health Status and Health Delivery Systems in the United States. (5) Four hours of lecture and 1 hour of discussion per week. A study of the health status of blacks in America and the health delivery systems with an emphasis on policies toward manpower, medical training, public health, and education. Mr. Daniels (in charge) (W)

182. Black Life and Culture in the Caribbean. (5) Four hours of lecture 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 a film showing, a survey of the history from the early years through the 1950's. Mr. A. Johnson (F)

183. African Liberal Movements. (5) Four hours of lecture per week. An overview of the political systems in Southern Africa and Guinea-Bissau. The philosophies, strategies, and tactics of the African Liberation Movements as they appear in popular literature and in film. Mr. Jackson (charge) (F)

184. Contemporary Black Political Life. (5) Four hours of lecture per week. Analysis of the contemporary political involvements of black people, starting with the Civil Rights movement and progressing through the various forms and expressions of black political activity that exist today.

188A–188B. Politico-Economic Development in the New World. (5–5) Four hours of lecture per week. Prerequisite: lower division course in economics strongly recommended. Comparative analysis of the theoretical and practical aspects of development of black societies in Africa and the New World since 1850, from colonial economies to independent or quasi-independent status. Mr. Jackson (Sp)

189. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of the reading and composition requirement and a college level course in American history or consent of instructor. Examination of the evolution of black political thought from the Civil Rights movement and progressing through the various forms and expressions of black political activity that exist today. Mr. Jackson (Sp)

189A–189B. African-American Thought. (5–5) Two hours of lecture and 1 hour of discussion per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

190A–190B. Traditional Socio-Economic Systems of Africa. (5–5) Two hours of lecture per week. Prerequisite: 188A or 188B. A multi-media, audiovisual approach to the formation of black cultures through the institution of slavery. Mr. Jackson (Sp)

191J. Afro-American Autobiography as Literature. (5) Four hours of lecture per week. Prerequisite: completion of a lower division course in Afro-American Studies. Examination of autobiographies of black people, with a focus on the roles of autobiography and self-creation in black culture. Mr. Johnson (Sp)

192C. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192D. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192E. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192F. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192G. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192H. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192I. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192J. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192K. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192L. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192M. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192N. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192O. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192P. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192Q. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192R. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192S. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192T. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192U. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192V. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192W. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192X. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)

192Y. African-American Thought. (5) Four hours of lecture per week. Prerequisite: completion of American history or consent of instructor. Mr. Jackson (Sp)
in any area or period of Ethnic-American social and cultural history. Course will focus upon the ways in which historians can use materials such as folk narrative, humor, music, art — subjects that have generally been neglected by historians. The student will be responsible for a major research paper.

Ms. Christian (in charge) (W, Sp)


(1–5) Enrollment is restricted by regulations which historians can use materials such as folk narrative, humor, music, art — subjects that have generally been neglected by historians. The student will be responsible for a major research paper.

The Staff (F, W, Sp)

199. Supervised Independent Study and Research.

(1–5) Enrollment is restricted by regulations listed on page 36. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

Ancient History and Mediterranean Archaeology

Group Major Office, 5303 Dwintelle Hall

Professors:

Paul J. Alexander, Ph.D. (Near Eastern History)
Daniel A. Armit, Ph.D. (History of Art)
J. K. Anderson, M.A. (Folklore)
John L. Beazley, D.Litt. (Ecclesiastical History)
George F. Bates, Jr., Ph.D. (Near Eastern Archaeology)
David Dubin, Dr. Jor., Ph.D., D. Litt. (Near Eastern History)

Associate Professors:

Guylly Azarpay, Ph.D. (Near Eastern History)
C. E. Armstrong, Jr., Ph.D. (Classical Archaeology)
Wolfgang J. Heimpel, Ph.D. (Classical Art and Archaeology)
Leonard H. Lesko, Ph.D. (Egyptology)

Assistant Professors:

Beruch M. Bakker, Ph.D. (Artistic Studies)
Stanley H. Brandes, Ph.D. (Anthropology)

Professors:

Victor R. Gold, Ph.D. (Classical Art and Archaeology)
Fr. Michael D. Quiggin, O.F.M. (Arabic) (Visiting)

Assistant Professor:

William J. Futo, Ph.D. (Classical Art and Archaeology)

Señor Staff:

Frank Arase (Nuclear Chemistry)

The Major

There is no undergraduate major.

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 and 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, one of which is a major subject, two as minor subjects.

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. Applicants must have had sufficient training to undertake advanced work in at least one ancient language.

M.A. Requirements. The M.A. in the area of archaeological and art specializations requires 30 quarter units and a thesis. The M.A. in the purely historical area requires 36 quarter units, to be followed by a written examination, in the major subject. All M.A. candidates are expected to pass at least one modern language examination before the degree is awarded.

Ph.D. Requirements. There are no specific course requirements. Students are expected to take considerate seminar work in at least two of the departments represented in the program. Candidates must pass examinations in two modern languages and two ancient languages appropriate to the fields of study. They are then eligible for the Ph.D. qualifying examinations, both written and oral, which test competence in the major and minor subjects. Upon successful completion of these requirements, the student proceeds to the preparation and writing of a dissertation under the guidance of a three-person committee. The dissertation must be approved by the committee and be in a final form before the student is recommended for the Ph.D. degree.

For further information, inquiries should be addressed to the Graduate Group in Ancient History and Mediterranean Archaeology

Anthropology

Department Office, 232 Kroebert Hall

University Professor:

Sherwood L. Washburn, Ph.D.

Professors:

William R. Beekman, Ph.D.
Burton Benedict, Ph.D.
Brent Berlin, Ph.D.
Gerald D. Berreman, Ph.D.
J. Desmond Clark, Ph.D.
Florence Colpitt, Ph.D.
Barbara J. Davis, Ph.D.
Griffith Dutton, Ph.D.
Kristi Dutton, Ph.D.

Associate Professors:

James N. Anderson, Ph.D.
William H. Grimes, Ph.D.

Assistant Professors:

Stanley Brandes, Ph.D.

The Department of Anthropology offers students the opportunity to study mankind from the broadest historical and geographic perspectives. Courses in the department offer knowledge of the physical nature of mankind as well as the social and cultural aspects of behavior. Lower division courses are intended to give a general understanding of human evolution, prehistory, 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 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 program to meet the graduate program 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 about their programs or about courses should inquire Room 213 Kroebert Hall.

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 exhibition hall is used for instructional and educational purposes, particularly in connection with class work. Those interested may address the Director, 103 Kroebert Hall. For further information on the Lowie Museum, see Index.

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 functions both independently and as a link to the Campus Computer Center. Courses 190A–190E, 190D, 190E, 190L–190M, 191B, and 252 use these facilities intensively. Package programs 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 are 25 elective upper division units to total 40 units of upper division courses in anthropology. These elective units may be taken from any of the groups I–V; however, more than 10 units of courses 191, 196, 197, and 199 combined 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 requirements (Anthropology 1, 2, 3, 4) before they can be accepted into the major. Only a small percentage of applicants can be accepted. 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."

Honors 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 3.3 or higher and a grade-point average of 3.5 or higher in courses 191, 196, 197, and 199 combined will be accepted toward fulfilling major requirements. 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 supersede an A.B. in anthropology. The graduate program is oriented toward the doctorate, and only candidates for the Ph.D. will be accepted. The A.M. 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, students attend seminars, carry out individual research projects related to their fields of specialization, and prepare for the Ph.D. oral qualifying examination. With the successful passing of this examination, students are 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 research field, which normally requires a minimum of one year. The writing of the dissertation customarily 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, quarterly offerings, course descriptions, and schedule of classes are available in the Course Catalog in 215 Knobloch 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. (6) Three 1-hour lectures and one 1-hour section meeting per week. May be repeated with consent of instructor. Prerequisite: course 105 or the consent of the instructor. Mr. Sarich (F), Mr. White (Sp).

2. Introduction to Archaeology. (6) Three 1-hour lectures and one 1-hour section meeting per week. Prehistory and cultural growth. Mr. Isaac (W).

3. Introduction to Social and Cultural Anthropology. (6) Three 1-hour lectures and one 1-hour consultation meeting per week. Structure and dynamics of culture. Ms. Nader (F); Mr. Benedict (Sp).

4. Introduction to Linguistic Anthropology. (6) Two and a half hours of lecture and two hours of sections per week. Language in its interrelationships with man's biology, his culture and his society. Mr. Berlin (W).

5. Human Evolution. (6) Three hours of lecture and one hour of discussion per week. Limited to freshmen. Reading and written papers developing the salient problems of understanding human evolution. Why the understanding of evolution should be a part of every person's education.

6. Freshman Seminars. (2) One 2-hour meeting per week. Prerequisite: appropriate lower division lecture course (Anthropology 1, 2, or 3) completed or taken concurrently. Limited to 12 freshmen students per section. Discussion, substantial reading and written papers developing the salient problems which guide anthropological work.

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 an opportunity for 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 the antecedents 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 Primatology

100. Fossil Man. (6) Prerequisite: course 1 or equivalent. Origin and relationships of the extinct forms of mankind. Mr. White (F).

102. Human Variation In an Evolutionary Perspective. (6) Three 1-hour lectures per week. Prerequisite: course 100, or 102, or 105 (may be taken concurrently). Enrollment limited to twelve students: primarily for majors in anthropology and the life sciences. Descriptive and analytical techniques and methods applicable to the study of intra- and inter-group resemblances and differences. Mr. Sarich (Sp).

104L. Physical Anthropology Laboratory. (2) Two 3-hour laboratory sessions per week. Prerequisite: course 100 or 103 or consent of the instructor. Theories and methods in advanced human osteology. Variable topics include paleoanthropology, palaeoecology, forensic anthropology, and nonmetric and metric analysis, dental anthropology, computer use and statistical applications. May be repeated with instructor's consent as content changes. Enroll limited to 12 students.

108. Primate Evolution. (6) Prerequisite: course 1 or equivalent. A consideration of the major groups of primates with emphasis on the evolution of behavior. Mr. Rowe (F), Visitor (W).

108L. Primate Evolution Laboratory. (2) Four 3-hour lecture and laboratory sessions per week. Prerequisite: course 108 (preferably taken concurrently). Enrollment limited to twelve students; primarily for majors in anthropology and the life sciences.

109. Experimental Anthropology. (6) Prerequisite: lower division anthropology courses from the group 1, 2, 3. The course will illustrate the use of the combination of experimental and evolutionary approaches to understanding problems such as adaptation, learning, and social life. Emphasis will change from year to year.

110. Primate Social Behavior. (6) Three hours of lecture, two hours of laboratory sessions per week. Prerequisite: course 109 (preferably taken concurrently). Mr. Sarich (Sp).

110L. Primate Social Behavior Laboratory. (2) Four hours of lecture and laboratory sessions per week. Prerequisite: course 110. Enrollment limited to twelve students; primarily for majors in anthropology and the life sciences. Ms. Doihin (F).

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 their biological implications. Mr. Sarich (Sp).

112. Archaeology of North America. (6) Three hours of lecture per week. Prerequisite: course 2 or consent of instructor. Prehistory of North American prehistoric culture areas; relations with historic Indians. Visitor (F).

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 their neighbors. Mr. Graham (F).

125. The World of the Ancient Mayas. (4) Three hours of lecture per week. Prerequisite: upper division standing. Intensive study of the culture, sites, and chronology of the Preclassic Olmec civilization.

129A-122B-128C. Old World Prehistory. (5-5-5) Prerequisite: upper division standing or consent of instructor. Any quarter of this course may be taken independently, and no quarter is prerequisite to any other. Mr. Clark (F).

129A. Africa. Mr. Clark (F).

129B: Europe and Asia in the Pleistocene.

129C: Post-Pleistocene cultural phenomena of Europe and Asia.

130D. Special Topics in Old World Prehistory. (5) Three hours of lecture and one hour of discussion/demonstration per week. Prerequisite: upper division standing or consent of instructor. Prehistory of Australasia, Iron Age cultures of the Mediterranean, Population Growth and 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. Laboratory work at archaeological sites and materials. Depending upon study area selected, coverage may include reconstructions, mapping, recording, excavation. May be repeated for credit with consent of instructor.

130A. 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 Lowie Museum of Anthropology.

131A. Science and Archaeology. (5) Prerequisite: course 2. A survey of the application of techniques deriving from the physical and biological sciences to the interpretation of archaeological materials.

132. Archaeology and Sociology. (5) Three hours of lecture per week. Prerequisite: course 2 or consent of instructor. Archaeological research methods and their uses in the study of man's past.

133. Field Course in Archaeological Method. (6) One hour of lecture and one 8-hour (Saturday) field course meeting per week. Prerequisite: course 2 or the consent of instructor. Enrollment limited to eighteen students, admitted by the consent of the instructor; may be repeated without duplication of credit. Advanced field investigation, and guidance in preparation of materials for publication. Visitor (Sp).

134. Archaeological Method. (6) One 3-hour laboratory meeting with three hours of independent laboratory work required per week. Prerequisite: course 133 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.

135. Field Practice in Archaeology. (15) Forty hours of lab per week. Prerequisite: consent of instructor. Practical experience in the fieldwork of professional archeological sites and materials. Depending upon study area selected, coverage may include reconstructions, mapping, recording. May be repeated for credit. Limited enrollment.

136A. 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.
Group III. Social and Cultural Anthropology: Theory and Method

140. The Nature of Culture: An Introduction to Cultural Anthropology. (5) Not open for credit to students who have taken course 3. Advanced level introduction to cultural anthropology for non-majors. Mr. Brandes (W)

141. Comparative Society. (5) Prerequisite: course 3 or consent of the instructor. Theories of social structure and social change in societies throughout history. Prerequisite: course 4 or consent of the instructor. Mr. Brandes (W)

142. Kinship and Social Structure. (5) Prerequisite: course 3 or consent of the instructor. Theories of kinship and family types throughout the world; techniques of kinship and structural analysis. Mr. Grubert (Sp)

143. Plural Societies. (3) Three hours of lecture per week. Prerequisite: course 3 or consent of instructor. A critical examination of the theories of plural societies with ethnographic examples from various parts of the world. Mr. Graburn (W)

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, and structural change. Mr. Graburn (Sp)

145. Urban Anthropology. (5) Three hours of lecture per week. Prerequisite: course 3 or consent of instructor. A consideration of anthropological concepts and methods for the study of the urbanization process in local and global context. Mr. Graburn (F)

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. Graburn (W)

147. Anthropology and Development. (5) Three hours of lecture per week. Prerequisite: course 3. Critical examination of the relationships of applied anthropology to theoretical anthropology. Mr. Brandes (Sp)

148. Man's Ecological Relationships. (5) Three hours of lecture per week. Prerequisite: course 3 or consent of instructor. Survey of theories, methods, and applications of the ecological perspective to cultural and physical attributes of human populations. Mr. Graburn (Sp)

149. Culture and Personality. (5) Three hours of lecture per week. Prerequisite: course 3 or consent of instructor. Relationships of cultural, social, and personality factors in human behavior; personality in representative societies; techniques for studying culture-personality relations. Mr. DeVos (Sp)

150. Social Problems in Changing Cultures. (5) Three hours of lecture and two hours of tutorial and special lab. Prerequisite: course 3 or consent of instructor. Cross-cultural approach to conflict in society, race, and personality. Topics: social change, ethnic conflict, migration, and cultural influences on mental illness. Psychocultural methods will be illustrated as they apply to research in these areas. Mr. Bereman (F)

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 such as social change, education, and international technical-aid programs. Mr. Foster (Sp)

153. Introduction to Medical Anthropology. (4) Three hours of lecture per week. Prerequisite: No medical requirements for anthropology students; no anthropological requirements for students in disciplines related to anthropology. Survey of medical anthropology, United States and overseas, of definitions, causes, symptoms, and treatments of illness; of selections of types of medical care available; of organization and evolution of health services; and interactions among practitioners and with patients. Ms. Mackenzie (W)

155. Economic Anthropology. (5) Three hours of lecture per week. Prerequisite: course 3 or the consent of instructor. Economic behavior in nonindustrial societies; its social and cultural setting, and its modern changes. Mr. Graburn (W)

156. Politics and Anthropology. (5) Three hours of lecture per week. Prerequisite: course 3 or the consent of instructor. Theoretical analysis of political phenomena. Mr. Shack (Sp)

157. Law and Anthropology. (5) Three hours of lecture per week. Prerequisite: course 3 or the consent of instructor. A comparative study of the ethnography of law; methods and concepts relevant to the comparative analysis of the forms and functions of law. Mr. Nader (W)

158. Religion and Anthropology. (3) 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 culture. Mr. Mandelbaum (F)

159. The Forms of Folklore. (3) 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. Dundes (F)

160. Narrative Folklore. (3) Three hours of lecture per week. Prerequisite: course 3 or the consent of instructor. The study of folktales, myths, legends, and other forms of verbal art; methods and theories of folklore. Mr. Mandelbaum (Sp)

161. Art and Culture. (5) Three hours of lecture per week. Prerequisite: course 3 or the consent of instructor. Graphic and plastic arts and their relations to culture in non-Western material from the Louvre Museum of Anthropology.

162. Education and Culture. (5) Prerequisite: course 3 or consent of instructor. Anthropological theory and method applied to problems of education in traditional and modern cultures. Mr. Ogbu (F)

164. Man's View of Nature. (4) Three hours of lecture per week. Prerequisite: consent of instructor. Comparative study of man's conceptual organization of his natural universe, especially his views of the biological environment. Implications of folk classification in pre-literate societies for general principles of language, thought, and culture.

165. Advanced Survey of Social and Cultural Anthropology. (5) Three hours of lecture per week. Prerequisite: consent of instructor. Theories and methods of anthropological research and interpretation. Mr. Phillips (Sp)

166A-166B. Research Theory and Methods in Ethnology. (5-6) Three hours of lecture per week. Prerequisite: course 3 or consent of instructor. An introduction to definition of research problems, methods, and techniques for collection, analysis, and presentation of data. Dr. Kay (Sp)

Group IV. Language, Culture and Society

165A-165B-165C. Language, Culture, Society, and the Individual. (5-6-5) Three hours of lecture per week. Prerequisites: courses 3, 165A, or equivalent. 165A is not prerequisite to 165B; 165B is not prerequisite to 165C.

165A. Language in culture; the design of language, language and cognition, language and evolution, linguistic change and culture change. Mr. Grumpp (Sp)

165B. Language in society; social and linguistic aspects of verbal behavior, speech communities, language and social stratification, language and state. Mr. Grumpp (W)

165C. Language and the individual; theories of linguistic competence, acquisition of linguistic competence and of performances, styles, language and individual thought, hypersemantization of language, relation of natural to formal languages. Mr. Grumpp (W)

166. Variation in Language. (4) Three hours of lecture per week. Prerequisite: Two courses in linguistic anthropology or ethnolinguistics. Synchronic and diachronic perspectives; sociolinguistics; language and social change; implications for language change; Variable rules. Mr. Grumpp (W)

167A-167B. Research Theory and Methods in Ethnology. (5-6) Three hours of lecture per week. Prerequisite: course 3 or consent of instructor. An introduction to definition of research problems, methods, and techniques for collection, analysis, and presentation of data. Dr. Kay (Sp)

170A-170B. China. (5-5) Chinese culture and society with emphasis on the village level. 170A. Pre-Communist China. 170B. Communist China.
190L–190M. Laboratory in Analytic Methods. (1–1) Three hours of laboratory per week. Prerequisite: must be taken concurrently with 190A–190B. Entire sequence must be completed to receive credit. P/NP. Mr. Geoghegan (F, W)

Group VI. General Courses

191. Experimental Courses.

191P. Myth. (4) Three hours of lecture per week. Prerequisite: Upper-division standing. Survey of contemporary scholarship dealing with mytho-ematizing materials from North and South America, Africa, and Oceania. Mr. Dundes (W)

195. Undergraduate Seminars. (5) One 2-hour meeting and two consultation hours per week. Prerequisite: grade of B or better in an upper division course for which an associated seminar is scheduled, and/or consent of instructor. Enrollment limited. May be repeated without duplication of credit. Some, but not all, lecture courses will be followed, usually in the next quarter, by a seminar offering an opportunity for advanced study of the subject matter, emphasizing reading and discussion. Mr. Washburn (W); Visitor (W)

196. Fieldwork. (3–15) Prerequisite: consent of instructor. Individual field experience in anthropological research under the sponsorship of a faculty member with conferences to be arranged and written reports required. May be repeated up to a maximum of 15 units only. The Staff (F, W, Sp)

**197A–197B. Field Studies in Plural Society. (5–6) Two hours of lecture per week. Prerequisite: Course 3, Junior or Senior standing, or consent of Instructor. Each student will spend at least ten hours each week in a volunteer work situation in a community organization which focuses on the needs of an ethnic segment of the population. Two hours weekly must be spent in seminar. Credit and grade to be awarded upon completion of the sequence. (F, W, Sp)

197C. Field Study in Anthropology. (1–5) Individual conferences to be arranged. Prerequisite: consent of Instructor. Supervised experience relevant to specific aspects of anthropology in off-campus organizations. Regular individual meetings with faculty sponsor and written reports required. The Staff (F, W, Sp)

H198A–H198B–H198C, Senior Honors. (5–6–5) Open only to seniors in Anthropology who are seeking an A.B. degree with honors. Systematic readings in the history of anthropology and in significant modern developments within the field, collection and analysis of research materials, and the preparation of an honors thesis, in close consultation with individual members of the staff. Group and individual tutorials. Credit and grade will be awarded upon completion of full sequence. The Staff (F, W, Sp)

199. Supervised Independent Study and Research. (2–6) Individual conferences to be arranged. Enrollment limited to 12. Prerequisites listed on page 36. Must be taken on a passed or not passed basis. The Staff (F, W, Sp)

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.

200A. Human Evolution. 200B. Genetic Anthropology. 200C. Primate Behavior. 200D. Primate Socialization. 200E. Primate Evolution. 200F. Comparative Anatomy. 200G. Fossil Man. 200H. Molecular Anthropology. 200I. Biochemical Anthropology. 200J. Human Variation. 200K. Human Adaptation. 200L. Primate Ecology. 200M. Osteology. All seminars may be repeated for credit with consent of instructor. Mr. White (F); Mr. Serich, Mr. White (W); Mr. Washburn (Sp)

220. Archaeology Seminars. (4) Two hours of lecture per week. Prerequisite: consent of instructor.

220A. Western North America. 220B. Mesoamerica. 220C. Archaeology and Ethnology of South America. 220D. African Prehistory. 220E. African Prehistory/Archaeology. 220F. European and Near Eastern Prehistory. 220G. Method. Mr. Graham, Mr. Rowe (F); Mr. Graham, Mr. Isaac, Visitor (W); Mr. Clark, Mr. Graham (Sp)

240A–240B–240C. Fundamentals of Anthropological Theory. (5–5–5) One 2-hour lecture and two 2-hour section meetings per 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. Brands/Mr. Foster; Mr. Graburn/Mr. Shack; Ms. Colson/Mr. Mandelbaum

250. Seminars in Social and Cultural Anthropology. (4) Two hours of lecture per week. Prerequisite: consent of the Instructor. Several one-quarter seminars will be offered from the following list: consult departmental listings for accurate course information:

- 250A. Culture and Personality
- 250B. Deviance
- 250C. Applied Anthropology
- 250D. Economic Anthropology
- 250E. Politics
- 250F. Religion
- 250G. Social Issues
- 250H. Art and Culture
- 250I. Recent Developments
- 250J. Ethnological Field Method
- 250K. Theory of Research and Analytical Methods
- 250L. Social Stratification
- 250M. Urban Anthropology
- 250N. Ecological Anthropology
- 250O. Social Anthropology
- 250P. Kinship
- 250Q. Education
- 250R. Special Topics to be announced

May be repeated for credit with consent of instructor. Mr. Mandelbaum, Mr. Graburn, Mr. Ogbu (F); Mr. Berreman/Ms. MacKenzie, Mr. Potter (W); Mr. Brands, Mr. Geoghegan, Ms. Nader/Mr. Potter (Sp)

251. Two-Quarter Seminars on Social and Cultural Anthropology. (4–4) 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:

- 251A–251B. Comparative Social Institutions
- 251C–251D. Social Interaction
- 251E–251F. Social Change
- 251G–251H. Analysis of Field Data
- 251I–251J. Education and Culture
- 251K–251L. Research Design
- 251M–251N. Culture and Personality
- 251O–251P. Special Topic to be announced

May be repeated for credit with consent of instructor.

255A–255B–255C. Medical Anthropology. (4–4–4) Three hours of lecture per week. Prerequisite: background in behavioral or health science. Credit and grade will be assigned upon completion of full sequence. Consult departmental listings for accurate course information:

- 255D. Recent Developments
- 255E. Social Change
- 255F. Religion
- 255G. Color Categorization
- 255H. Urban Anthropology
- 255I–255L. Fieldwork
- 255M. Urban Anthropology
- 255N. Urban Anthropology
- 255O. Social Anthropology
- 255P. Special Topics to be announced

May be repeated for credit with consent of instructor.

257A–257B–257C. Preseminar in Linguistic 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 anthropoogy. Topics in ethnographic semantics, language development, natural conversation, folk biological nomenclature, formal rule systems. Linguistic Anthropology Staff

258. Area Studies Seminars. (4) Two hours of lecture per week. Prerequisite: consent of instructor.

280A. Contemporary Latin American. 280B. Africa South of the Sahara. 280C. South Asia. 280D. China. 280E. Japan. 280F. Southeast Asia. 280G. Oceania. 280H. Special Topics to Be Announced. Mr. DeVos (W)


295. History and Theory of Anthropology. (4) Two hours of lecture per week. Prerequisite: consent of instructor.

299A–299B. Supervised Research. (4–8–4) Two hours of lecture per week. Prerequisite: consent of instructor.
Art and History of Art

Practice of Art

Practice of Art Office, 238 Kroeber Hall

Professors:
Elmer M. Bischoff, M.A.
Sidney Gordin
Robert Hartman, M.A.
Karl A. Kasten, M.A.
James McCray, M.A.
James Ruvolo, M.A.
Harold Paris
Felix Ruvolo
David Simpson, M.A.

Associate Professors:
Boyd G. Allen, M.A.
Jerold Ballaine, M.F.A.
(Chairman)

Mr. Allen, Mr. Balialne, Mr. Kasten (F, W, Sp)

Lower Division. Art 2A, 2B, 3, 14A with satisfactory grades. Students wishing to declare a major in art must see their assigned major adviser to have a declaration of major petition signed. The petition is then submitted to the College of Letters and Science in Campbell Hall by the student.

Lower Division. Art 2A, 2B, 3, 14A, one of the following: Art 4, 14B (note that 2A is prerequisite to 2B; 2A-2B are prerequisite to 3 and 4, 14A is prerequisite to 14B), and two of the following: History of Art 30, 31, 40, 41, 60, 61.

Upper Division. 28 units of studio art, 10 units of History of Art, and Art 120 or Art 121.

It is a requirement for the major that the student complete at least 12 units of upper division studio art courses under three instructors of the regular staff.

Honors Program in the Practice of Art. Students 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, enroll in the honors program not later than the second term of the senior year. In special cases, other students may so enroll on the recommendation of the major adviser and by permission of the Dean.

The honors program will consist of a period of independent study under course H195A-H195B-H195C which will culminate in the submission of a body of work called the "Honors Project," upon which the student's performance will be graded. This program must be taken for a minimum of two quarters and a maximum of three quarters, comprising a minimum of 8 units and a maximum of 12 units.

Graduate Programs

The Department of Art and History of Art offers programs of graduate study leading to the M.A. degree and the M.F.A. degree in Practice of Art.

Further information concerning these programs may be obtained from the Practice of Art office, 238 Kroeber Hall.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSES

2A. Form in Drawing. (4) Three 3-hour studio classes per week. Introduction to the basic elements of form and their interrelationships. 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-2B. Introduction to the elements of form and their relationships to the human figure. The Staff (F, W, Sp)

4. Materials of Painting. (4) Three 3-hour studio classes per week. Prerequisite: course 2A-2B. An exploration of the techniques and methods of painting. Mr. Allen, Mr. Ballaine, Mr. Kasten (F, W, Sp)

14A-14B. Introduction to Sculpture. (4-4) Three 3-hour studio classes per week. 14A is prerequisite to 14B. 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 studio courses to enter upper division courses.

102. Advanced Drawing And Painting. (4) Three 3-hour studio classes per week. Group Prerequisites.

102A. Ms. Brown
102B. Mr. McCray
102D. Mr. Ruvolo
102E. Mr. Kasten
102F. Mr. Hartman
102G. Mr. Bischoff
102H. Mr. Allen
102I. Mr. MiyasakI
102K. Mr. Simpson
102M. Mr. Ballaine
102V. Visitors

103A. Advanced Drawing and Composition. (4) Formerly 100. Three 3-hour studio classes per week. Prerequisite: 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 in residence.

The Staff (F, W, Sp)

103B. Human Figure Drawing. (4) Formerly 103. Three 3-hour studio classes per week. Prerequisite: 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. Prerequisite: 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. Mr. Kasten, Mr. MiyasakI, visitors (F, W, Sp)

107. Practice In the Graphic Arts: Emphasis on Lithography. (4) Three 3-hour studio classes per week.

Mr. McCray (F, W, Sp)

114. Advanced Sculpture. (4) Three 3-hour studio periods per week. Prerequisite: group prerequisites.

114B. Mr. Gordin
114C. Mr. Paris
114D. Mr. Voulikos
114E. Mr. Melchert
114G. Mr. Wall
114V. Visitors

*120. Art Analysis (Emphasis on Painting). (4)

NOTE: For key to symbols, see page 36.
History of Art

History of Art Office, 405 Doe Library

Professors:

Svetlana Alpers (Mrs. Paul J.), Ph.D.
Darrell A. Ames, Ph.D.
James Cahill, Ph.D.
Herschel B. Chipp, Ph.D.
L. D. Ettinger, D.Phil.

Associate Professors:

Jacques de Caso, Ph.D.
Loren Partridge, Ph.D.
Joanna Williams (Mrs. Chovit), Ph.D.

Assistant Professors:

Yoshiki Shimizu, Ph.D.
Lawrence A. Silver, Ph.D.

Lecturers:

Alfred Frankenstein, Ph.B., D.F.A. (hon.) (Emeritus)
Peter H. Setz, Ph.D., D.F.A. (hon.)
Jean V. Barn, Agédé, (Emeritus)
Walter W. Hom, Ph.D. (Emeritus)

History of Art

102 / L&S: Art and History of Art

Three hours of lecture per week. Prerequisite: course 2A, 2B, and ten units of Art History. A survey course analyzing ideas in art. Primarily for art majors.

Mr. Simpson (Sp)

121. Art 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, including sculpture, painting, graphics, photography and architecture. Primarily for art majors.

Mr. Gordin (Sp)

146. Ceramics Sculpture. (4) Three 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 materials as sculpture.

Mr. Voulkos (F, W, Sp)

SPECIAL STUDY COURSES

H195A-H195B-H195C. Special Study for Honors Candidates in the Practice of Art. (4-4-4) Individual hours to be arranged. Prerequisite: eligibility for admission to the honors program. Credit and graded. May 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. (1-5) Enrollment is restricted by regulations listed on page 96. 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.

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)

212. 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)

294. M.F.A. Seminar. (4) Three hours of seminar per week. Staging 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)

295. 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)

298. Special Study for Graduate Students. (1-4) Staff approval required.

The Staff (F, W, Sp)

Major Program

LOWER DIVISION COURSES

30. The Art of India and Southeast Asia. (5) Four hours of lecture and one hour of discussion per week. Prerequisite: course 212.

31. The Art of China and Japan. (5) Four hours of lecture and one hour of discussion per week. Prerequisite: course 212.

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. (5) Four hours of lecture and one hour of discussion per week. Ancient Greek and 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.

61. Introduction to the History of Art: Sculpture. (5) Three hours of lecture and one or one-and-a-half hours of discussion per week. Selected examples of sculpture emphasizing the human figure, including portraits and narrative reliefs, from the Pyramid Temples to Picasso.

UPPER DIVISION COURSES

Open to nonmajors. General prerequisite: upper division standing or consent of instructor. Unless otherwise stated, the "A" part of a sequence is not prerequisite to the "B" part. No part A, B, or C is prerequisite to another.

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.

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.

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.

136A-136B-136C. The Art of India. (5-5-5) Three hours of lecture per week.

136A. 500-1500 A.D., primarily the Hindu temple and its sculpture.

136B. 1500-1950 A.D., primarily the Hindu temple and its sculpture.

136C. 1550 A.D. to the present, primarily Muslim and Rajput miniature painting.

137. The Art of Southeast Asia. (5) Three hours of lecture per week. The art of Cambodia, Thailand, Burma, the Philippines focused on the period from 400 to 1500 A.D. Sculpture and architecture will be considered as a balance of Indian and indigenous elements.

140A-140B-140C. Greek Art. (5-5-5) Three hours of lecture and one optional hour of discussion per week. Prerequisite: upper division standing and consent of instructor.

140A. Greek Art of the Classical Period. 480-323 B.C.

140B. 323 B.C. to 323 A.D., primarily the Greek Empire and its sculpture.

140C. Greek Art of the Hellenistic Period. 323-30 B.C.

141. Aegean Art. (5) Three hours of lecture and one hour of discussion per week. Prerequisite: upper division standing and consent of instructor. The art of Crete and Greece in the Bronze Age, with attention to connections with neighboring cultures.

144A-144B. Etruscan and Roman Art. (5-5) Three hours of lecture and one hour of discussion per week. Prerequisite: upper division standing and consent of the instructor. The first part (144A) will treat Etruscan and Roman art as background to Roman art, and carry Republican art to the accession of Augustus. The second part will deal with art under the Empire, particularly in Rome itself.

145. Roman Art. (5) Four hours of lecture per week. The art of Rome and of the Roman Empire, from its sources in the Republican era to the Age of Constantine the Great.

150A-150B. Early Medieval Art. (5-5) Three hours of lecture and one hour of discussion per week. No prerequisites. If it is believed that nonmajors are interested in medieval history and in Christian theology.

150A. c. 300 to 750 A.D.

150B. c. 750 to 1100 A.D.

150C. History of Art 150A and 150B may be taken separately; for students taking 150A and 150B in succession, credit and grades will be assessed upon completion of the sequence. Research papers will normally extend through two successive quarters.

151A-151B. Later Medieval Art. (5-5) Formerly 150C. Three hours of lecture and one hour of discussion per week. 151A. c. 1000 to 1300 A.D. General...
review of Romanesque and Gothic art in their multiple aspects. The art of the thirteenth and fourteenth centuries (15th-16th c.) from 1270 to 1420 A.D. General introduction to late Romanesque and International Style Art with related developments in the Mediterranean and Byzantine Art. The same period where relevant. 

151A. Mr. Bony; 151B. Mr. Silver

154A-154B. Romanesque and Byzantine Art. (5-5) Three hours of lecture per week. Required knowledge: a background in the history of art and of the symbolism and stylistic development in the Netherlands of such genres as history painting, portraiture, landscapes, still-life, and various other kinds of meanings with which students have been introduced. 

175. Rubens and Rembrandt. (5) Hours of lecture and one hour of discussion per week. The problems of the time are to be introduced and used to determine the overall develop of the symbolism and stylist of the time. 

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

190C. Impressionism and Post-Impressionism. (5) Three hours of lecture and one hour of discussion per week. 

190D. 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 references to the sculpture and art of the Symbolist and Art Nouveau periods. The study and other works considered in involvement in architecture, draughtsmanship, and artistic criticism. 


157A. Romanesque Architecture. Mr. Bony

157B. Gothic Architecture. Mr. Bony

157C. Romanesque Sculpture. Mr. Bony Development of sculpture in western Europe between late-10th and mid-12th century: Traditions and in-ventions in 11th century; sculptural workshops, 1090 to 1130; late Romanesque developments (with particular emphasis on Sicily and Spain). 

157D. Gothic Sculpture. Mr. Bony Development of sculpture in western Europe between mid-12th and early-14th century: Emergence of Gothic sculpture; its early developments to ca. 1215-1220; Paul Reymond and the new style of the 13th century; courtly art and new turns of sensibility. 

158. Gothic Art In Northern Europe. (5) Three hours of lecture and one hour of discussion per week. Major developments in Northern European Art from the late phases of medieval art. Discussed in central and French regions; Middle Ages highlighted, with emphasis on both royal and civic patronage; major media include architecture, sculpture, manuscripts, panel paintings, and early prints. 

160A-160B. Italian Renaissance Art. (5-5) Three hours of lecture per week and additional directed study. 

160A. The Fifteenth Century Mr. Partridge, Mr. Ettinger

160B. The Sixteenth Century Mr. Partridge, Mr. Ettinger

161. The Trecento. (5) Three hours of lecture per week and additional directed study. Italian painting and sculpture, 1250-1400. Mr. Ettinger

163. Michelangelo and Raphael. (5) Three hours of lecture per week and additional directed study. Prerequisite: course 160B and consent of 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. 

170A. Southern Baroque Art. (5) Four hours of lecture per week. The major artists (including Van Dyck, Oostade, de Hooch, van Meegeren, Ruysdael) organized according to the genres of types of painting done at the time. The historical and philosophical background for the development in the Netherlands of such genres as history painting, portraiture, landscapes, still-life, and various other kinds of meanings with which students have been introduced. 

190A-190B. Romanesque Sculpture. Mr. Bony

203. Late Roman Imperial Art. (5-5) Three hours of lecture per week. 

205. Mannerism. Mr. Bony

241. European Art from 1640 to 1850. (5) Hours of lecture and one hour of discussion per week. Major developments in European Art from 1640 to 1850. 

241A. Seventeenth-Century Painting. Mr. Wright

241B. Eighteenth-Century Painting. Mr. Wright

241C. Nineteenth-Century Painting. Mr. Wright

241D. Twentieth-Century Painting. Mr. Wright

260A-260B. Seminar In Early Medieval Art. (3-3) Two hours of lecture per week. 

260C-260D. Seminar In Later Medieval Art. (3-3) Two hours of lecture per week. 

260A. The Dark Ages to 1000. Mr. Wright

260B. The Romanesque and Gothic Art. (3-3) Two hours of lecture per week. 

270A-270B. Seminar In Italian Art. (3-3) Two hours of lecture per week. 

270C-270D. Seminar In Northern European Art. (3-3) Two hours of lecture per week. 

270E. Renaissance and Baroque. Mr. Silver

270F. Seventeenth Century. Mr. Silver

270G. Eighteenth Century. Mr. Silver

270H. Nineteenth Century. Mr. Silver

270I. Twentieth Century. Mr. Silver

280A-280B. Seminar In Late Medieval Art In Renaissance. (3-3) Two hours of lecture per week. 

280C-280D. Seminar In Renaissance Art. (3-3) Two hours of lecture per week. 

284A-284B. Seminar In Renaissance Art. (3-3) Two hours of lecture per week. 

286A-286B. Seminar In Renaissance Art. (3-3) Two hours of lecture per week. 

287A-287B. Seminar In Renaissance Art. (3-3) Two hours of lecture per week. 

288A-288B. Seminar In Renaissance Art. (3-3) Two hours of lecture per week.
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 Religious Studies), Mr. William Geoghegan (Department of Anthropology).

Group Major In Asian Studies

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 for 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)
- History of Art 31, The Art of China and Japan (5)
- Political Science 2, Introduction to Political Science—Comparative Government and Politics (5)
- Political Science 3, Introduction to Political Science—Scope and Methods (5)
- Sociology 1A, Introduction to Sociology (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 section. It is to be noted that, in the case of Malay/Indonesian, all or part of the first two years' work carries upper division credit. In this instance 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 one 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 to be completed 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 focus and complete at least 12 units of work from the courses listed there (see item 2 under "Additional Major Requirements" above):

- Anthropology 143, Plural Societies (5)
- Anthropology 146, Comparative Peasant Society (5)
- Anthropology 149, 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, China (5,5); History 189A, Social History of China (5); History 190, Modern Chinese Intellectual History (5)

Economics

1. One course treating the theories and/or methods appropriate to the discipline, chosen with the consent of the major adviser

2. Economics 106, The Economics of Man (4)

3. Economics 103, The Economics of the Communist World (4)

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 140C, Comparative Communism (5); Political Science 141E, 141F, Political Theory in Communist Political Systems (5,5); 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 186, 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 164, China, Japan and Korea (4)
Public Policy 168, Population and Public Policy (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) (4)
- 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. 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 171, Japan (5)
3. One of the following courses: Anthropology 149, Culture and Personality (5); Anthropology 150, Social Problems in Changing Cultures (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 185B, 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)
3. 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 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) 160, 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 155, 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 a 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 186A or 186B, Southeast Asia (5,5)
3. One course from among the following: Anthropology 143, Plurals Societies (5); Anthropology 146, Comparative Peasant Societies (5); Anthropology 148, Man's Ecological Relationships (5); Anthropology 153, Introduction to Medical Anthropology (5)

Geography
1. One course treating the theories and/or methods appropriate to the discipline, chosen with the consent of the major adviser
2. Geography 163, Southeast Asia (5)
3. One course from among the following: Geography 100, Principles of Cultural Geography: Culture and Rural Environments (5); Geography 104, The City in the Third World (5); Geography 111, Systems of Cities and Regional Development (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. Political Science 143D, Political Cultures of Southeast Asia (5), or Political Science 143E, Policy Problems of Southeast Asia (5)
3. One course from the following: Political Science 143D, Political Cultures of Southeast Asia (5); Political Science 143E, Policy Problems of Southeast Asia (5); Political Science 145D, American Role in Asia (5)
C. Additional units necessary to complete the unit requirement may be selected from among the courses listed under other disciplinary foci above and from the following:
- History of Art 137, Art of Southeast Asia (5)
- Public Policy 186, Population and Public Policy (5)
- Sociology 135, Social Change in Underdeveloped Countries (5)
- South and Southeast Asian Studies (Malay/Indonesian) 151, Readings in Indonesian (4)
- A third year of Dutch or French where appropriate
D. In exceptional cases individual waivers of specific course requirements for valid academic reasons will be considered with the approval of the major adviser.

COURSE
H195A-H195B, Honors Colloquium. (5–6) Open to seniors in the group major in Asian Studies whose GPA is 3.40 or higher in all University work and 3.40 or higher in the major. Students must enroll in both quarters of H195A-H195B, with credit (5 units/quarter) and letter grade to be awarded upon completion of the sequence. Colloquium topics will be supervised by the Chairperson of the Group and will be expressly designed for students in the major. Each student will submit an honors thesis based on research performed in the colloquium.

Astronomy
Department Office, 601 Campbell Hall

Professors:
- C. Stuart Bowyer, Ph.D.
- John S. Gaustad, Ph.D. (Chairman)
- Carl E. Helles, Ph.D.
- Iven C. King, Ph.D.

Assistant Professors:
- Jonathan Arons, Ph.D.
- Christopher McKee, Ph.D.

Lecturers:
- Frank H. Shu, Ph.D.
- Joseph I. Silk, Ph.D.
- Leland E. Cunningham, Ph.D. (Emertitus)

Graduate Advisers: Mr. Gaustad, Mr. Shu.

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. A considerable amount of research and teaching related to astronomy is 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 telescope at Leuschner Observatory (near the campus), a 120-inch telescope at Lick Observatory, 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 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 plan 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.

Students of marked ability may 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 and an overall grade-point average of at least 3.5 in the University; (2) in Astronomy 127 A—B—C—D, a minimum of two A's and two B's or three A's and one C; (3) an individual project of research or study, involving at least 3 units of Astronomy 127 A—B—C—D. The project is evaluated 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 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.

In addition to the qualifying examination on the thesis topic required by the University, the Department requires students to pass a preliminary examination which tests 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 which are essential for preparing for the preliminary and qualifying examinations. 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 four to 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 these in graduate courses) and the preliminary examination.

**LOWER DIVISION COURSES**

**2. 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, black holes, cosmic rays, pulsars, stellar matter, X-ray astronomy, pulsars, neutron stars, black holes, planets, cosmic rays, etc. Intended for non-science majors. Mr. Phillips (F).

**3. Descriptive Cosmology.** (3) Three hours of lecture per week. Prerequisite: Astronomy 10 or consent of instructor. Non-mathematical discussion of the evolution of the universe. Topics include: cosmological models, galaxy formation, the cosmic background radiation, interstellar matter, and stellar evolution. Mr. Silb (W).

**4. 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 space probes. Possible topics: extra-terrestrial life, neutron stars, black holes, X-ray, neutrino and gravity-wave astronomy, 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 astronomy, the modern space age, and modern astronomical tests of special and general relativity. Additional topics may include interstellar communication and some aspects of cosmology. Mr. Heiles (F).

**6. Introduction to Modern Astronomy and Astrophysics.** (4) Three hours of lecture and two hours of laboratory per week. An introduction to high school physics and mathematics (algebra and trigonometry). Not open to students who have received credit for Astronomy 1 or 1A. DISCUSSION: Description and interpretation of astronomical phenomena using the laws of modern physics. Modern astronomical instrumentation. Discussion of stellar, planetary, relativistic, etc. magnetohydrodynamic, nuclear and atomic processes in relation to the structure and evolution of stars, galaxies, and the Universe. Mr. McKee (F). Mr. Weaver (W), Mr. Shu (Sp).

**7. Computational Techniques in Astronomy.** (3) Three hours of lecture and three hours of laboratory per week. Prerequisite: Astronomy 127 A—B—C—D. Introduction to the Theoretical Probability and Statistics (Stat. 100A—100B—100C).

**8. Stellar Dynamics and Galactic Structure.** (3) Three hours of lecture and one hour of discussion per week. Prerequisite: course 127 A—B—C—D or consent of instructor. Structure and kinematics of the galaxy; stellar population concepts; dynamics of stellar systems with and without a nuclear component; open problems of research. May be taken by qualified seniors. Various orbit methods, reduction of observations, special perturbations, introduction to general perturbation theory. Sequence beginning (W).

**9. Introduction to Stellar Atmospheres.** (3) Three hours of lecture per week. Spectral characteristics of normal and peculiar stars, interpretation of model atmosphere, line profiles, curve of growth, etc. Line and continuous opacity, line-blanketing, convection, non-LTE, extended atmospheres. Current research and historical topics of special interest. May be taken by qualified seniors. The student's project is chosen in consultation with the major adviser. Mr. Shu (F).

**10. Introduction to General Astronomy.** (4) Three hours of lecture and one hour discussion each week. Prerequisites: Open without prerequisite to all students but designed mainly for those students who have not had high school physics or mathematics. Not open to students who have received credit for Astronomy 7. A non-mathematical discussion of the structure and evolution of stars, galaxies, and the Universe. Additional topics optionally discussed, such as quasars, pulsars, black holes and universes, interstellar communication, etc. Individual instructors' synopses available from the Department. Mr. Phillips (F), Mr. Shu (W), Mr. Phillips (W), Mr. Kuhl, Mr. Weaver (Sp).

**11. Advanced Stellar Dynamics.** (3) Three hours of lecture per week. Prerequisite: course 127 A—B—C—D. The same material as course 267, but in a more concentrated and more rapid fashion. May be repeated for credit. Enrollment limited to 15 students. Topics include instrumentation for and recent advances in astronomical research. Prerequisite: course 127 A—B—C—D. The student's project is chosen in consultation with the major adviser. Mr. Bowyer, Mr. Arons (F), Mr. Shu, Mr. Phillips (W), Mr. Kuhl, Mr. Weaver (Sp).

**UPPER DIVISION COURSES**

**12. Introduction to Modern Astronomy and Astrophysics.** (3) Three hours of lecture and two hours of discussion per week. Prerequisite: course 127 A—B—C—D. A non-mathematical introduction to the principal fields of modern astronomical research. Intended primarily for majors in the physical sciences and engineering. Mr. Phillips (Sp).

**13. Advanced Stellar Dynamics.** (4) Four hours of lecture per week. Prerequisite: course 127 A—B—C—D. The same material as course 267, but in a more concentrated and more rapid fashion. May be repeated for credit. Enrollment limited to 15 students. Topics include instrumentation for and recent advances in astronomical research. Prerequisite: course 127 A—B—C—D. The student's project is chosen in consultation with the major adviser. Mr. Bowyer, Mr. Arons (F), Mr. Shu, Mr. Phillips (W), Mr. Kuhl, Mr. Weaver (Sp).

**14. Astrophysical Fluid Dynamics and Plasma Physics.** (4) Three hours of lecture per week. A basic understanding of the dynamical and transport properties of plasmas and fluid continua which are relevant to a wide range of astronomical phenomena. Mr. Arons (W).

**15. Stellar Dynamics and Galactic Structure.** (3) Three hours of lecture per week. Prerequisite: course 127 A—B—C—D or consent of instructor. Structure and kinematics of the galaxy; stellar population concepts; dynamics of stellar systems with and without a nuclear component; open problems of research. May be taken by qualified seniors. Various orbit methods, reduction of observations, special perturbations, introduction to general perturbation theory. Sequence beginning (W).

**16. Introduction to Stellar Atmospheres.** (3) Three hours of lecture per week. Spectral characteristics of normal and peculiar stars, interpretation of model atmosphere, line profiles, curve of growth, etc. Line and continuous opacity, line-blanketing, convection, non-LTE, extended atmospheres. Current research and historical topics of special interest. May be taken by qualified seniors. The student's project is chosen in consultation with the major adviser. Mr. Shu (F).


**18. Special Topics in Astronomy.** (4) Three 1-hour lectures and two 1-hour discussion sections per week. Prerequisite: Physics 105. May be repeated for credit. Sequence beginning (W).

**19. Radio Astronomy.** (3) Three hours of lecture per week. Prerequisite: course 216. Comparison of radio and optical instrumentation and techniques. Detailed application of radio interferometry to observed objects in the radio range, including emission nebulae, gas clouds, and relativistic plasmas, with application to current observations.

**20. Special Topics in Astronomy.** (3) Three hours of lecture per week. Prerequisite: Consent of instructor, may be repeated for credit. Topics will vary from quarter to quarter. See Department of Astronomy announcements.

**21. Advanced Stellar Dynamics.** (3) Three hours of lecture per week. Prerequisite: consent of instructor. A more advanced discussion of the dynamical and transport properties of plasmas and fluid continua which are relevant to a wide range of astronomical phenomena. Mr. Silb (Sp).

**22. Advanced Stellar Dynamics.** (3) Three hours of lecture per week. Prerequisite: consent of instructor. A more advanced discussion of the dynamical and transport properties of plasmas and fluid continua which are relevant to a wide range of astronomical phenomena. Mr. Silb (Sp).

**23. Special Topics in Astronomy.** (4) Three hours of lecture per week. Prerequisite: consent of instructor. A more advanced discussion of the dynamical and transport properties of plasmas and fluid continua which are relevant to a wide range of astronomical phenomena. Mr. Silb (Sp).
Bacteriology and Immunology

Department Office, 3573 Life Sciences Building

Professors:
Phyllis B. Blair, Ph.D.
Marian E. Kosland, Ph.D.
Alexander Glazer, Ph.D.
Robert I. Mitchell, M.D.

Koichi Nikaido, M.D., M.D.Sc.
Leon Wolfs, Ph.D.

Associate Professors:
H. Claudia Henry, Ph.D.
Tae Ven Lennett, Ph.D.

Janis D. Young, Ph.D. (Adjunct)

Assistant Professors:
Jeremy Thomen, Ph.D.
David R. Zunman, Ph.D.

Lecturers:
Anne H. Good, M.D., Ph.D.
Mary L. Cole, M.A.

Departmental Major Advisers: Mrs. Blair, Mr. Glazer.
Mr. Good, Mrs. Kosland, Mr. Leighton, Mr. Nikaido, Mr. Thomen, Ms. Zunman.

Graduate Advisers: Mr. Leighton, Mr. Mitchell

Students who are interested in the major in bacteriology are urged to consult with the major adviser concerning the specific courses to be taken as a basis for the major.

The Department of Bacteriology and Immunology offers an undergraduate major in bacteriology, and graduate training in both bacteriology and immunology. The undergraduate major, administered according to two plans, provides training in bacteriology at the upper division level, on the basis of a preparation at the lower division level in general biology and physical science. Plan I is strongly recommended for all students who plan to undertake subsequent graduate work. Honor students with a special interest in immunology may arrange an individual major program in this area with the approval of the undergraduate adviser.

The Major

Plan I

Lower Division. Chemistry 1A-1B-1C, 5; Chemistry 8A-8B, or 12A-12B; Mathematics 16A-16B; Physics 8A-8B; Biology 1A; Biology 1B and/or Molecular Biology 1.

Upper Division. Bacteriology 100A-100B, 101A-101B; Biochemistry 102, 102L, Chemistry 108A. At least 10 additional units chosen from: Bacteriology 103, 202A-202B; Molecular Biology 110A-110B; Zoology 104, 110A-110B, 155; Botany 101, 130-130L.

Plan II

Lower Division. Chemistry 1A-1B-1C, 5, 8A-8B; Mathematics 16A and either Mathematics 16B or Statistics 2; Physics 8A-8B; Biology 1A; Biology 1B and/or Molecular Biology 1. Physics 6 and/or Molecular Biology 1 are recommended.

Upper Division. Bacteriology 102-102L; Biochemistry 102, 102L; Public Health 180A-180B, 180L-180M. At least 9 additional units chosen from: Bacteriology 103; Biomedical and Environmental Health Sciences 281; Molecular Biology 110A-110B or Genetics 100; Public Health 182, 182L; Zoology 104, 156; Zoology 110A-110B or Botany 130-130L.

Honors Program. With the consent of the major adviser, students with an overall grade-point average of 3.9 or higher in courses in the major may apply for admission to the honors program. Students enrolled in the program must take at least 5 units of research courses (H100 and/or H101), and must present the results of their research in a paper and in a seminar at the end of their last quarter. The honors program adviser will plan for the honors program individuality; approval of the program by the honors program adviser is required. The honors program adviser is authorized to exempt students in the honors program from requirements concerning specific courses or sequences of courses in the major. Students interested in enrolling in the program should consult the honors program adviser, Mrs. Kosland.

Preparation for Graduate Study

For the pursuit of graduate work in either bacteriology or immunology, the undergraduate training outlined under Plan I is preferable. Other courses strongly recommended as basic preparation for future graduate work are: Chemistry 105B; Chemistry 112E (for students who have taken Chemistry 12E); Physics 5C. 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 M.A. degree is usually earned as part of the doctoral program. The completion of teaching assignments or a minimum of 9 units is required of all students working for the Ph.D. degree in bacteriology. Information is available from the graduate adviser in 3573 Life Sciences Building.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSE

6. Immunity and Defense, (1) One two hour session. Prerequisites: High school course in biology, freshman status. Lectures, selected readings, and discussion concentrating on the organism's biological defenses against its environment. Topics will be limited in number, but explored in depth suitable for freshman who plan to major in life sciences. To be taken pass/no pass.

P. Blair (Sp)

UPPER DIVISION COURSES

100A-100B. General Bacteriology. (4-4) Three 1 1/2-hour lectures per week (discussion included). Prerequisites: Biology 1A; Molecular Biology 1 or Biology 101B; Chemistry 5 and 8 or 12; Biochemistry 102 or 100A. A two-semester sequence which presents our current understanding of and emphasis on the central role of the microorganisms in the biology, physiology, genetics, biochemistry, and the structure of microorganisms, with primary emphasis on the biology and the viruses of their environment.

101A-101B. General Bacteriology Laboratory. (4-4) Three 3-hour labs per week. 101B: Two 1 1/2-hour laboratories per week. Prerequisite: course 100A-100B (may be taken concurrently). Laboratory experiments planned to accompany the lectures in courses 100A-100B. Sequences beginning (W).

Ms. Cole, Mr. Leighton, Mr. Mitchell, Ms. Zunman (W, Sp)

102. An Introduction to General Bacteriology. (4) Two 1 1/2-hour and one 1-hour lecture per week. Prerequisites: Biology 1A-1B; Chemistry 1C and 8A-8B. Not open to students who have credit in courses 100A-100B.

102L. Bacteriology Laboratory. (4) One 1-hour lecture per week and two 4-hour laboratories per week. Prerequisite: course 102 (may be taken concurrently). Experimental work to acquaint the student with the techniques of general bacteriology. Planned to accompany lectures in course 102.

Ms. Cole (F)

103. An Introduction to Immunology. (4) Two 1 1/2-hour lectures and one 2-hour discussion per week. Prerequisites: Biology 1A-1B and/or Molecular Biology 100A-100B; Bacteriology 103; or, consent of the instructor. Prerequisite: 102A. To introduce students to research being conducted in the Department of Bacteriology and Immunology. Open to juniors eligible to undertake the 102A course in their senior year.

H100. Research Seminar. (0) One hour seminar per week. Prerequisites: Bacteriology 102 or Bacteriology 100A-100B; Bacteriology 103; or, consent of the instructor. Presentations and informal discussions designed to introduce students to research being conducted in the Department of Bacteriology and Immunology. Open to juniors eligible to undertake the 102A course in their senior year.

H100. Research. (3-3) Formerly numbered H197.

NOTE: For key to symbols, see page 30.
Open to students in their senior year who are enrolled in the Department of Bacteriology and Immunology honors program.

The Staff (Mrs. Koshland in charge) (F, W, Sp)

H195. Individual Study. (3-5) Open to students in their senior year who are enrolled in the Department of Bacteriology and Immunology honors program.

The Staff (Mrs. Koshland in charge) (F, W, Sp)

199. Supervised Independent Study and Research. (1-5) Formerly numbered 195. Enrollment is restricted by regulations listed on page 56. Must be taken on a passed/not passed basis.

The Staff (Mrs. Koshland in charge) (F, W, Sp)

GRADUATE COURSES

202A–202B. Immunology. (4–3) 202A. Two 1/2 hour lectures per week. Prerequisite: Biochemistry 102 or the equivalent. The immune response; antigen-antibody reactions, structure and function of antibody molecules; genetic basis of immunoglobulin diversity; lymphocyte differentiation; cellular interactions and mechanisms of immunity and tolerance. Mrs. Koshland (F)

202B. Two 1/2 hour lectures per week. Cell-mediated immunologic reactions, the alloresponse, antigens in neoplasms and immunologic surveillance.

Mrs. Blair (W)

203L. Immunology–Immunochemistry Laboratory. (4–8) Experimental methods and immunochemical techniques. Course 202A–202B. Consent of instructor. 202B may be taken concurrently. Laboratory, seminar, and discussion periods to be arranged. Students will select one or more projects involving a variety of techniques. The course may be taken in any of the three quarters; under special circumstances the student may take the course in more than one quarter and receive credit.

Mrs. Good (F, W, Sp)

203. Microbial Metabolism. (3) Prerequisite: Biochemistry 102B, or consent of instructor. Recommended: an elementary bacteriology course. Covering selected topics on the metabolism of microorganisms, with special emphasis on intermediary metabolism.

R. David Cole, Ph.D.

204. Tumor Immunology. (3) Two 1/2 hour lectures per week. Prerequisite: graduate standing in a biological science, and consent of instructor. An introduction to the research laboratory for first-year graduate students in bacteriology and immunology. To be taken on a satisfactory/unsatisfactory basis.

Mrs. Good (Sp)

205. The Nature of the Immune Response. (2) Three hours of lecture per week. Prerequisite: course 204 or equivalent background. Focus on the immune response. Mrs. Koshland (Sp)

206. Individual Study for Doctoral Students. (1–8) Open to students in bacteriology and immunology. To be taken on a satisfactory/unsatisfactory basis.

Mr. Mikako (Sp)

207. Structure and Function of the Prokaryotic Cell. (3) Three hours of lecture per week. Prerequisite: Biochemistry 102 or equivalent. A synthesis of structural and biochemical knowledge about the prokaryotic cell, the most important component of prokaryotic cells. Mr. Glazer (W)

208L. Laboratory Methods in Cellular Immunology. (4-8) Laboratory, seminar, and discussion periods to be arranged. Prerequisite: course 202A–202B, and 202L, or consent of instructor. Students will work on a project involving a variety of techniques in cellular immunology. Under special circumstances, a student may arrange to take the course for more than one quarter and receive credit.

Ms. Henry (Sp)

209. Microbial Models of Development. (4) Two 1/2 hour lectures per week. Prerequisite: Biochemistry 102 or 102A—first quarter course and consent of instructor. A critical analysis of the advantages and disadvantages of microbial systems for studying principles of growth, morphogenesis, differentiation, and multicellular organization. Genetic and biochemical approaches will be emphasized. Open to advanced undergraduates and graduate students. Mr. Leighton, Mr. Thorne, Mr. Zusman (F)

212. Seminar in Current Research. (1–3) Two hours of lecture and 4–6 hours of laboratory per week. An introduction to research and to the analysis of scientific literature. Required of all first-year graduate students in bacteriology and in immunology. To be taken on a satisfactory/unsatisfactory basis.

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

213. Seminar in Advanced Laboratory Methods. (2) Three hours of lecture per week. Prerequisite: graduate standing in bacteriology and immunology, and consent of instructor. An introduction to advanced general laboratory methods for first-year graduate students in bacteriology and immunology. To be taken on a satisfactory/unsatisfactory basis.

(Sp)

214. Introduction to Research. (4–8) Prerequisite: Graduate standing in the Department of Bacteriology and Immunology, and consent of the Instructor. An introduction to the research laboratory for first-year graduate students in bacteriology and immunology. To be taken on a satisfactory/unsatisfactory basis.

Mrs. Koshland (F)

216. Seminar in Tumor Immunology. (1) Two hours of lecture per week. Prerequisite: course 204 or equivalent background, and consent of instructor. Student presentations and discussion of current research on the immunology of neoplastic cells. To be taken on a satisfactory/unsatisfactory basis.

Mrs. Blair (F, W, Sp)

220. Current Topics in Microbiology. (1) One hour lecture per week. Prerequisite: Graduate Standing in the Department of Bacteriology and Immunology or in the Department of Immunology, and consent of the instructor. Presentations by graduate students and others of topics selected from the current research literature. Required of all graduate students in bacteriology and microbiology for at least four quarters. To be taken on a satisfactory/unsatisfactory basis.

Mr. Glazer (W), Mr. Mikako (Sp)

221. Seminar in Cellular Immunology Research. (2) Two hours of lecture per week. Prerequisite: Graduate standing in Immunology or consent of the Instructor. This course is an advanced seminar in cellular immunology. Student participates by reading, presenting, discussing and preparing written critiques of selected papers from the current literature. To be taken on a satisfactory/unsatisfactory basis.

Mr. R.I. Mishell (W)

280. Research. (1–12) The Staff (F, W, Sp)

295. Special Topics. (1–3) Prerequisite: consent of instructor. From time to time, lecture series are offered on topics of special interest related to the student's field. To be taken on a satisfactory/unsatisfactory basis.

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

299. Special Study for Graduate Students. (2–4) Two 1/2 hour lectures per week. Prerequisite: consent of instructor. The Staff (W)

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 for 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, intended to provide an opportunity for qualified students to prepare for the comprehensive 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)

**Biochemistry**

Department Office, 401 Biochemistry Building

Professors:

Bruce N. Negras, Ph.D.
Clinton E. Bello, Ph.D.
Frederick H. Carpenal, Ph.D.
Michael J. Chamberlin, Ph.D.
R. David Cole, Ph.D.
Charles A. Dekker, Ph.D.
Jack F. Kirsch, Ph.D.
Daniel E. Koshland, Jr., Ph.D. (Chairman)
R. D. Linn, Ph.D.
R. David Cole, Ph.D.
Edward E. Pennell, Ph.D.
Howard K. Schechman, Ph.D.

Assistant Professors:

Edward E. Penhoet, Ph.D.

Assistant Professors:

Nancy Meutzels, Ph.D.

Ph.D. (Nancy Meutzels)

Professor:

Randy W. Schekman, Ph.D.

Adjunct Professor:

James A. Bassham, Ph.D.

Departmental Major Advisors: Mr. Ames, Mr. Baitou, Mr. Chamberlin, Mr. Kirsch, Mr. Linn, Ms. Majels, Mr. Neillands, Mr. Penhoet.

Graduate Advisors: Mr. Dekker, Mr. Schechman, Mr. Wilson.

The Undergraduate Major. The Department offers two programs for the major: Plan I for students expecting to pursue graduate study in biochemistry, and Plan II for those who do not. Students in Plan I may elect the honors program.

**The Major**

**Lower Division.** Chemistry 4A–4B–4C (or 1A–1B–1C and 5); Chemistry 12A–12B (or 8A–8B for those expecting to follow upper division Plan II, see below); Mathematics 1A–1B–1C; Physics 6A–6B–6C (or 5A–5B–5C); Biology 1A–1B.

Recommended: Plan I: Additional courses in biological and physical science; a reading knowledge of one foreign language (German, French, Japanese, Russian).

**Upper Division.** Plan I: Biochemistry 100A–100B–100C; Biochemistry 101A–101B; Biochemistry 180; Chemistry 109A–109B (or 14 and 110A–110B); Chemistry 112; Related elective (3 units).

Plan II: Biochemistry 100A–100B–100C; Biochemistry 101A–101B; Biochemistry 180; Chemistry 109A–109B; Related electives (6 units).

Recommended: Plans I and II: additional courses in biochemistry and in allied subjects, chosen in accordance with a plan approved by the departmental advisor.

**Honors Program.** A student enrolled in the major under Plan I who has an overall grade-point average of 3.0 or higher and a grade-point average of 3.3 or higher in courses acceptable in the major may, with the approval of the major advisor, enroll in the honors program no later than the beginning of the senior year. In addition to the courses prescribed under the Plan I major, the student in this program will be required to complete 4 units in course 180 and to write a thesis based on research. Certain graduate biochemistry courses will be open to these students on approval of the instructor and advisor. To remain in the honors program a student must maintain a grade-point average of 3.3 in biochemistry courses and in those courses acceptable in the major. To graduate with honors, a student must also have a cumulative grade-point average of 3.3 or higher on all work completed in the University.

**Graduate Study**

The Department offers the M.A. degree (under either Plan I or Plan II as described in the Graduate Division section of this catalogue), and the Ph.D. degree. All students working for the Ph.D. degree are required to serve as teaching assistants for two quarters. For information concerning the requirements of either degree consult a graduate advisor in the Department.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.
20. Current Topics in Biochemistry. (1) One 1-hour lecture per week. Prerequisite: sophomore standing or consent of instructor. A course intended primarily to acquaint potential biochemistry majors with developments in this area. Typical topics include: genetic coding, cell growth and division, molecular evolution, mechanism of catalysis in living systems, membrane processes. Must be taken on a pass/not-passed basis. The Staff, Mr. Carpenter in charge (W)

UPPER DIVISION COURSES

100A–100B–100C. General Biochemistry. (4–4–4) Three lectures and one hour of section meetings per week. Prerequisite: Chemistry 100B or equivalent and a course each in physical chemistry and biology, or consent of the instructor. Designed for biochemistry majors. Introduces the chemical and physical factors concerned in life processes, including the chemistry, function, degradation, and biosynthesis of major cellular constituents; enzymatic catalysis; energy and metabolism of metabolic processes. Sequence, beginning in the fall. Mr. Koshland, Mr. Alper (F); Mr. Bailou, Mr. Kirsch (W); Mr. Linn, Mr. Schekman (Sp)

101A–101B. General Biochemistry Laboratory. (4–4) Two 1-hour laboratories per week. Prerequisite: courses 100A and 100B. Sequence, beginning in the fall and in the winter. Mr. Bailou, Mr. Penhoet (F); Mr. Linn, Mr. Schekman (W), Mr. Ames, Mr. Neillands (W), Mr. Ames, (Sp)

102. A Survey of the Principles of Biochemistry. (5) Four 1-hour lectures and one hour of discussion per week. Prerequisite: Chemistry 88, or consent of the instructor. Recommended courses in physical chemistry and biology. Designed for nonbiochemistry majors. Not open for credit to students who have credit in courses 100A–100B–100C. Mr. Dekker, Mr. Wilson (F); Mr. Kirsch, Ms. Malzels (Sp)

102L. Biochemistry Laboratory. (5) Two 1-hour lectures and two 4-hour laboratories per week. Prerequisite: courses 100A and 100B. Sequence, beginning in the fall and in the winter. Mr. Kammern (F); Mr. Kammern, Mr. Dekker (Sp)

150. Biochemistry and Society. (2) Two 1-hour lectures per week. Prerequisite: course 102, 1004 or consent of instructor. This course will deal with the arrangement and biogenesis of eukaryotic membrane proteins and lipids, the movement and assembly of cell organelles, and the function of the cell surface in various cell cycle events. Related courses on prokaryotic membranes: Back/Immun 107 offered in the alternate year). Mr. Schekman (W)

150A. Biochemistry of Carbohydrates. (3) Three 1-hour lectures per week. Prerequisites: courses 100A–100B–100C or consent of the instructor. The role of complex carbohydrates in cell recognition, agglutination and adhesion, with emphasis drawn from bacterial, fungal and mammalian systems. Mr. Bailou, Mr. Penhoet (F)

150B. Structure and Function of Eukaryotic Cellular Membranes. (3) Two hours of lecture per week. Prerequisite: graduate standing. Mr. Kammen (F), Mr. Schekman (W)

BIOLOGY

Department Office, 4583 Life Sciences Building

Field Major in Biological Sciences

Field Major Office, 4583 Life Sciences Building

Major Advisers: Plan A, Option I: Mr. R. Calendar, Mr. W. Z. Cande, Mr. G. Stent; Plan A, Option II: Mr. T. Mamen, Ms. P. Schulz, Mrs. R. E. VonBlum, Plan B: Ms. P. Schulz; Plan C: Ms. N. Vivrette; Plan D: Mr. A. H. Home, Mr. R. Smith, Mr. J. West

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; 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 (8 units); Mathematics 16A (4 units); Physics 6A–6B–6C (12 units); Biology 1A–1B (12 units). Chemistry 1A–1B and Biology 1A–1B required for admission to the field major.

Note: For key to symbols, see page 36.
Upper Division Courses. Required of all students in the major. Genetics 100 (5 units), or Molecular Biology 110A (5 units), or Genetics 150 (5 units); at least one course in Botany. A course in the history or philosophy of biological science (2-5 units) is recommended.

Other courses as follows:

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 (6 units); Biochemistry 102 (5 units); Biochemistry 102L (5 units); Physiology 101 (5 units) or two quarters from among the following: Zoology 104 (5 units); Zoology 110A–110B (10 units); Botany 105 (15 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 (5 units); or Zoology 131 (4 units), or Entomology 104 (3 units), or Entomological Sciences 103 (2 units) and Entomological Sciences 103L (2 units); Zoology 107A–107B (5-5 units); or Zoology 108A–108B (5-5 units) or Entomological Sciences 100 (5 units); Zoology 105 (6 units), or Botany 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 systematics and evolutionary biology; study of the structure, classification, and function of living things): Botany 102 (5 units); Botany 105 (5 units); Botany 110 (5 units) or Botany 125 (3 units) and Botany 125L (2 units); Botany 144 (5 units), or Entomological Sciences 103 (2 units) and Entomological Sciences 103L (2 units), or Physiology 102A (5 units), or Physiology 102L (5 units), or Zoology 107A–107B (5-5 units); Zoology 108A–108B (5-5 units), or Entomological Sciences 100 (5 units); Zoology 109 (15 units), or Genetics 131 (5 units); to complete a minimum of 45 units.

Plan C. (specialization in the area of human ecology; study of the relations between living things and their environment): Biology 150 (4 units); biology 160A–160B (4 units); Botany 142 (4 units) or Zoology 143 (10 units); Zoology 108A–108B (5-5 units) or Zoology 157 (10 units); or Botany 100 (15 units); Botany 105 (5 units) or Botany 125 (3 units) and Botany 125L (2 units); Botany 144 (5 units), or Entomological Sciences 103 (2 units) and Entomological Sciences 103L (2 units), or Zoology 104 (5 units), or Zoology 140 (3 units), or Zoology 141 (5 units), or Zoology 142 (4 units) or Zoology 143 (10 units); Zoology 107A–107B (5-5 units); or Botany 105 (15 units), or Zoology 108A–108B (5-5 units) or Entomological Sciences 100 (5 units); Physiology 123 (5 units), or Zoology 125L (2 units); Botany 105 (15 units), or Zoology 107A–107B (5-5 units); Zoology 108A–108B (5-5 units), or Entomological Sciences 100 (5 units); Zoology 109 (15 units), or Genetics 131 (5 units); to complete a minimum of 45 units.

Plan D. (specialization in the area of marine biology): Biology 150 (4 units); Biology 160A–160B (4 units); Botany 142 (4 units) or Zoology 143 (10 units); Zoology 108A–108B (5-5 units) or Zoology 157 (10 units); or Botany 100 (15 units); Botany 105 (5 units) or Botany 125 (3 units) and Botany 125L (2 units); Botany 144 (5 units), or Entomological Sciences 103 (2 units) and Entomological Sciences 103L (2 units), or Zoology 104 (5 units), or Zoology 140 (3 units), or Zoology 141 (5 units), or Zoology 142 (4 units) or Zoology 143 (10 units); Zoology 107A–107B (5-5 units); or Botany 105 (15 units), or Zoology 108A–108B (5-5 units) or Entomological Sciences 100 (5 units); Physiology 123 (5 units), or Zoology 125L (2 units); Botany 105 (15 units), or Zoology 107A–107B (5-5 units); Zoology 108A–108B (5-5 units), or Entomological Sciences 100 (5 units); Zoology 109 (15 units), or Genetics 131 (5 units); to complete a minimum of 45 units.

UPPER DIVISION COURSES

100. Problems in Marine Biology. (15) Full-time study at the Sogdena Marine Laboratory. Prerequisite: Biology 1 or 11 and consent of instructor. Lectures, laboratory, field work, and directed study on selected topics, stressing experience in original research. Mr. Smith, Mr. Hand (Sp)

150. General Ecology. (4) Three hours of lecture and one hour of discussion 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, different biological science majors. Mr. Colwell, Ms. Vivrette (F)

151. Microbial Ecology. (4) Two 1 1/2-hour lectures and one 3-hour discussion/demonstration/lab work per week. Prerequisite: one quarter course or summer course (4-unit minimum) at a marine laboratory; additional upper division courses in biological science to complete a minimum of 45 units of upper division work in the major. At least one course in statistics is strongly recommended (Public Health 160A).

Honors Program. 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 of 1970 which became effective on September 1, 1972. At least one course in the biology of high school teachers in life science are encouraged to complete a major in a biological science. Prospective teachers should consult with a counselor in the

School of Education, Student Personnel Office, Room 1615 Tolman Hall, early in their university career so that a program may be planned for meeting credential requirements. For a list of specific requirements, please refer to the Announcement of the School of Education.

Letter and Science List: For regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSES

1A–1B. General Biology. (6–8) Three hours of lecture, three hours of laboratory and one hour of discussion per week. Prerequisite: three quarters of high school biology (including 1A–1B or 11A–11B). A 12-unit minimum of upper division courses in biological science to complete a major in a biological science. Prospective teachers should consult with a counselor in the
Biophonics

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 Medical Physics for further information.

Graduate degree programs in Biophysics (Ph.D. and M.A.), Biomedical Physics (M. Biorad.), and Medical Physics (Ph.D.) are administered by the Graduate Group in Biophysics.

Biostatistics

Group Major Office, 101 Haviland Hall

Preparation for Graduate Study

It is realized that few of the entering students will be prepared in mathematics, statistics, and the subject matter areas. Most prerequisites, however, can be made up during the first year of graduate study. Minimum entrance requirements consist of two full-year courses in calculus, and one-year courses in mathematical statistics or biostatistics, and in biology, zoology, or physiology.

Research Facilities

Graduate students in the group have direct access to a small electronic computer and also have available to them the services of the University Computer Center. A unique facility available to group members is the Child Health and 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 un-usually 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.

Botany

Department Office, 2017 Life Sciences Building
Preparation for Graduate Study

Students planning to study for the Doctor of Philosophy under membership of the faculty of the Department of Botany at Berkeley are encouraged to include in their undergraduate programs the following subjects: general botany and zoology or biology, comparative morphology of higher plants, plant taxonomy, plant physiology, general and organic chemistry, biochemistry, calculus, general physics, and a firm foundation in at least one language (German, French, or Russian). Those students anticipating graduate work in different botanical aspects of plant science should include, in addition to the above, a grounding in thermodynamics and physical chemistry. Minor deficiencies in the above subject areas may be filled after admission to the Graduate Division.

Detailed information on the graduate program in botany will be sent upon request. Address inquiries to the Graduate Admissions Office, Department of Botany, University of California, Berkeley, California 94720.

The Graduate Program

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 foreign language (see above) in their first year of graduate work, and they are expected to attend Botany 301 if Biology 301A–301B is the first time they are Teaching Assistants and graduate seminars (Botany 200 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 professor and the graduate adviser.

Students should note that 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 group programs 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 advisers.

The Botanical Garden in Strawberry Canyon provides opportunities for research with living plants, supplies teaching material for classes on campus, and serves as an outdoor laboratory for students; its collections are expected to include succulents, South American, South African, European, and Australian plants. The combined University and Jepson Herbaria offer a world-wide, floristic, reference-research collection and library which form a foundation for basic research in systematic botany, ecology, phytogeography, and evolution, not only for faculty, staff, and students but also for visiting scholars and for botanists throughout the United States and other countries. For further information on the Botanical Garden, see Index, 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 the structure; life equivalent courses taken elsewhere will be acceptable.

LOWER DIVISION COURSES

1. General Botany. (6) Three 1-hour lectures and two 3-hour laboratory periods per week. Prerequisite: Biology 1A–1B. This course covers the structure, life histories, reproductive mechanisms and relationships of the major groups of plants. Mr. Kaplan (F)

2. Practical Botany. (2) One 4-hour lecture-workshop per week to be given at the Botanical Garden. Prerequisite: consent of instructor. The fundamentals of plant physiology, taxonomy, and morphology as related to principles of practical ornamental horticulture. To be taken on a pass/fail basis. Mr. Ornduff (F)

10. Plant Biology. (4) One 1-hour lecture and one 3-hour audiotutorial (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 plant morphology as illustrated by the structure and function of plants. (W)

UPPER DIVISION COURSES

101. Survey of Mycology. (5) Two 1 1/2-hour lectures and two 3-hour laboratories per week. Prerequisite: Biology 1A–1B; course 1 recommended. Selected aspects of fungi: their structure, reproduction, physiology, genetics, ecology, pathology, industry, and taxonomy. Mr. Collins (F)

102. General Mycology. (5) Two 1 1/2-hour lectures and two 3-hour laboratories per week and two or three half-day trips on weekends. Prerequisite: Biology 1A–1B. General biology of fresh-water and marine algae including both phytoplankton and benthos. Emphasis is on morphology, phylogeny, and systematics. Laboratory involves identification of microscopic species, identification of field-collected specimens, techniques for culture, and simple experiments on development and reproduction. Mr. West (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 conferences with visiting scientists. Prerequisite: Biology 1A–1B. Students may enroll in such group programs with a faculty member of Botany as their major professor.

105. Principles of Plant Morphology. (5) Three 1-hour lectures and two 3-hour laboratories per week. Prerequisite: Biology 1A–1B; course 1 recommended. An analysis of the structural diversity of multicellular plants, particularly the higher forms, with emphasis on the developmental mechanisms responsible for this variation in form and the significance of this diversity in relation to the environments in which the plants grow. General biology of fresh-water and marine algae including both phytoplankton and benthos. Emphasis is on morphology, phylogeny, and systematics. Laboratory involves identification of microscopic species, identification of field-collected specimens, techniques for culture, and simple experiments on development and reproduction. Mr. West (W)

110. Evolutionary Morphology of Vascular Plants. (5) Two 1 1/2-hour lectures and two 3-hour laboratories per week. Prerequisite: Biology 1A–1B and course 1 recommended. An analysis of the evolution and comparative morphology of vascular plants studied from the viewpoint of both fossil and living representatives. Mr. Schmid (F)

112. Anatomy of Vascular Plants. (5) Two 1 1/2-hour lectures and two 3-hour laboratories per week. Prerequisite: Biology 1A–1B; course 1 recommended. A consideration of the various structure and functions of cell, tissue, and organ structure; including adaptations to ecological factors such as pollination, dispersal, and water availability. Mr. Schmid (F)

116. Plants and Man. (4) Two 1 1/2-hour lectures and 2 hours of demonstration per week. Prerequisite: a knowledge of the biology of higher plants. Emphasis on the relationship between man's selection and use of plants for his own purposes and the evolution of domesticated plants and the cultural evolution of man. Mr. Schmid (F)

120. Taxonomy of Seed Plants. (5) Three 1-hour lectures and two 3-hour laboratories per week plus 2 hours of laboratory work. Prerequisite: a knowledge of phylogeny and classification of spermatophytes; laboratory and field work illustrating taxonomic principles and methods. Mr. Duncan (W)

123. Computer-assisted Methods in Systematics and Ecology. (4) Two 1-hour lectures and one 2-hour discussion per week. Prerequisite: one course in systematic or taxonomic biology and one course in ecology. An examination of the theoretical background and application of computer-assisted methods in systematic and ecological studies including similarity and difference, cluster analysis, ordination techniques, evolutionary estimating procedures, and information retrieval. A project utilizing these methods will be conducted by each student. Mr. Schmid (F)

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 Sägehen Creek, near Truckee, California. Prerequisite: a background in biology. The taxonomic aspects include a brief survey of the flowering plants with practice in identification. The ecological aspects include studies of physiological tolerances of plants and the nature and influence of factors in the environment as they influence patterns of distribution. Acceptable in place of course 120 for the major.

125. The California Flora. (3) Two 1-hour lectures and one 1-hour discussion per week. Prerequisite: None, but concurrent enrollment in course 125L recommended. The relation of California plants to both native and introduced communities of the California flora. Mr. Jones (Sp)

130. Plant Cell Biology. (5) Three 1-hour lectures and one 4-hour laboratory per week. Prerequisite: Biology 1A–1B. A synthesis of morphological, biochemical, and genetic information on cell function, structure, and development. Mr. Cande (Sp)

144. Plant Physiology. (5) Three 1-hour lectures and two 3-hour laboratories per week. Prerequisite: Biology 1A–1B. Prereq: chemistry 4A or 4B. A synthesis of research on the relationship of keys and examination and identification of the native and introduced members of the California flora. Mr. Cande (Sp)

145. Laboratory in Plant Biology. (2) Three 1-hour lectures per week. Prerequisite: Biology 1A–1B. Laboratory work in plant physiology. Mr. Cande (Sp)

191. Special Study for Honors Candidates. (1–8) Prerequisite: eligibility as determined by the graduate program. The Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1–3) Enrollment is restricted by regulations listed on page 38. Additional limitations for one upper division course in Botany and an overall grade point average of 3.0 must be taken on a pass/fail basis. The Staff (F, W, Sp)

GRADUATE COURSES

201. Biology of the Lower Fungi. (5) Three 1-hour lectures and two 3-hour laboratories per week. Prerequisite: course 101. Phycomycetes, Ascomycetes, and Hypomycetes (in part). Given in alternate years. Mr. Schmid (Sp)


204. Experimental Botany. (5) Two 1 1/2-hour lectures and two 3-hour laboratories per week. Prerequisite: course 101. A laboratory course emphasizing quantitative studies on marine algae including consideration of principles and methods for extinct and unialgal culture and as control of development and reproduction. Given in alternate years. Mr. West (F)

210. Phycology. (4) Two lectures and three hours of laboratory per week. Prerequisite: Chemistry 102. Emphasis on water relations, ion uptake, and developmental physiology of higher plants. Recommended for biology major students. Not open to students who have taken course 144.

212. Phycology. (5) Three 1-hour lectures and two 3-hour laboratories per week. Prerequisite: Biology 1A–1B and Biology 150. The structure, development, and history of the vegetation of marine algae, with emphasis on the development and ecology of higher plants. Recommended for biology major students. Not open to students who have taken course 144.

214. Maintenance Physiology and Development. (5) Three 1-hour lectures and two 3-hour laboratories per week. Prerequisite: Biology 1A–1B. Laboratory for course 154 in Plant Ecology.

Seminor for Botany Majors. (2) One 1-hour meeting per week with student presentations. Prerequisite: Senior standing Botany majors. Student discussions of botanical topics. Must be taken on a pass/fail basis. Mr. Schmid (Sp)

198. Supervised Independent Study and Research. (1–3) Enrollment is restricted by regulations listed on page 38. Additional limitations for one upper division course in Botany and an overall grade point average of 3.0 must be taken on a pass/fail basis. The Staff (F, W, 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 247, Bodega Bay, California 94923.

**220. Advanced Taxonomy.** (3) Two 1 1/2-hour lectures per week. Prerequisite: course 120. A survey of the literature basic to classification of flowering plants. Given in alternate years.

**222. Plant Biosystematics.** (3) Three 1-hour lectures per week. Prerequisite: course 120. A study of the biometrical, cytological, and experimental bases of bi-systematics, the morphological patterns resulting from various evolutionary processes, and the taxonomic problems these pose. Given in alternate years.

**224. Evolutionary Ecology.** (4) Two 1-hour lectures and two 3-hour laboratories per week. Prerequisite: course 120 and Genetics 100. A study of processes involved in the development and maintenance of ecological adaptations in individuals, populations, and communities. Given in alternate years. Mr. Baker (Sp)

**226. Plant Interactions.** (4) Two 1-hour lectures and two 3-hour laboratories per week. Prerequisite: Chemistry 8A-8B; courses 120 or 125, 154 and 154L. A review of the literature and current research in interactions between plants. Prerequisite to another.

**249A–249B–249C. Advanced Plant Physiology.** (4-4-4) Meetings with the faculty for an evening of discussion every two to three weeks. Prerequisite: Consent of the instructor. No one quarter of 249 is prerequisite to another.

249A. Intensive reading and analysis of the literature in water relations, nutrition, absorption and translocation of inorganic nutrients and organic solute translocation. Designed for candidates for the Ph.D. in the area of plant physiology. Given every sixth quarter, beginning Fall 1976. Mr. Park, Roberts, (Sp)

249B. Intensive reading and analysis of the literature in photosynthesis, chemosynthesis, respiration, fermention, and carbohydrate and nitrogen metabolism. Designed for candidates for the Ph.D. in the area of plant physiology. Given every sixth quarter, beginning Spring 1977. Mr. Park, Mr. Jones (Sp)

249C. Intensive reading and analysis of the literature in plant development. Designed for candidates for the Ph.D. in the area of plant physiology. Given every sixth quarter, beginning Fall 1977. Mr. Jones, Mr. Jacobson (F)

**258. 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 topics in the Department of Botany. Topics will be announced at the beginning of each quarter. Enrollment in more than one section is permitted. Must be taken on a satisfactory/unsatisfactory basis.

299. Research. (1–12) Graduate student research. Must be taken on a satisfactory/unsatisfactory basis.

**395. 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 Biologists. (3) Three 3-hour laboratories per week. Prerequisite: graduate standing, approval of major professor, and consent of instructor. The purpose of this course is to familiarize students with the principles and theory of electron microscopy. May be taken without Botany 431L.

431L. Laboratory on Techniques of Electron Microscopy for Biologists. (3) Three 3-hour laboratories per week. Prerequisite: graduate standing, approval of major professor, consent of instructor. Botany 431 must be taken concurrently with Botany 431L. The purpose of this course is to prepare graduate students in the biological sciences to use electron microscopy in their research.

902. 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**

**Group Major Office, 4115 Dwinelle Hall**

**Professors:**
- Robert N. Bellah, Ph.D. (Comparative Studies)
- James Cahill, Ph.D. (History of Art)
- Padmanabha S. Jaini, Ph.D. (South and Southeast Asian Studies)
- Robert P. Goldman, Ph.D. (South and Southeast Asian Studies)
- J. Frits Staal, Ph.D. (Philosophy and South and Southeast Asian Studies)
- Wei-king Tu, Ph.D. (History of Art)

**Associate Professors:**
- Lewis R. Lancaster, M.Th., Ph.D. (Orientation Languages)
- Barend A. van Noot, Ph.D. (South and Southeast Asian Studies)
- Yoichi Shimagi, Ph.D. (History of Art)

**Assistant Professor:**
- Joshua Shimizu, Ph.D. (History of Art)

**Chairman:** P. S. Jaini

**Graduate Adviser:** Lewis R. Lancaster

**Group Major in Buddhist Studies**

The Group in Buddhist Studies offers an interdisciplinary program of study and research leading to the Ph.D. degree in Buddhist Studies. The group cooperates closely with the Department of South and Southeast Asian Studies and the Department of Oriental Languages, emphasizing 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 in Sanskrit or in an East Asian language, i.e., 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 career, 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 the 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
Chemistry: 1A, 1B, 1C, 5 (or 4A, 4B, 4C); 12A, 12B, 14, 10A, 10A, 11B, 112, and a choice of 105, 106, 107, or 11A–11B.

(For students who wish to be certified to the American Chemical Society, this must be 11A–11B.)

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.

**Honors Program.** In addition to completing the requirements for the major in chemistry, a student in the honors program must (a) earn a grade-point average of at least 3.3 in upper division courses in the major and overall in the University; and (b) be recommended by the major adviser—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 adviser 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.

**Classics**

**Department Office, 5303 Dwinelle Hall**

**Professors:**
- John K. Anderson, M.A. (Graduate Advisor)
- Ronald S. Stroud, Ph.D. (Chairman)
- John M. Dillon, Ph.D.
- William S. Anderson, Ph.D.
- Peter R. I. Brown, B.A.
- Thomas G. Rosenmeyer, Ph.D.

**Classics (Single or Multiple Subject)**

For information concerning the Classics (Single or Multiple Subject), see the Announcement of the School of Education.

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**NOTE:** For key to symbols, see page 30.
Sanskrit (see South and Southeast Asian Studies), Art concurrently with upper division courses); Greek 100, Including Greek 150A-150B and at least one part of major program. Including Latin 160 and at least one of Greek 115 or Latin 1195 taken during the senior year.

To be admitted to the honors program, students must have 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 may graduate with Honors, High 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 Classics majors to take Latin 170A-170B. There will be no further Latin language requirement. The purpose of the undergraduate courses called Classics is to give the student instructor in Greek and Roman civilization in all its phases—literature (read in translation), mythology, religion, government, and archaeology. The latter courses require no knowledge of Greek and Latin. The graduate courses, all of which are designated Classics, are advanced courses in Greek, Latin, and classical archaeology, all requiring knowledge of one or both of the languages.

Preparation for Graduate Study

To enter graduate study in Classics, students should complete the major in Greek or Latin or Classical 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 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 graduate study of classical civilization. The language requirement has been raised too. Prospective graduate students in Classics should also take upper division prose composition in both languages (Greek 150A-150B and Latin 160A-B); 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, Classics (each under Plan B: a program of 36 units in graduate and advanced undergraduate courses, and a series of examinations), or Classical Archaeology (under Plan A: a program of 30 units of graduate and advanced undergraduate courses, and a dissertation).

The Doctor of Philosophy degree may be taken in Classics or Classical Archaeology. Whatever the graduate course work pursued, the individual student may choose any field or fields of study. The study of Classical Languages 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. qualifying examinations an extensive knowledge of literature and history. They are especially advised to enter courses in epigraphy, paleography, comparative grammar, and Greek dialects when they are offered, since the interval between offerings of each is at least three years. The graduate program 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 Letters and Science.

Classes

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 is the subject of this course. Study of the works of Homer and Hesiod, and the role they play in the development of the Hellenic world. 10A is not prerequisite to 10B.

Mr. Dilson (W, Sp)

11A–11B. The Golden Age of Rome. (4–4) Three 1-hour lectures per week. Roman civilization in its greatest age (133B.C.–4 A.D.) as revealed in the works of its statesmen, poets, and historians. Translations of Latin classics studied in their historical and social setting, will illustrate the formation of the Roman state and its emergence as a world capital. 11A is not prerequisite to 11B.

17A–17B. Elementary Course in Classical Archaeology. (4–4–4) Three 1-hour lectures per week. 17B or 17C may be taken first.

17A. The development of Greek Civilization from the Bronze Age to 700 B.C. as illustrated by the monuments. Mr. J. K. Anderson, Mr. Greenewalt (F)

17B. Monuments of Greek civilization 700–300 B.C., with particular reference to the life of the citizen. Mr. J. K. Anderson, Mr. Grenewalt (W)

17C. Monuments of western civilization from the Hellenistic Age to the Age of the Antonines, with particular reference to urban development and provincial organization. Mr. J. K. Anderson, Mr. Greenewalt (Sp)

28. The Classical Myths. (4) Two 1 1/2-hour lectures per week. A study of Greek, Roman, and Indian myths with emphasis on the universal meanings of ancient mythologies. The interaction of myth, religion, and philosophy as a means of understanding some aspects of past and present cultures. Mr. Nagler (W)

34. Epic Poetry: Homer and Vergil. (4) Three 1-hour lecture-discussions per week. Lectures on Greek and Roman epics with readings of Iliad, Odyssey, and Aeneid. Mr. Bullock (Sp)

35. Greek Tragedy. (4) Three 1-hour lectures per week. Lectures on Greek tragic drama with readings of plays of Aeschylus, Sophocles, and Euripides. Mr. Mastronarde (Sp)

36. Plato: Selected Dialogues. (4) Three 1-hour lectures per week. Lectures on the life and thought of Plato's Dialogues. Mr. Rabinowitz (F)

UPPER DIVISION COURSES

100A–100B. Greek Literature in Translation. (4–4) Three 1-hour lectures per week. Emphasis limited to 100B or may be taken first.

100A. Greek literature to 300 B.C. Mr. Griffith (F)

100B. Hellenistic literature and Latin literature of the Roman Republic. Mr. Bullock (W)

100C. Latin literature under the Roman Empire.

*133. Ancient Comedy. (4) Three 1-hour lectures per week. A study of individual plays and of the concept of the comic genre in the works of Aristophanes, Menander, and other classical writers.

*136A–136B. Socrates and the Socratic Tradition. (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 Aristotles. Analysis of the way later Greek Thinkers expanded and altered Socrates' original significance.

137. The Ancient Novel. (4) Three 1-hour lectures per week. A review of the ancient romances (origins, development, form) including Andrius, Heliodorus, Longus, Daphnis and Chloe, and Heliodorus' Egyptian Tale. Mrs. Goldstine (F)

139. The Greek and Roman Historians. (4) Three 1-hour lectures per week. The five historians Herodotus, Thucydides, Polybius, Livy, and Tacitus, in English translation: their intellectual background, documentary sources, and views of history.


170A. Greek Vase-Painting from 700 B.C. to Ekekias. Mr. Greenewalt (F)

170B. Greek Red-figure Vase Painting.

170C. Greek Sculpture in the Sixth and Fifth Centuries B.C. Mr. J. K. Anderson (W)

170D. Greek Sculpture in the Fourth Century B.C. and Hellenistic Period.

170E. Survey of Greek Architecture.

170F. Aspects of Roman Art. 40A, 40B, 40C.

170G. Roman Wall Painting. Mr. Miller (F)

175A–175B–175C–175D. Greek and Roman Cities and Citadels. (4–4–4–4) Three 1-hour lectures per week.
1. Greek for Beginners. (6) Five 1-hour class meetings per week. First part of two-part course in elementary Greek. (W)

2. Greek for Beginners. (6) Five 1-hour class meetings per week. Second part of two-part course in elementary Greek. (W)

1A–1B–1C. Greek for Beginners. (4–4–4) Three 1-hour class meetings per week. Three-part course in elementary Greek equivalent to Greek 1-2. (F, W, Sp)

40A–40B–40C. Intermediate Greek: Composition, Grammar, and Sight Reading. (4–4–4) Three 1-hour class meetings per week. Prerequisite: courses 1–2 or 1A–1B–1C. Development of skill in written and oral expression in Greek. (W)

199. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations on page 36. Additional restrictions: limited to senior honors students. Must be taken on a passed/not passed basis. (W, Sp)

100. Xenophon, Anabasis. (4) Three 1-hour class meetings per week. Prerequisite: course 2–1 or 1A–1B–1C. (W)

101. Homer. (4) Three 1-hour class meetings per week. Prerequisite: course 100. (W)

102. Plato. (4) Three 1-hour class meetings per week. Prerequisite: course 100. (W, Sp)

103. Drama: Euripides. (4) Three 1-hour class meetings per week. Prerequisite: course 100. (F)

110. Senior Course in Greek Poetry. (4) Three 1-hour class meetings per week. Prerequisite: course 103.

115A. Aristophanes. Mr. Mastronarde (F)
115B. Sophocles. Mr. Mastronarde (F)
115C. Aeschylus. Mr. Miller (W)
115D. Lyric Poets. Mr. Nagler (Sp)
115E. Hellenistic Poets. (F)
115F. Epic Poets. Mr. Rodgers (F)
115G. Euripides. (F)

120. Senior Course in Greek Prose Authors. (4) Three 1-hour class meetings per week. Prerequisite: course 103.

120A. Demosthenes. Mr. Bulloch (F)
120B. Herodotus. Mr. Herington (Sp)
120C. Thucydides. (W)
120D. Aristotle. Mr. Threatte (Sp)
120E. Plato's Republic. (F)
120F. Attic Orators. (F)

125. The Greek New Testament. (4) Two 1 1/2-hour class meetings per week. Prerequisite: course 100. Readings in the gospels and epistles in Greek. (W)

130. Greek Political Institutions. (4) Three 1-hour class meetings per week. Study of Greek political institutions. (W)

150A–150B. Advanced Greek Prose Composition. (4–4) Three 1-hour class meetings per week. Prerequisite: courses 100 and 101. Advanced writing in the writing of Attic Greek prose. Either Greek 150A or Greek 150B may be taken separately for grade and credit, or the sequence Greek 150A–150B may be taken concurrently with course 173, for students prepared to read relevant texts in Greek. (F)

175. Topography and Monuments of Asia Minor. (4) Three 1-hour class meetings per week. Study of ancient cities and sites in Asia Minor, with a focus on the development of Greek civilization. (W)

180. Ancient Athletics. (4) Three 1-hour lectures per week. Study of ancient athletes and athletics including athletic training, facilities, competitions, and the role of athletics in Greek and Roman society. Mr. Miller (F)

185. Political and Social Thought of the Ancient World. (4) Three 1-hour lectures per week. Greek and Roman ideas about society and the state, from Homer to St. Augustine. Mr. Miller (F)

198. Directed Group Study for Advanced Undergraduates. (1–5) Prerequisite: restricted to senior honors students. The Staff (Su, F, W, Sp)

199. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations on page 36. Additional restrictions: limited to senior honors students. Must be taken on a passed/not passed basis. The Staff (Su, F, W, Sp)

H195A-H195B-H195C. Honors Course in Greek. (3-3-3) Prerequisite: appropriate linguistic preparation and eligibility for admission to the honors program. Large seminars with a maximum of three quarters, terminat- ing in the writing of a thesis, which will be evaluated by an Honors Committee of three members. The written thesis is to be submitted to all three members of the committee no later than four weeks before the Monday of examination week of the final quarter, and the committee shall agree upon the level of Honors and grade no later than the Monday of examination week of the final quarter. Credit and grade awarded upon completion of the sequence. (W, Sp)

198. Directed Group Study for Advanced Undergraduates. (1–5) Prerequisite: restricted to senior honors students. Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations on page 36. Additional restrictions: limited to senior honors students. Must be taken on a passed/not passed basis. Staff (F, W, Sp)

104. Vergil. (4) Three 1-hour class meetings per week. Prerequisite: course 10 or 30. Mr. Rodgers (W)

105. Caesar. (4) Three 1-hour class meetings per week. Prerequisite: course 10 or 30. Selected readings. Mr. Knapp (F)

106. Horace: Odes and Epodes. (4) Three 1-hour class meetings per week. Prerequisite: course 10 or 30. Mrs. Goldstine (W)

107. Cicero. (4) Three 1-hour class meetings per week. Prerequisite: course 10 or 30. Mr. Rodgers (W)

108. Roman Political Institutions. (4) Three 1-hour class meetings per week. Study of Latin texts which elucidate the development of Roman political institutions. Mr. Knapp (F)

110A. Introduction to Medieval Latin. (4) Three 1-hour class meetings per week. Prerequisite: courses 104 and 30, or equivalent. Readings in Latin and its influence on Latin literature, concentrating on outstanding periods such as the Carolingian Revival and the twelfth century, with reference to the classical tradition and its influence. Mr. Knapp (W)

110B. Intermediate Latin Prose Composition. (4) Three 1-hour class meetings per week. Prerequisite: course 104 and 30. More advanced study of Latin prose composition, with emphasis on developing ability to read prose. Course is prerequisite to all subsequent Latin courses. Mr. Knapp (W)

110C. Senior Course in Latin Prose. (4) Three 1-hour class meetings per week. Prerequisite: course 104 and 30. More advanced study of Latin prose composition, with emphasis on developing ability to read prose. Course is prerequisite to all upper division Latin poetry courses. Mr. Knapp (F, W, Sp)

110D. Intermediate Latin Verse Composition. (4) Three 1-hour class meetings per week. Prerequisite: course 104 and 30. More advanced study of Latin verse composition, with emphasis on developing ability to read verse. Course is prerequisite to all upper division Latin poetry courses. Mr. Knapp (F, W, Sp)

115A. Caesar. (4) Three 1-hour class meetings per week. Prerequisite: course 104 and 30. More advanced study of Latin prose composition, with emphasis on developing ability to read prose. Course is prerequisite to all subsequent Latin courses. Mr. Knapp (W)

115B. Cicero. (4) Three 1-hour class meetings per week. Prerequisite: course 104 and 30. More advanced study of Latin prose composition, with emphasis on developing ability to read prose. Course is prerequisite to all subsequent Latin courses. Mr. Knapp (W)

115C. Seneca. Mr. Rodgers (W)

115D. Tacitus. Mr. Murgia (Sp)

115E. Livy. (W)

115F. St. Augustine. (W)

116A. Latin Verse Composition. (4) Three 1-hour class meetings per week. Prerequisite: courses 104 and 30. More advanced study of Latin verse composition, with emphasis on developing ability to read verse. Course is prerequisite to all upper division Latin poetry courses. Mr. Knapp (W)

116B. Latin Verse Composition. (4) Three 1-hour class meetings per week. Prerequisite: courses 104 and 30. More advanced study of Latin verse composition, with emphasis on developing ability to read verse. Course is prerequisite to all upper division Latin poetry courses. Mr. Knapp (W)

116C. Latin Prose. (4) Three 1-hour class meetings per week. Prerequisite: courses 104 and 30. More advanced study of Latin prose composition, with emphasis on developing ability to read prose. Course is prerequisite to all upper division Latin poetry courses. Mr. Knapp (W)

116D. Latin Prose. (4) Three 1-hour class meetings per week. Prerequisite: courses 104 and 30. More advanced study of Latin prose composition, with emphasis on developing ability to read prose. Course is prerequisite to all upper division Latin poetry courses. Mr. Knapp (W)

116E. Latin Prose. (4) Three 1-hour class meetings per week. Prerequisite: courses 104 and 30. More advanced study of Latin prose composition, with emphasis on developing ability to read prose. Course is prerequisite to all upper division Latin poetry courses. Mr. Knapp (W)

116F. Latin Prose. (4) Three 1-hour class meetings per week. Prerequisite: courses 104 and 30. More advanced study of Latin prose composition, with emphasis on developing ability to read prose. Course is prerequisite to all upper division Latin poetry courses. Mr. Knapp (W)

120. Introduction to Latin Prose. (4) Formerly 3. Three 1-hour class meetings per week. Prerequisite: one of the following: course 2, 12, 14B or equivalent. Reading in Latin literature with emphasis on reviewing grammar and developing ability to read prose. Course is prerequisite to all subsequent Latin courses. Competency at this level may be established by an examination administered during pre-registration week of each quarter.

120A. Demosthenes. Mr. Bulloch (F)
120B. Herodotus. Mr. Herington (Sp)
120C. Thucydides. (W)
120D. Aristotle. Mr. Threatte (Sp)
120E. Plato’s Republic. (F)
120F. Attic Orators. (F)

20. Introduction to Latin Prose. (4) Formerly 3. Three 1-hour class meetings per week. Prerequisite: one of the following: course 2, 12, 14B or equivalent. Reading in Latin literature with emphasis on reviewing grammar and developing ability to read prose. Course is prerequisite to all subsequent Latin courses. Competency at this level may be established by an examination administered during pre-registration week of each quarter.

30. Introduction to Latin Poetry. (4) Formerly 5. Three 1-hour class meetings per week. Prerequisite: Latin 20 or equivalent established by examination. Selections from Latin literature with emphasis on developing ability to read poetry. Course is prerequisite to all upper division Latin poetry courses.

NOTE: For key to symbols, see page 36.
by an Honors Committee of three members. The written thesis is to be submitted to all three members of the committee no later than three weeks before the Monday of the examination week of the final quarter, and the committee shall agree upon the level of Honors and grade no later than the Monday of examination week. Credit and grade awarded upon completion of the sequence. Staff (F, W, Sp)

198. Directed Group Study for Advanced Undergraduates. (1–5) Prerequisite: restricted to senior honor students. Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations on page 38. Additional restriction: limited to senior honor students. Must be taken on a pass/fail/not pass basis. Staff (F, W, Sp)

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.

200A–200B. Prosomnara. (4) Two 1 1/2-hour class meetings per week. An introduction to the general literature of classical philology, to methods of research, and to textual criticism. Staff (F, W, Sp)

200A. Prosommar to Greek. Mr. Mastronarde (F)

200B. Prosommar to Latin. Mr. Mur gia (W)

201A–201B–201C. Survey of Greek Literature. (4–4–4) Two 1 1/2-hour class meetings per week. A 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. Mr. Griffith (F)

201B. Tragedians and Historians of the Fifth Century. Mr. Mastronarde (W)

201C. From Aristophanes to Hellenistic Literature. Mr. Bulloch (Sp)

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. Pritchett (W)

202B. Augustan Literature. Mr. Pritchett (W)

202C. Post-Augustan Literature. Mr. Pritchett (W)

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. Mr. Nagler (F)

210C. Homer. (4) Two 1 1/2-hour class meetings per week. Language, meter, and questions of oral poetry. Mr. Nagler (F)

211B. Thucydides. Mr. Pritchett (W)

212C. Aristotle's Constitution of Athens. Mr. Pritchett (W)

215B. Diodorus. Mr. Pritchett (W)

215C. Polybios. Mr. Pritchett (W)

215E. Polybius. Mr. Pritchett (W)

215F. Polybius. Mr. Pritchett (W)

216. Greek Historians. (4) Two 1 1/2-hour class meetings per week. The social, legal, and administrative background to the literary sources for the Roman Empire. Staff (F, W, Sp)

217. Roman Polities and Administration. (4) Two 1 1/2-hour class meetings per week. Select problems in Roman imperial history from 69–235 A.D. Mr. Knapp (W)

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 artifacts. Staff (F, W, Sp)

270A. Mr. J. K. Anderson (F)

270B. Mr. Greenewalt (W)

270C. Mr. Greenewalt (Sp)

271. Pan-Hellenism and Nemesis. (4) One 3-hour meeting per week. In addition to providing an opportunity to study in detail the types of monuments, artifacts, dedications, etc., relevant to the Pan-Hellenic centers, the seminar will investigate the place and significance of the Pan-Hellenic festival in Greek society, especially as exemplified by the discoveries at Nemea. Mr. Greenewalt (W)

278. Special Study. (2–8) Prerequisite: completion of qualifying examination for the Ph.D. degree. This course is normally reserved for students writing the doctoral dissertation. Staff (F, W, Sp)

279. Special Study. (1–5) Special individual study for qualified graduate students. Staff (F, W, Sp)

601. Individual Study for Mentor's Candidates. (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. Staff (F, W, Sp)

602. Individual Study for Doctoral Candidates. (1–8) Individual study in consultation with the major field adviser, intended to provide another 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. Staff (F, W, Sp)

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 168), (4)

Advanced Indo-European Comparative Linguistics (Linguistics 244), (4)

IDB 213. Studies in the Philosophy of Democritus. (3) See Interdepartmental Studies for the complete description of this course.

Medieval Studies. Students who are interested in specializing in medieval studies should consult Medieval Studies in the Index of this catalog.

Comparative Literature

Department Office, 4401 Dwinelle Hall

Professors:

Robert Alter, Ph.D. (Hebrew)
William S. Anderson, Ph.D. (Latin)
Cyril Brown, Ph.D. (Chinese)
Louise George Cubb, Ph.D. (Greek)
Philip W. Damon, Ph.D. (Greek)
Eric O. Johannesson, Ph.D. (Scandinavian)
James T. Monroe, Ph.D. (Arabic)
L. Janette Richardson, Ph.D. (Slavic)
Thomas G. Rosenney, Ph.D. (Chinese)
Blake L. Spahr, Ph.D. (Egean)
Paul J. Alexander, Ph.D. (History) (Egean)

Associate Professors:

Paul M. Bertrand, Aug. Ph.D. (French)
John S. Coolidge, Ph.D. (French)
Joseph J. Duggan, Ph.D. (French)
James T. Monroe, Ph.D. (Arabic)
Eric O. Johannesson, Ph.D. (Scandinavian)
Kenneth Wasling, Ph.D. (German)
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 knowledge of at least one national literature and 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 methodological investigation of problems involving more than one literature. The junior division program provides students interested in literature with 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 studied in the junior course and to undertake a research project involving the comparative examination of one author from each of the literatures which they studied separately in the preceding quarters. The specific requirements for the A.B. with a major in comparative literature are listed below.

The Major

Lower Division. There are no specific lower division requirements beyond completion of the Letters and Science reading and composition requirement and of 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 offerings and two other literature courses are recommended but not required. Students potentially interested in the A.B. with honors should note the requirement 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 is required, including (1) CL 100 and the junior year and a section of CL 190 in the senior year, (2) at least four courses totaling not fewer than 16 units in one literature read in the original language and with emphasis on selected aspects of the literary works of that literature, (3) at least two courses totaling not fewer than 6 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) or Latin. Note that, although only two literatures (for example, English-French) are required for the A.B. degree, students interested in language and literature may find it advantageous to work in three literatures (for example, English-French-Latin).

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 the division work in both a 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 and in all work completed in the University by the time of their graduation, (2) do upper division work in both a vernacular foreign language and either Greek or classical Latin, (3) demonstrate, through either examination or course work, a sense of the historical development of their principal literature, (4) earn a grade of B or higher for the written work in the 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 at Berkeley 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 English and 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. The written comprehensive examination consists of four foreign languages. Applicants for the Ph.D. must (1) accumulate at least a grade-point average of at least a 3.0 in courses in the major, (2) have completed at least two courses in each of the major and minor literatures and three courses (totaling not fewer than 18 units) in courses in the minor literature. Courses on foreign literature in English translation may not be counted in satisfaction of the requirements listed above. The purpose of graduate study is usually spent preparing for the M.A. written examination on a list of approved texts selected by the student in consultation with the adviser, but students working in Oriental or Near Eastern literatures should expect to spend at least two additional quarters preparing for the degree.

Requirements for the M.A. Degree. A minimum of 36 approved graduate and upper division units including (1) at least 18 graduate units, (2) at least two advanced graduate courses in Comparative Literature, and (3) work in at least two separate ancient or modern literatures (for example, English and Italian), one of which must be studied 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 (totaling not fewer than 8 units) in the minor literature and three courses (totaling not fewer than 12 units) in the major literature. Courses on foreign literature in English translation may be counted in satisfaction of the requirements listed above. Each student at the end of two years of graduate study is usually spent preparing for the M.A. written examination on a list of approved texts selected by the student in consultation with the adviser, but students working in Oriental or Near Eastern literatures should expect to spend at least two additional quarters preparing for the degree.

Requirements for the Ph.D. Degree. While only one graduate seminar is formally required beyond the methods of the graduate seminar, students are encouraged to develop a broad range of knowledge in one or more literatures. Students are expected to work in both a 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 and in all work completed in the University by the time of their graduation, (2) do upper division work in both a vernacular foreign language and either Greek or classical Latin, (3) demonstrate, through either examination or course work, a sense of the historical development of their principal literature, (4) earn a grade of B or higher for the written work in the 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 at Berkeley 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 English and 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. The written comprehensive examination consists of four foreign languages. Applicants for the Ph.D. must (1) accumulate at least a grade-point average of at least a 3.0 in courses in the major, (2) have completed at least two courses in each of the major and minor literatures and three courses (totaling not fewer than 18 units) in courses in the minor literature. Courses on foreign literature in English translation may not be counted in satisfaction of the requirements listed above. The purpose of graduate study is usually spent preparing for the M.A. written examination on a list of approved texts selected by the student in consultation with the adviser, but students working in Oriental or Near Eastern literatures should expect to spend at least two additional quarters preparing for the degree.

Requirements for the M.A. Degree. A minimum of 36 approved graduate and upper division units including (1) at least 18 graduate units, (2) at least two advanced graduate courses in Comparative Literature, and (3) work in at least two separate ancient or modern literatures (for example, English and Italian), one of which must be studied 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 (totaling not fewer than 8 units) in the minor literature and three courses (totaling not fewer than 12 units) in the major literature. Courses on foreign literature in English translation may be counted in satisfaction of the requirements listed above. Each student at the end of two years of graduate study is usually spent preparing for the M.A. written examination on a list of approved texts selected by the student in consultation with the adviser, but students working in Oriental or Near Eastern literatures should expect to spend at least two additional quarters preparing for the degree.

Requirements for the Ph.D. Degree. While only one graduate seminar is formally required beyond the methods of the graduate seminar, students are encouraged to develop a broad range of knowledge in one or more literatures. Students are expected to work in both a 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 and in all work completed in the University by the time of their graduation, (2) do upper division work in both a vernacular foreign language and either Greek or classical Latin, (3) demonstrate, through either examination or course work, a sense of the historical development of their principal literature, (4) earn a grade of B or higher for the written work in the 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.
Three 1-hour lectures and discussion periods per week.
Miss Walker (Sp), Mr. Hughes (W)

*190A–198B. Modern Literature and the Arts. (4–4)
Three 1-hour lecture and discussion and three 1-hour laboratory periods per week. Prerequisite: at least four quarters in one foreign language and at least two quarters in a the other foreign language(s) and semester comparative paper. Comparative investigation of the interrelationships between modern poetry and modern painting, sculpture, music, and literature. Three 1-hour lectures and discussion periods per week. From 1885 to the present. 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 Chinese and China's response in literary theory, movements, and creation. When not given see Oriental Languages 204. Mr. Birch (F)

165. Myth and Literature. (4) Two 1 1/2-hour lecture and discussion periods per week. Study of the earliest myth-texts to the progressions in the growth of literature out of myth which has continued to the present day. Myth and oral composition. Emphasis on the timeless meanings of myths as reflected in varying idioms.
Mr. Nagler (Sp)

Mr. Cooledge

*180. Manemann in Art and Literature. (4) Two 1 1/2-hour lectures and discussion periods per week. The phenomenon of a literary 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 archetypal modern mannerism.
Mr. Spahr

185. Women's Perspective in Literature. (4) Three one-hour lectures plus one hour of discussion (to be arranged) per week. Comparative study of 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.
(W)

Group II: Restricted Courses

(Designed primarily for students whose major subject is Comparative Literature; sections limited to fifteen students each.)

The Junior Courses

100. Introduction to Comparative Literature. (4) Three 1-hour lectures and one tutorial meeting per week. Prentice Library literature course covering a foreign language or consent of the instructor. Selected critical and literary texts from classical antiquity to the present day. Only one foreign language. Emphasis on principles of literary comparison and analysis.
The Staff (F, W, Sp)

112A–112B. Introduction to Modern Greek. (5–5) Three 1 1/2-hour meetings per week. Two years of classical Greek at college, including a course on Homer and a course on either Plato or a dramatist. Modern Greek pronunciation, vocabulary, morphology, and syntax studied in comparison with Attic Greek; reading of selections of progressive length and complexity.
(W, Sp)

The Senior Courses

190A. Comparison of Authors: English, French, German. (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 German. Comparison of three important authors, English, French, German; one foreign author must be read in the original language; examination and substantial comparative paper required.
Mr. Smith (Sp)

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.
Miss Hoover (W)

*190D. Comparison of Authors: English, Spanish, Italian. (4) Three 1-hour lectures and discussion period 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 language must be read in the original language; examination and substantial 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 Latin or Greek. Comparison of three important authors, English, Latin, Greek; one foreign author must be read in the original language; examination and substantial comparative paper required.

190U. Comparison of Authors: Unlisted Literatures. (4) Individual conferences to be arranged. 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 authors, including at least one author belonging to a literatures under the other 180 courses. The works belonging to the literatures listed in the 180 course must be read in the original languages. Substantial comparative paper required.
The Staff (Miss Richardson in charge) (F, W, Sp)

*191E–191F. Literary Methodology/Comparison of Authors. (4–4) Two 1 and 1/2 lectures and one hour of lab per week. Prerequisite: reading knowledge of one of the following: Hebrew, Latin, Italian, or French. Credit and grade to be awarded upon completion of the sequence. Two quarter combination of courses 180 and 190. Introduction to comparative methodology and application (W): modes of narration and evolution of the idea of the hero examined in the Old Testament, Ovid, Tasso, Fielding, and Laclos. Mr. Alter, Mrs. Ciubbi, Mrs. Goldstine (W, Sp)

Tutorial Courses

H196. Special Honors. (1) Prerequisite: course H1A–H1B with a grade of B or higher, and permission of the instructor or charge. One hour or tutorial or seminar with permission of the instructor or charge. Permission to graduate standing in Comparative Literature. Weekly tutorial meetings including oral and written reports on a reading list designed to prepare students for a formal examination. May be repeated each quarter until the senior year.
The Staff (Mr. Larson in charge) (F, W, Sp)

198. Directed Group Study for Upper Division Students. (1–4) One to four hours lecture per week. Tutorial instruction in areas not covered by regularly scheduled courses.
The Staff (Mr. Larson in charge) (F, W, Sp)

199. Supervised Independent Study and Research. (1–8) Enrollment is restricted to regulations listed on page 36. Must be taken on a pass/not passed basis.
The Staff (Mr. Larson in charge) (F, W, Sp)

GRADUATE COURSES

Introductory Graduate Courses

200. Methods of Study in Comparative Literature. (4–5) Two meetings per week. Prerequisite: admission to graduate standing in Comparative Literature. Required of all candidates for the M.A. degree. Introduction to the methods of comparative study. Lectures on such general topics as bibliography, textual criticism, and the scope and direction of comparative literary studies in the U. S. and abroad. Readings and discussion on representative novels, plays, and poems, and major critical treatments of each.
The Staff (F, W)

202A. Approaches to Epic 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 epic poetry.
Mr. Daron (Sp)

202B. 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.

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.

*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.

Graduate Seminars

*204A–204B. Studies in Relations Between Classical and Modern Literatures. (4–4) One 3-hour lecture and discussion period per week. Prerequisite: preparation in two foreign languages. 204A is not prerequisite to 204B. Comparative investigation of a topic in Western literature involving the study of modern poetry and post-classical documents.
Mr. Nagler (W)

210A–210B. Studies in Medieval Literature. (4–4) One 3-hour lecture and discussion period per week. Prerequisite: preparation in two foreign languages. 210A is not prerequisite to 210B. Comparative investigation of a topic in Western literature between the fifteenth century and the fourteenth century.
Mr. Duggan (Sp)

218A–218B. Studies in Renaissance Literature. (4–4) One 3-hour lecture and discussion period per week. Prerequisite: preparation in two foreign languages. 218A is not prerequisite to 218B. Comparative investigation of a topic in Western literature between the end of the Renaissance and the beginning of the nineteenth century.

225A–225B. Studies in Symbolist and Modern Literatures. (4–4) One 3-hour lecture and discussion period per week. Prerequisite: preparation in two foreign languages. 225A is not prerequisite to 225B. Comparative investigation of a topic in Western literature between the end of the Neoclassical period and the beginning of the contemporary period.
Mr. Johannesson (W)

*230A–230B. Studies in Oriental-Western Literature Relations. (4–4) One 3-hour lecture and discussion period per week. Prerequisite: preparation in one Oriental and one other foreign language. 230A is not prerequisite to 230B. 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 one Near Eastern or European language. Undergraduate majors must be admitted with consent of the instructor. 231A is not prerequisite to 231B. Comparative investigation of a literary topic requiring the investigation of both Near Eastern and Western documents. Since topics and texts vary from year to year, the course may be repeated for credit.
Mr. Monroe (F, W)

*235A–235B. The Experience of Tragedy. (4–4) One 3-hour lecture and discussion period per week. Prerequisite: course 245A or 245B. Study of the sense of the tragic in Greek, Elizabethan, and 20th century literature. Focus on the philosophical beliefs underlying the respective tragic visions, from Aristotle to Hegel.
Computers Science

Introduction to Software Engineering. (3) A course in problem solving and algorithm design. Includes the development of software using an object-oriented approach.

Computer Organization. (4) A study of the design and analysis of computer architecture. Includes instruction formats, instruction execution, and memory systems.

Computer Architecture. (4) A study of the design and analysis of computer architecture. Includes instruction formats, instruction execution, and memory systems.

Data Structures. (4) A study of the design and analysis of computer architecture. Includes instruction formats, instruction execution, and memory systems.

Operating Systems. (4) A study of the design and analysis of computer architecture. Includes instruction formats, instruction execution, and memory systems.

Computer Networks. (4) A study of the design and analysis of computer architecture. Includes instruction formats, instruction execution, and memory systems.

Software Engineering. (3) A study of the design and analysis of computer architecture. Includes instruction formats, instruction execution, and memory systems.

Database Systems. (4) A study of the design and analysis of computer architecture. Includes instruction formats, instruction execution, and memory systems.

Computer Security. (3) A study of the design and analysis of computer architecture. Includes instruction formats, instruction execution, and memory systems.

Computer Forensics. (3) A study of the design and analysis of computer architecture. Includes instruction formats, instruction execution, and memory systems.

Computer Architecture. (4) A study of the design and analysis of computer architecture. Includes instruction formats, instruction execution, and memory systems.

Computer Networks. (4) A study of the design and analysis of computer architecture. Includes instruction formats, instruction execution, and memory systems.

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Computer Security. (3) A study of the design and analysis of computer architecture. Includes instruction formats, instruction execution, and memory systems.

Computer Forensics. (3) A study of the design and analysis of computer architecture. Includes instruction formats, instruction execution, and memory systems.
The Majors

Dramatic Art


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, 15A, 15B, 15C, 141A–141B–141C, 142A–142B–142C, 143A–143B–143C, 144A–144B; 145A; 150A–150B; at least 2 and not more than 5 units of 170, 171, or 190; in the junior year, 120; in the senior year, 128. 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.)


Upper Division. Forty-five units of upper division courses in the Department of Dramatic Art including: 125; five units chosen from courses 122, 123A, 123B, 124, 125, 126, 127, 15A, 15B, 15C; 141A–141B–141C, 142A–142B–142C, 143A–143B–143C, 144A–144B; 145A; 150A–150B; at least 2 and not more than 5 units of 170, 171 or 190. See also Tryout Regulations, below.

Honors Program. Majors in the Department of Dramatic Art with an overall grade-point average of 3.3 in the semester and in the year may, with the approval of the Department, apply for admission to the honors program. Application should be made through a departmental major adviser not later than the end of the student’s junior year. Students accepted in the honors program will include in their programs course H195A, intensive critical study of problems of dramatic literature, acting, playwriting, directing, or designing; and H195B, development of studies begun in H195A, either under circumstances of actual theatrical production or as a senior thesis. No course in Dramatic Art offered in satisfaction of undergraduate major requirements may be taken on a passed/not passed basis except Dramatic Art 40A–40B–40C, 141A–141B–141C, 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 may be required to take the necessary courses while enrolling 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 instances a one-year course of study for a second bachelor’s degree may be in order.

Advising and Evaluation of Student Programs. Graduate students will be assigned to a team of two advisers with whom they will develop their program from year to year. In addition to the regular evaluations of course grades and of the comments of 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 objectives. The intention of these evaluations 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...
come eligible to apply for the M.A. degree upon completion of the Ph.D. qualifying examination. In exceptional cases, students interested in acting, design, playwriting, and dance may be accepted for work toward the M.A. degree only. Admission is by special arrangement, including, in the cases of actors and dancers, an audition, and in the cases of designers and playwrights, submission of portfolios of designs or manuscripts of original plays.

Requirements for the M.A. Degree. Students accepted for the M.A. only will be required to complete forty-five units of graduate and upper division work in the Department of Dramatic Art, including at least 18 units of graduate work. The program is to include the following: During the first year, one of the twenty-week seminars (222A–222B, 223A–223B, 224A–224B, 225A–225B); the seminar in Critical Approaches to Theatre (226); fulfillment of the performance requirement; and a language examination in either French or German. During the second year, performance work as assigned; two 2-unit courses of Directed Group Study (298); and the M.A. Comprehensive Examination.

Requirements for the Ph.D. Degree. Graduate study including graduate and upper division work in the Department of Dramatic Art. Program is to include the following: During the first year, the year-long course in Directing (241A–241B–241C); one of the twenty-week seminars (222A–222B, 223A–223B, 224A–224B, 225A–225B); the seminar in Critical Approaches to Theatre (226); fulfillment of the performance requirement; and an oral examination in any foreign or European languages. During the second year, the year-long course in Advanced Directing (281A–281B–281C); two 2-unit courses in Directed Group Study (298); the seminar in Theatre Research (227); fulfillment of the performance requirement; and a second language examination. During the third year, course work as developed in conference with advisers; the Ph.D. Written Preliminary Examination; the Ph.D. Oral Qualifying Examination. During the fourth year, completion of the Ph.D. dissertation.

For further details on the requirements for advanced degrees, consult the Graduate Division section of this catalog, and the department office in 101 Dwight Hall. Now:

The University Theatre

Under the direction of the Department of Dramatic Art, the University Theatre offers a major and workshop series of play productions, extending into the laboratory of stage practice, the theories of dramatic literature, criticism, and production studied in the department's curriculum. These programs are structured to present to the University community distinguished dramas of various periods and cultures. Participation is open to all registered students, majors and nonmajors, interested in acting, design, or stagecraft.

The University Dance Theatre presents an annual concert of works choreographed by the faculty and performed by the students. Student works are presented at quarterly choreographic workshops. The Bay Area Repertory Dance Company, an in-residence 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 drama and dance production.

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 courses 293 and course 295 (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 production under courses H195B and 261A–261B–261C are scheduled at intervals throughout the academic year and are announced on the department bulletin boards. In addition to attending General Tryouts, students enrolled in an acting class, with the exception of course 10, are required 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. (5) Five 1-hour sessions per week. Prerequisite: consent of instructor. Team Teaching: Ms. Evans, Mr. Berman, Ms. Sussel (F)

11A–11B. Beginning Scene Study and Voice Work. (6–6) Five 1 1/2-hour sessions per week. Prerequisite: consent of instructor. Coursed to be taken consecutively, beginning winter quarter. Credit and grade will be awarded upon completion of full sequence.

25A–25B–25C. Introduction to Dramatic Literature. (5–5–5) Five 1-hour lectures per week. Prerequisite: Subject A, examination or course. Coursed to be taken consecutively, beginning fall quarter. Reading and composition in connection with the study of literature. Mr. Roth (F, W, Sp)

139. Introduction to Playwriting. (3) Three 1 1/2-hour lectures per week.

45A–45B–45C. Introduction to Theatre. (5–5–5) Three 1-hour lectures and ten hours of laboratory per week. Prerequisite: consent of instructor is required for all courses. Scene construction from designer’s concept to physical realization, stage practice and management. Each course in the sequence may be repeated once for credit; however, total units may not exceed 15. Mr. Utlic (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. Must be taken concurrently with 112A–112B–112C. Courses to be taken consecutively, beginning fall quarter. May be repeated for credit; however, repeated units may not be used to fulfill major requirements. Team Teaching: Ms. Evans, Mr. Berman, Ms. Sussel (W), Mr. Sussel (F, W, Sp)

111A–111B–111C. Advanced Acting. (5–5–5) Two 4-hour sessions per week. Prerequisite: two years of work in acting instruction or the equivalent, including voice and speech training, and consent of instructor. Coursed to be taken consecutively, beginning fall quarter. May be repeated for credit; however, repeated units may not be used to fulfill major requirements. Mr. Berman (F), Ms. Sussel (W), Mr. Sussel (F, W, Sp)

112A–112B–112C. Advanced Study of Voice and Speech. (2–2–3) Two 1 1/2-hour sessions per week. Prerequisite: course 111A–111B–111C. 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)

125A–125B–125C. Introduction to Dramatic Literature: Continental Drama, 1500–1700. (5) Five 1-hour lectures per week.

129A. Medieval Drama to 1600. Mr. Rosenberg (W)

129B. The Seventeenth Century Drama. Mr. Rosenberg (Sp)

124. Dramatic Literature of Western Civilization: Continental Drama, 1500–1700. (5) Five 1-hour lectures per week. Mr. Oliver (F)

1125. Dramatic Literature of Western Civilization: European Drama, 1700–1850. (5) Five 1-hour lectures per week.

126. Dramatic Literature of Western Civilization: European Drama, 1850–1918. (5) Five 1-hour lectures per week. Mr. House (W)

127. Dramatic Literature of Western Civilization: European and American Drama, 1918 to Present. (5) Five 1-hour lectures per week. Mr. Oliver (Sp)

129. Senior Prosseminal. (5) Five 1-hour lectures per week. Prerequisite: course 120, senior standing. Sections limited to 20 students. Study in a single playwright or mode of theatre. Not for practice of acting or playwriting. Designed primarily for seniors majoring in Dramatic Art. Mr. Prindle (F); Mr. Bogard (W); Mr. Bogard, Mr. Rosenberg (Sp)

Playwriting

139A–139B–139C. Playwriting. (5–5–5) Three 1 1/2-hour lectures per week. Prerequisite: course 39 or consent of instructor. Study may be given in the history and theory of playwriting. Designed primarily for students majoring in Dramatic Art. Mr. Sussel (W), Mr. Sussel (F, W, Sp)

123A. Medieval Drama to 1600. Mr. Rosenberg (W)

123B. The Seventeenth Century Drama. Mr. Rosenberg (Sp)

Dramatic Art-Dance

Students intending to complete the major in Dramatic 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. Prerequisite: consent of instructor and elementary body alignment and basic locomotor patterns, utilizing the body and extremities as a totality. Must be taken on a pass/not pass basis. Team Teaching: Ms. Evans (W, Sp); Ms. Egan (F); Ms. Murola (F, W, Sp)

41. Rhythmic Analysis for Dancers. (3) Two 1 1/2-hour studios and one 1 1/2-hour laboratory per week. Prerequisite: one year of concurrent enrollment or consent of instructor. 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. Mrs. Marcus (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 140A–140B–140C or consent of instructor. Development of physical control through color-coordinated movement and its utilization in spatial exploration. Must be taken on a pass/not pass basis. May be repeated for credit. Team Teaching: Ms. Wood (F, W, Sp)

142A–142B–142C. Advanced Modern Dance Technique. (1–1–1) Five 1 1/2-hour studios per week. Prerequisite: courses 141A–141B–141C or consent of instructor. Exploration of movement and form through the improvisation and their musical relationship using both individual and group

NOTE: For key to symbols, see page 35.
Dramatic Art. Courses to be taken consecutively, beginning fall quarter. Credit and grade will be awarded upon completion of the full sequence.

225. Critical Approaches to Theatre. (5) One 3-hour lecture per week. Prerequisite: graduate standing in the Department of Dramatic Art, Berkeley. Through study of selected critical works and of performance, students evolve analytical approaches to the drama and to the theoretical issues. Each student produces a paper on a piece of critical writing.


239A—239B—239C. Advanced Playwriting. (6—5—5) Three 1 1/2-hour lectures per week. Prerequisites: courses 139A—139B—139C or consent of instructor. Any year that Dramatic Art 139A—139B—139C is not given, qualified undergraduate students may apply to the instructor for permission to take 239A—239B—239C.

249A—249B—249C. Advanced Choreography. (6—5—5) One 3-hour studio per week and laboratory hours to be arranged. Prerequisite: courses 143A—143B—143C or equivalent; one year of graduate study in the Department of Dramatic Art, University of California, Berkeley, and consent of instructor. Courses to be taken consecutively, beginning fall quarter. Credit and grade will be awarded upon completion of the full sequence.

256. University Theatre. (1—5) To be arranged. Prerequisite: consent of instructor. Courses to be taken consecutively, beginning fall quarter. Credit and grade will be assigned upon completion of the full sequence. Prerequisites: courses 139A—139B—139C or consent of instructor. Practice in theatre directing. May be repeated for credit. Must be taken on a passed/not passed basis.

257. Theatre Performance. (1—5) To be arranged. Prerequisite: consent of instructor. Practice in theatre directing. May be repeated for credit. Must be taken on a passed/not passed basis.

260A—260B—260C. Directing. (5—5) Three 2-hour sessions per week. Prerequisite: consent of instructor. Courses to be taken consecutively, beginning fall quarter. Credit and grade will be awarded upon completion of the full sequence. Prerequisites: courses 139A—139B—139C or consent of instructor. Practice in theatre directing. May be repeated for credit. Must be taken on a passed/not passed basis.

270. Theatre Laboratory. (1—5) To be arranged. Prerequisite: graduate standing and consent of instructor. Practice in theatre design, lighting, and stage production. May be repeated for credit. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

271. Theatre Performance. (1—5) To be arranged. Prerequisite: graduate standing and consent of instructor. Practice in theatre directing. May be repeated for credit. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

280A—280B—280C. Advanced Directing. (6—5—5) Six hours of meetings per week and laboratory hours to be arranged. Prerequisite: courses 280A—280B—280C or equivalent; one year of graduate study in the Department of Dramatic Art, University of California, Berkeley, and consent of instructor. Recommended: one year of actor training. Courses to be taken consecutively, beginning fall quarter. Credit and grade will be assigned upon completion of the full sequence.

287A—287B—287C. Advanced Acting Class. (5—5—5) Five 1 1/2-hour sessions per week. Prerequisite: completion of H195A with an honors grade. Group studies of selected topics which will vary from quarter to quarter. Special Projects. May be repeated for credit. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

290. University Theatre. (1—5) To be arranged. Prerequisite: consent of instructor. Courses to be taken consecutively, beginning fall quarter. Credit and grade will be awarded upon completion of the full sequence. The Staff (F, W, Sp)

298. Advanced Costume Design and Lighting. (5—5) Formerly numbered 222A—222B—222C. Three 1-hour lectures per week. Prerequisites: completion of a year of study in the Department of Dramatic Art, Berkeley. Courses to be taken consecutively, beginning fall quarter. Credit and grade will be awarded upon completion of the full sequence. The Staff (F, W, Sp)

299. Special Studies. (6) Prerequisite: consent of instructor. Advanced directorial practice for third and
Dutch Studies

Group Major Office, 5329 Dwinelle Hall

Professors:
- Siewtana Alpera, Ph.D.
- J. Frits Staal, Ph.D.
- William J. Bouwsma, Ph.D.
- Blake Lee Snapp, Ph.D.

Associate Professors:
- Jan de Vries, Ph.D.
- Johan P. Snapper, Ph.D.

Assistant Professor:
- Larry Silver, Ph.D.

Introduction

The Department of Dutch Studies offers a major and minor program designed to provide students with a comprehensive understanding of the Dutch language, literature, history, and culture. The program is structured to give students the opportunity to study the rich cultural heritage of the Netherlands and its contributions to the world of art, science, and thought. It is designed to prepare students for careers in fields such as diplomacy, international business, and cultural exchange, as well as for further academic study.

In addition, the Department offers a variety of courses in related fields such as German, French, and Asian Studies. These courses provide students with a broader perspective on European and Asian cultures and their interactions.

The Major in Dutch Studies

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. Literature courses: Dutch 150 plus 4 units in either the Dutch 140 series, Dutch 180, or Dutch 180. Culture courses: Dutch 170 or one History of Art course (170, 174, 175). History course: History 142. 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) 110, 120, 130, 140A-140B-140C-140D-140E-140F, 150, 160, 170, 180, 190, 198, 199; German 104, 105A-105B; Comparative Literature 180, 190UL, 210A; Linguistics 165; History 126A, 128, 1308, 142; History 142.

Honors Program. Students accepted in the honors program will enroll in Dutch H196 (1-5 units) for a total of 6 units and will be expected to write a senior thesis (Dutch 190) 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 A. Akerloff, Ph.D.
- George F. Breakey, Ph.D., LL.D. (Hon.)
- Emile A. Cappetta, Ph.D.
- Albert Fisk, Ph.D.
- David Gates, Ph.D.
- Benet Hansen, Ph.D. (Chairman)
- John C. Harsanyi, Ph.D.
- Sidney S. Hoek, Ph.D.
- John M. Lopata, Ph.D.
- Daniel L. McCaffrey, Ph.D.
- James L. Pierce, Ph.D.
- Roy Rainwater, Ph.D.
- Richard C. Dutch, Ph.D.
- Lloyd Ullman, Ph.D.
- Pravin Varatyo, Ph.D.
- Benjamin N. Wiest, Ph.D.
- Joel S. Bain, Jr., Ph.D.
- Fredrik R. Engström, Ph.D.
- John B. Constable, Ph.D.
- Malcolm M. Davidson, J.D., Ph.D. (Emeritus)
- Howard E. Ellis, Ph.D., LL.D. (Flood Professor, Emeritus)
- Robert A. Gordon, Ph.D. (Emeritus)
- Erik T. Gregor, Ph.D., LL.D., ekon. Dr. (Hon.), (Emeritus)
- Stephen C. Peck, Ph.D.
- Andreu Mas-Colell, Ph.D.
- Theodore E. Keeler, Ph.D. (Vice Chairman)
- Steven M. Goldman, Ph.D.
- Richard J. Gilbert, Ph.D.
- Carl L. Mores, Ph.D.
- Robert A. Gordon, Ph.D. (Emeritus)
- Andreu Mas-Colell, Ph.D.
- Stephen C. Peck, Ph.D.
- Theodore E. Keeler, Ph.D. (Vice Chairman)
- Steven M. Goldman, Ph.D.
- Richard J. Gilbert, Ph.D.
- Carl L. Mores, Ph.D.
- Robert A. Gordon, Ph.D. (Emeritus)

Associate Professors:
- Robert A. Gordon, Ph.D. (Emeritus)
- Erik T. Gregor, Ph.D., LL.D., ekon. Dr. (Hon.), (Emeritus)
- Stephen C. Peck, Ph.D.
- Andreu Mas-Colell, Ph.D.
- Steven M. Goldman, Ph.D.
- Richard J. Gilbert, Ph.D.
- Carl L. Mores, Ph.D.
- Robert A. Gordon, Ph.D. (Emeritus)

Assistant Professors:
- Stephen C. Peck, Ph.D.
- Michael Reich, Ph.D.
- Claire B. Vickery, Ph.D.
- Michael L. Wiseman, Ph.D.
- Paul S. Taylor, Ph.D., LL.D. (Hon.), (Emeritus)
- Larry Silver, Ph.D.

Lecturers:
- Margaret S. Gordon, Ph.D.
- Eugene M. Swamin, M.A., LL.B.

The Major

Unfortunately, because of large and increasing enrollments and the limited resources available, it has proved necessary to restrict the number of economics students...
majors. Berkeley students are asked to file an application for admission in 275 Barrows Hall the quarter before admission is desired. The admission of transfer students from other colleges will be sharply restricted. Transfer students will be expected to complete at least one upper division economics course before seeking admission to the major. Demonstrated ability in previous college work at Berkeley and elsewhere will be considered in evaluating applicants.

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.

### Departmental Honors

Students who are interested in graduating with honors in economics and who have a grade-point average of 3.3 or higher both overall and in the major must consult the faculty adviser no later than the first quarter of the senior year. The Department recommends a student for graduation with honors on the basis of (a) evidence of superior performance provided by a thesis written in the senior year, and (b) the student’s course grade record in the major. The senior thesis may be an extension of a seminar paper prepared under the continued guidance of a faculty member through enrollment in Economics 199.

Advising. Students planning to do graduate work in economics should consult with faculty advisers regarding appropriate programs. These students would typically elect to be Plan B majors. All majors are encouraged to consult with a faculty adviser frequently in planning their program.

### Graduate Study

The graduate program is designed for doctoral students interested in pursuing advanced study and conducting original research in economics. Detailed information concerning admission, financial aid, and degree requirements is given in the brochure, Ph.D. Program in Economics, which is available from the Graduate Secretary, Department of Economics.

The program is oriented toward the doctorate, and new admissions are restricted to candidates for the Ph.D. However, students enrolled in the School of Law or in other doctoral programs on the Berkeley campus may take a Master of Arts degree in economics if approval is given by both departments. The requirements for an M.A. are: (1) a background in economic theory equivalent to that provided in Economics 101A–101B; (2) completion of 36 units of approved course work, of which 18 units must be in graduate economics courses numbered 201 or greater; (3) satisfactory performance in two written qualifying examinations. Each student’s program must be approved by the economics graduate adviser and must include a balanced mixture of applied and theoretical courses. Students in other graduate programs at Berkeley who are interested in receiving an M.A. in economics should see the Department’s Graduate Secretary for further details.

### 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. degree 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 Chairman of the Graduate Committee of the Department of Economics.

#### LOWER DIVISION COURSES

1. **Introduction to Economics.** (3) Three hours of lecture and two hours of section meeting per week. A survey offering an overview of the field: supply and demand, resource allocation in a market economy, national economic policy. (G, F, W, S) Staff

2. **Law and Economics.** (4) Three 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

3. **World Population and Economics.** (4) Three hours of lecture and one hour of section meeting per week. Prerequisite: course 1. A survey courses covering basic population analysis and an outline of the history of world population. The problems of "overpopulation," urbanization, public health, and environmental quality. Staff

#### UPPER DIVISION COURSES

1. **Economics 100A–100B.** Economic Analysis. (5–6) 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 100B. Students who have taken 101B may not receive credit for 100B.

2. **Economics 100B.** Macroeconomic Analysis. (5) Three hours of lecture and two hours of section meeting per week. Prerequisite: course 100A. Further topics in microeconomic and macroeconomic analysis with special emphasis on general equilibrium and welfare economics. Intended primarily for Plan A economics majors wishing to switch to Plan B.

3. **Economics 101A–101B.** Economic Theory. (5–6) Three hours of lecture and one and one-half hours of discussion per week.

   a. **Economics 101A.** Basic microeconomic theory, the theory of the firm, problems of economic efficiency, competition and monopoly. Staff

   b. **Economics 101B.** Basic macroeconomic theory, the Keynesian model, aggregate demand, monetary theory. Policy analysis. Staff

4. **Economics 102.** Aggregative Economic Theory and Policy. (5) Three hours of lecture and one and one-half hours of discussion per week. Prerequisite: course 101B. Basic macroeconomic theory, the Keynesian model, aggregate demand, monetary theory. Policy analysis. Staff

5. **Economics 104.** Introduction to Mathematical Economics. (4) Previously 191A. Three hours of lecture per week. Prerequisite: Courses 51A, 51B, 51C, 52A, 52B, and 52C; 101A–101B. Further topics in mathematical economics which are required for Plan B. (W) Staff

#### Special topics courses

- **Economics 105. History of Economic Thought.** (3) Three hours of lecture per week. Offered in alternate years.
- **Economics 106. Economics of Marxism.** (4) Three hours of lecture per week. Offered in alternate years.
- **Economics 107. History of Economic Thought Seminar.** (3) Three hours of seminar per week. Offered in alternate years.

#### Pre-Law Program

Students intending to go to law school after graduation may elect to major in economics under either Plan A or Plan B. The following courses are strongly recommended as electives for such students:

1. Business Administration 110, 111, and 120.
2. Mathematics 1A–1B or 1A–16B.
3. Courses in statistics and computer science.

#### Pre-M.B.A. Program

Students intending to do graduate work in business administration may major in economics under either Plan A or Plan B. The following courses are strongly recommended as electives for students:

1. Business Administration 110, 111, and 120.
2. Mathematics 1A–1B or 1A–16B.
3. Courses in statistics and computer science.

#### Departmental Honors

Students who are interested in graduating with honors in economics and who have a grade-point average of 3.3 or higher both overall and in the major must consult the faculty adviser no later than the first quarter of the senior year. The Department recommends a student for graduation with honors on the basis of (a) evidence of superior performance provided by a thesis written in the senior year, and (b) the student’s course grade record in the major. The senior thesis may be an extension of a seminar paper prepared under the continued guidance of a faculty member through enrollment in Economics 199.

Advising. Students planning to do graduate work in economics should consult with faculty advisers regarding appropriate programs. These students would typically elect to be Plan B majors. All majors are encouraged to consult with a faculty adviser frequently in planning their program.
110. Economic History of the World Economy in the 20th Century. (4) Formerly 116. Three hours of lecture per week. Prerequisite: course 100A or 101A. The organization and structure of industries and their markets in the American economy; competitive behavior, price formation, and performance.

122. 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.

123. Government Regulation of Industry. (4) Three hours of lecture per week. Prerequisite: course 121. Problems of public policy in the field of industrial organization such as antitrust policy, regulation of public utilities, and the regulation of public utilities.

124. Economics of Transportation. (4) Three hours of lecture per week. Prerequisite: course 121. Problems of transportation policy in the domestic transportation industries, with emphasis on policy problems such as regulation of transport firms and public investment in transportation facilities.

125. Economics 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 preserve and improve human environments. A number of case studies will be examined.

131. Public Finance. (4) Three hours of lecture per week. Prerequisite: course 100A or 101A. Principles of pricing and resource allocation in the domestic transportation industries, with emphasis on policy problems such as regulation of transport firms and public investment in transportation facilities.

132. Public Finance Seminar. (5) Three hours of seminar per week. Prerequisite: course 131 and consent of instructor. Enrollment will be limited. A seminar paper will be required.

133. Economics of State and Local Governments. (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.

199. Supervised Independent Study and Research. (1-5) Number hours per week. Prerequisite: upper division standing. May be repeated once for credit. The Staff (F, W, Sp)

GROUNDS COURSES
200A-200B. Fundamentals of Economic Theory. (4-4) Three hours of lecture per week. Prerequisite: Primarily for graduate students outside the Department of Economics. Students with a strong background in mathematics should enroll in Economics 199A-199B. Students with a strong background in economics or mathematics should enroll in Economics 199A-199B or equivalent. Mathematics 190A-190B-190C or equivalent. Mathematics 190A-190B-190C may be taken concurrently with courses 200A-200B.

2004. Microeconomics. The behavior of firms and households and the determination of prices and resource allocation in a market economy. Topics may be initiated by the instructor. May be repeated once for credit.

200B. Macroeconomics. Determination of national income, employment, price level, growth, and distribution.

201A-201B-201C. Advanced Economic Theory. (4-4-4) Three hours of lecture per week. Prerequisite: courses 200A-200B or 101A-101B or equivalent. Mathematics 190A-190B-190C or equivalent. Mathematics 190A-190B-190C may be taken concurrently with courses 201A-201B. Basic preparation for the Ph.D. program including: organization of economic data, theory of the firm, consumer theory, capital theory, welfare economics, aggregate economic theory, growth theory, and policy analysis.

202A-202B. Advanced Economic Theory. (3-3) Three hours of lecture per week. Prerequisite: course 201A-201B-201C.

202A. Linear economic models, linear programming, multiple regression analysis, linear programming, introduction to non-linear programming.

202B. Foundation of production and demand theory, alternative theories of behavior, behavior under uncertainty, and topics in market theory, public goods, and exteriors.

202C. Capital and Economic Growth. (3) Three hours of lecture per week. Prerequisite: course 201A-201B-201C. Natural capital and capital effects; capital aggregation problems; dynamic considerations in the accumulation of capital; alternative theories of economic growth; production to dynamic programming and control theory.

*202D. Advanced Macroeconomic Theory. (3) Two hours of lecture per week. Prerequisite: course 201A-201B-201C. A numerical analysis of general equilibrium models, the behavioral and structural interpretation of the models, and the empirical validity of the models.
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of the world. The accent is on the comprehension of the structures and the vocabulary.

*202E. Dynamic Macroeconomic Theory. (3) Two hours of lecture per week. Prerequisite: course 201A–201B–201C. The study of models explaining the causes and patterns of economic fluctuation and change.

202F. Monetary Economics. (3) Two hours of lecture per week. Prerequisite: course 201A–201B–201C. The role and impact of money and financial intermediaries, the supply and demand for money; portfolio behavior; the financial sector.

*203. Analytic Methods in Economics. (3) Two hours of lecture per week. Prerequisite: Mathematics 100A–100B or equivalent. Theory of non-linear programming. The Kuhn-Tucker theorem 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.

*205A–205B. History of Economics Thought. (4–4) Formerly 205. Three hours of lecture per week. Economics 205A is not a prerequisite to 205B. Analysis of the relationship between historical conditions, economic thought, 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 104B or equivalent. Mathematical analysis of economic theory. The problems treated involve as wide a range of mathematics as the theory itself permits, including theories of choice, personal probability, general equilibrium, games, growth, and stability.

208. Seminar in Mathematical Economics and Advanced History. (2–2–2) Two hours of meetings per week. Prerequisite: consent of instructor. May be repeated for credit.

210A. Introduction to Economic History. (3) Two hours of lecture per week. Prerequisite: course 210A. A brief survey of some central themes in modern European and United States economic history. Ph.D. students will normally take this course in association with the departmental requirement in economic history.

210B. Selected Topics in European Economic History. (3) Two hours of lecture per week. Prerequisite: course 210A.

210C. Selected Topics in American Economic History. (3) Two hours of lecture per week. Prerequisite: course 210A.

210D. Selected Topics in East Asian Economic History. (3) Two hours of lecture per week. Economic history of Japan from the Tokugawa period to the pre-World War II era. The nature of the regulated sector of the American economy. The characteristics and economic problems of regulated public utilities. Public policies related to promotion or restriction of competition.

211. Seminar in Economic History. (4) Two hours of meetings per week. A brief survey of some central themes in economic history. Case studies of the Soviet Union and other non-market economies.

212. Seminar in Industrial Organization. (4) Two hours of meetings per week. Prerequisite: consent of instructor. May be repeated for credit.


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. Market structure, conduct, and performance in the unregulated sector of the American economy. The characteristics and economic problems of regulated public utilities. Public policies related to promotion or restriction of competition.

231. Seminar in Industrial Organization. (4) Two hours of meetings per week. Prerequisite: consent of instructor. May be repeated for credit.

232. Economics of Public Enterprise. (3) Two hours of lecture per week. Criteria for the efficient performance of public enterprises in a dominantly private enterprise economy.

270A–270B–270C. Economic Development. (3–3–3) Two hours of lecture per week. Prerequisite: 270A is prerequisite to 270B; 270B is prerequisite to 270C. The problems of development analyzed both theoretically and through case studies. Attention given to the problem of development as a dynamic process, the capital flows, alternative development strategies, specific policies to promote development, including national planning policies.

271. Seminar in Economic Development, Demography and International Trade. (4) Two hours of seminar per week. Prerequisite: consent of instructor. May be repeated for credit.

275A–275B–275C. Economic Demography. (3–3–3) Two hours of lecture per week. Prerequisite: 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.
Preparation for Graduate Studies

Those interested in graduate studies 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 foreign languages.

Graduate Study

The Ph.D. Program. Students are expected to graduate within three years of enrollment. The program requires successful completion of twelve letter-graded courses, including an introductory course in literary scholarship (208), normally taken in the first quarter of graduate study, and an upper-division seminar (250), before advancement to candidacy. The first two years of study are devoted to building and demonstrating comprehensive knowledge of five fields of study: Old and Middle English; Renaissance and Shakespeare; the Restoration, 18th Century, and Twentieth-Century British Literature; and American Literature. Comprehensive knowledge may be demonstrated by a series of field examinations or successful completion of the required reading courses in each period arranged in consultation with graduate advisers. The balance of the graduate program requires passage of an oral qualifying examination of two to three hours, and of written comprehensive examinations on requirements for the doctorate in English, including language requirements, are available from 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 students, including older students, from a variety of academic and cultural backgrounds. It is designed to serve students who wish 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 cuts across the traditional fields. A student’s course of study will be determined individually at the beginning of the year by the student 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 (a) 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, the nature of which is to be decided in consultation with the Graduate Chairman, and which may vary from a written comprehensive examination to an oral examination in the general area of an approved project or thesis. There is no general language requirement for M.A. students.

Teacher Training. The Department of English offers an examination waiver program for the Single Subject teaching credential in English; that program has been submitted for approval to the California Commission for Teacher Preparation and Licensing. Further information is available from the Department or the Student Personnel Office, School of Education, 1615 Tolman Hall.

Courses in Writing

LOWER DIVISION

1A–1B. First-Year Reading and Composition. (5–6) Four to 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 control 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).

40. Intermediate Expository Writing. (5) Four to 4 1/2 hours of lecture per week. Prerequisite: course 117 or equivalent, or consent of instructor.

Mr. Oliver (F), Mr. Paterson (W), Mr. Portales (Sp).

42. Writing in Connection with the Reading of Important Books of the Nineteenth and Twentieth Centuries. (5) Four to 4 1/2 hours of lecture per week. Prerequisite: course 118A or equivalent, or consent of instructor. Mr. Paterson (F).

43B. Introduction to the Writers of Verse. (5) Four to four and one-half hours of lecture per week. A workshop course intended for students who have recently begun to write verse or who have not previously taken a course in creative writing.

Mr. Salas (F).

UPPER DIVISION

141. Modes of Writing. (Exposition, Fiction, Verse, etc.) (5) Four to 4 1/2 hours of lecture per week. Prerequisite: course 141A or 141B or equivalent, or consent of instructor. Writing in connection with readings in recent English literature and its continental background. Course may be repeated for credit with a different instructor. Mr. Burgess (F), Mr. Gunn (W), Mr. Deane (Sp)

142A. Advanced Composition for Potential Teachers of English in Secondary Schools. (5) Four to four and one-half hours of lecture per week. Prerequisite: course 117A. Advanced composition and methods of teaching composition; emphasis on writing about literature with readings from literature of major American ethnic groups suitable for young people. Primarily for students who wish to pursue English as their single subject teaching field. Mr. Salas (F), Mr. Gray (W)

142D. Advanced Composition for Potential College Teachers. (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. Mr. Stroud (W).

142E. Advanced Composition for Potential Teachers in Secondary and Elementary Schools. (6) Four to 4 1/2 hours of lecture per week. Primarily for students seeking the secondary school teaching credential whose major teaching major is not English. Mr. Stroud (Sp).

Admission to courses numbered 142A, 143B and 143C is by consent of the instructor. Since instructors often wish to see samples of a student’s writing before making a decision, students should see the instructor at least two weeks before the term in which the course is offered. Any of these courses may be repeated for credit, but students normally may enroll for only one at a time.

143A. Short Fiction. (5) Four to 4 1/2 hours of lecture per week. Mr. Burgess (W), Mr. Michaels (Sp).

143B. Verse. (5) Four to 4 1/2 hours of lecture per week. Mr. Anson (F), Mr. Gunn (W), Ms. Miles (Sp).

143C. Long Narrative. (5) Four to 4 1/2 hours of lecture per week. The student will work throughout the year on a single project (novel or nonfiction (biography, history)). Mr. Burgess (Sp).

143D. Expository and Critical Writing. (5) Four to 4 1/2 hours of lecture per week. Mr. Kratins, Mr. Oliver (W).

143E. Advanced Expository Prose; Report Writing. (6) Four to 4 1/2 hours of lecture per week. Prerequisite: admission by permission of the instructor. This course is designed for students in English. Intensive practice and instruction in prose composition, with attention to questions of style and documentation appropriate to a variety of professional and academic disciplines. Mr. Stroud (W).

143T. Poetry Translation Workshop. (5) Four to 4 1/2 hours of lecture per week. Prerequisite: consent of instructor. Designed for students who have a working knowledge of at least one foreign language. Open to those who wish to assimilate foreign influences for writing
poetry or to seek a fuller understanding of any foreign poetry by rendering it into English.

**Courses in Language**

**LOWER DIVISION**

25. Language, (5) Four to 4 1/2 hours of lecture per week. Prerequisite: Designed for sophomores, but open to others in the upper division. The origins and symbols of human speech; pattern, change, and growth in language with emphasis on English; inter-relationships of language and thought. Emphasis on English as spoken in America; particular attention given to social and regional dialects. Mr. Niles (F)

110A. Structure of the English language. Mr. Boyd (Sp)

110B. History of the English language. Mr. Niles (W)

**Courses in Literature**

**LOWER DIVISION**

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 theories. The Staff (F, W, Sp)

20. Modern British and American Literature. (5) Four to 4 1/2 hours of lecture per week. Mr. Crews (W)

26. Introduction to the Study of Poetry, (5) Four to 4 1/2 hours of lecture per week. Lectures and discussion on poetry intended to develop the student's ability to understand, and evaluate a poem. Designed primarily for students whose major is not English, but majors and prospective majors are welcome. Mr. Bloom (F)

27. Introduction to the Study of Fiction, (5) Four to 4 1/2 hours of lecture per week. Lectures and discussion intended to develop the student's ability to understand and evaluate fiction. Designed primarily for students whose major is not English, but majors and prospective majors are welcome. Mr. Tracy (W)

30. Introduction to American Literature, (5) Four to 4 1/2 hours of lecture per week. Mr. Bridgman (F)

33A–33B–33C. American Studies. Please see listing under HONORS AND TUTORIAL COURSES.

44A–44B–44C. Masterpieces of Literature, (5–6–5) Four to 4 1/2 hours of lecture per week. Lectures on great works of the world's literature. Ms. Middleton (F)

44B. Classical Literature. Ms. Middleton (F)

44C. Literature since the seventeenth century. Ms. Middleton (F)

*91A. Women's Personal Writings, (5) Four to four and one-half hours of lecture per week. Examination of a variety of personal writings by twentieth-century American women, including letters, diaries, autobiographies, autobiographical fiction, and oral history. No prior knowledge of English literature is assumed.

**UPPER DIVISION**

100. Methods and Materials of Literary Criticism, (5) Four to 4 1/2 hours of lecture per week. (Sections limited to 20 students.) The Staff (F, W, Sp)

*104A–104B. Irish Literature, (5–6) Four to 4 1/2 hours of lecture per week. Prerequisite: 104A is prerequisite to 104B.

104A. Gaelic Literature 700–1800 (in translation). Study of the prose saga-cycles, satire, classical lyric poetry, and bardic poetry, developing the mythological and traditional background of modern Irish literature.

104B. The Native Tradition in English 1800–present: focusing on the influence of Irish traditions in Yeats, Synge, Joyce, Beckett, Behan, Flann O'Brien, the modern poets, with attention to their nineteenth-century precursors, Carrollton, Maria Edgeworth, Moore, the Nation writers.

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, subject to approval of the department. Special emphasis will be given to a different topic. Students should consult the department's Announcements of Courses for offerings in the current academic year. The Staff (F, W, Sp)

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 assignments and examinations at the discretion of the instructor. May be repeated for credit with a different topic and permission of the instructor.

114A–114B–114C. English Drama, (5–5–5) Four to 4 1/2 hours of lecture per week.

114A. English drama to 1603.

114B. English drama 1603-1700. Mr. Rabbkin (W)

114C. British and American drama from 1680 to the present.

116. The English Bible as Literature, (5) Four to 4 1/2 hours of lecture per week. Mr. Lord (W)

117A–117B. Shakespeare, (5–5) Four to 4 1/2 hours of lecture per week. A chronological survey of Shakespeare's career. Mr. Rabbkin (W, Sp)

117E. Shakespeare (or Nonmajors, (5) Four to 4 1/2 hours of lecture per week. Mr. Keating (W)

117F. Shakespeare and Film, (2–2) Two hours of lecture per week. Studies in filmed versions of Shakespeare's plays. Discussions and analysis of films; cinematic techniques; relationship of film technique to interpretation of dramatic texts. The course will be offered in conjunction with a regular course in Shakespeare, and enrollment will be limited to students who are concurrently enrolled in the course.

Mr. Richmond (F)

117J. Shakespeare, (5) Four to 4 1/2 hours of lecture per week. Lectures on Shakespeare and reading of his best works. Mr. Richmond (F), Mr. Traugot (Sp)

117T. Shakespeare In the Theater. (2.5) Two to 4 1/2 hours of lecture per week. Examination of the presentation of Shakespeare's plays in the theater. Mr. Richmond (Sp)

117U. Shakespeare In the Theater. (2.5) Two to 4 1/2 hours of lecture per week. Black writers in the American cultural context. Ms. White (W)

118. The Augustan Age, (5) Four to 4 1/2 hours of lecture per week. Mr. Feingold (W)

119. The Age of Johnson, (5) Four to 4 1/2 hours of lecture per week. Mr. Seely (W)

120A–120B. Medieval Literature, (5–5) Four to 4 1/2 hours of lecture per week. Students may receive credit for 120A without taking 120B.

120A. Development of literary form and ideology throughout the Christian West from the first to the fifteenth centuries.

120B. Close study of selected classics in translation, including the Nibelungenlied and Dante's Divine Comedy. Mr. Scott (Sp)

121A–121B. Romantic Period, (5–5) Four to 4 1/2 hours of lecture per week. Mr. Griffin (Sp)

121A. Blake, Wordsworth, Coleridge and contemporaries. Mr. Griffin (W)

121B. Byron, Shelley, Keats and contemporaries. Mr. Griffin (Sp)

122A–122B. Victorian Period, (5–6) Four to 4 1/2 hours of lecture per week. Mr. Griffin (W)

122A. British literature from about 1840 to 1870. Mr. Miyoshi (W)

122B. British literature from about 1870 to 1901. Mr. Traur (Sp)

128. Regional Literature: California and the West. (5) Four to 4 1/2 hours of lecture per week. Mr. Flanagan (W)

132. American Autobiography, (5) Four to four and one-half hours of lecture per week. A study of autobiography as a genre and the history of its development in America from puritan times to the present. Mr. McClung (W)

133A–133B–133C. Black Writers in America, (5–5–5) Four to 4 1/2 hours of lecture per week. Black writers in the American cultural context. Mr. White (W)

137B. Major American Writers: The American Renaissance, (5) Four to 4 1/2 hours of lecture per week. Enrollment limited to 25 students. Students who have completed course 130B cannot take 137B without instructor's permission.

Mr. Portales (W), Mr. McClung (Sp)

137C. Major American Writers: American Literature: 1660–1600, (5) Four to 4 1/2 hours of lecture per week. Enrollment limited to 25 students. Students who have completed course 130B cannot take 137C without instructor's permission.

Mr. Portales (W), Mr. McClung (Sp)

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–1B; three segments of the sequence should be taken in segments. Students who have completed course 1A–1B may enroll in the 147A–C sequence and credit and grade to be assigned upon completion of the sequence or of two contiguous segments of it. Students who have completed course 1A–1B prior to Fall, 1974, may not enroll in 147A–C. Close study of typical works of major authors from Chaucer through the twentieth century, with consideration of the more important aspects of English literary history. 147A, Chaucer through the sixteenth century; 147B, Milton through the eighteenth century; 147C, nineteenth and twentieth centuries.

Mr. Richmond (F), Mr. Flanagan (W)

147D. Major British Writers: American Literature: 1900 to Present, (5) Four to 4 1/2 hours of lecture per week. Enrollment limited to 25 students. Students who have completed course 130B cannot take 137D without instructor's permission.

Mr. Richmond (W), Mr. Flanagan (W)

148. The English Lyric, (5) Four to 4 1/2 hours of lecture per week. The English traditions of structure and style in lyric poetry. Mr. Oliver (Sp)

151. The Senior Course, (5) Sections limited to 20 students each. A period of concentrated study as background for the major author studied is strongly recommended. Designed primarily for English majors. Intensive study of one or more works of a major author and the writing of a long essay.
Honors and Tutorial Courses

LOWER DIVISION

33A–33B–33C. American Studies. (5–5–5) Four to 4 1/2 hours of lecture per week. Open to sophomores; limited to fifteen students. Admission by interview with the three instructors during the spring semester for honors course in the study of American culture. The class will study significant ideas and issues, drawing on material from history, literature, political science, anthropology, and other fields. The course will emphasize discussion and the writing of essays, and will include occasional quizzes. Normal enrollment is restricted to ten students; two equivalent courses (History 33ABC, Political Science 33ABC).

Ms. Porter (F, W)

96. Sophomore Seminar: Great Books of the Western World. (5) Four to 4 1/2 hours per week. Intensive study of major works, for example: Oresteia; The Republic; Augustine, Confessions; Divine Comedy; King Lear; Montaigne; Essays; The Prince; Don Quixote; Paradise Lost; Brothers Karamazov; The Interpretation of Dreams. Limited to 15 students. Normally open only 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, Sp)

99. Supervised Independent Study for Advanced Placement Students. (1-5) Meetings to be arranged. Enrollment is restricted by regulations listed on page 36. Open to students who have completed 15 or more units of equivalent course with an average of not less than B. Requires the consent of the instructor and the approval of the chairman of major advisers. Reading and conference with the instructor in a field that shall not coincide with that of any regular course 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. The Staff (F, W, Sp)

UPPER DIVISION

H195. Honors Course. (5) Prerequisite: open only to seniors in the honors program. H195 entails the writing of a book report or term paper of 20 pages. The term paper must be based on the reading of a book that was published before 1800. The course is designed to acquaint the student with the design and practice of the modern research paper and to introduce him to the methods of research in English literature.

The Staff (F, W, Sp)

Graduate Courses

For admission to some seminars, special competence in the particular language may be required, at the instructor's discretion.

202. History of Literary Criticism. (5) Three 1 1/2-hour lectures per week. Ms. Miles (W)

203. Graduate Readings. (6) Four to 4 1/2 hours of meetings per week. Graduate lecture courses surveying broad areas and periods of literature history, and directing students in wide reading. (Open to advanced undergraduates, with the instructor's consent.) May be repeated for credit. Offerings vary from year to year. Students should consult the department's Announcement of Courses for offerings in the English 1A–1B program, the courses will include class visitation. May be repeated for credit with permission of the instructor. Ms. Crews (F)

204. Celtic Studies. (5) Four to 4 1/2 hours of lecture per week. This course may be repeated for credit.

Mr. O'Hehir (W)


205A. Structure of English. The structure of present-day English—pronunciation, grammar, vocabulary, dialects. Mr. Boyd (F)

205B. History of English. Mr. Renoyal (Sp)

208. Problems in the Study of Literature. (5) Four to 4 1/2 hours of lecture per week. Approaches to literary study, including scholarship, methodology and bibliography, critical theory and practice. The Staff (F)
Environmental Studies

Group Major Office, Division of Special Programs, 301 Campbell Hall

Lecturer: Doris Sloan

Major Advisers: Mr. Clyde Wahlhätt, Head Adviser;
Area I, Physical Science: Mr. Clyde Wahlhätt (F, W);
Mr. James Cason, Jr. (Sp); Area II, Biological Science:
to be appointed (F, W); Mr. Herbert G. Beker (Sp); Area III, Social Science: Mr. Orman Grainger.

Group Major in Environmental Studies

The group major program is administered through the Division of Special Programs. Students are referred to this office for all administrative matters, and this is where major students will file their study lists.

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 offerings 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 fundamental elements of mathematics, 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 people in cities, such as matters must be left to the fields of urban and of ethnic studies.

The senior seminar (Environmental Studies 196A-198B) 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.

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; Physics 5A-5B; Chemistry 1A-1B;
123. The Bay Area Environment: Physical Problems.

(a) Three hours of lecture per week with field trips. Prerequisite: enrollment limited to 25 students. Selected topics concerning geological hazards, water management and air pollution.

Area II: Biological Science

Lower Division Courses.

Mathematics 1A-1B; Physics 5A-5B; Chemistry 1A-1B;
Economics 1; strongly recommended: Chemistry 6A, biological science areas. A detailed consideration of a specific environmental problem. Credit and grade will be awarded upon completion of the sequence.

Upper Division Courses.

Anthropology 148 or Geography 103 or Sociology 147 and 148; Biological science areas. A detailed consideration of a specific environmental problem. Credit and grade will be awarded upon completion of the sequence.

Economics 1; strongly recommended: Chemistry 6A, 6B, Computer Science 3.

Area III: Social Science

Lower Division Courses.

Mathematics 1A-1B; Physics 5A-5B; Chemistry 1A-1B;
Economics 1; strongly recommended: Chemistry 6A, 6B, Computer Science 3.

Each course in demography recommended by the advisor; Sociology 140; Geography 130; Environmental Studies 198A-198B, Senior Seminar in Environmental Studies; Economics 100A.

Fifteen units from the following list of courses: Anthropology 148; Economics 100B; Environmental Studies 102; Geography 100, 101, 103, 131, 132, 189; PENR 100A; Sociology 1, 160.

Recommended electives: Economics 121, 175; Environmental Studies 123, 124, 125; Geography 10, 108; Interdepartmental Studies 180; Public Health 150 or Civil Engineering 144; Sociology 178; Statistics 2, 20, 130A-130B, 151, and 151L.

102. Quantitative Aspects of Global Environmental Problems. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: Physics 40 or Physics 4C plus Biology 150; consent of instructor. Transport and fate of persistent pollutants, processes governing sources and fate of petroleum in the oceans, impact of human activities on the atmosphere, measures of complexity and of stability in lightly exploited and intensively exploited ecological systems.

Mr. Holden (W)

232. The Bay Area Environmental Problems. Three hours of lecture per week with field trips. Prerequisite: enrollment limited to 25 students. Park, open space, outdoor recreation; bay filling and solid waste management; modification of the bay by reclamation; competition for land.

Ms. Sloan (W)

234. Land Use Problems of the Bay Area. Three hours of lecture per week with field trips. Prerequisite: enrollment limited to 20 students. Distribution, numbers and changes in Bay Area flora and fauna stemming from population and industrial growth; from federal, state and local decisions on land use and from conservation.

196A-196B, Senior Seminar in Environmental Studies. 3-3 Field work plus 1-hour meeting per week. Prerequisite: Enrollment limited to students majoring in Environmental Studies. Joint seminar for majors in presenting the physical background and major science areas. A detailed consideration of a specific environmental problem. Credit and grade will be awarded upon completion of the sequence.

Ms. Sloan (W, Sp)
Film

Group Major Office, Division of Special Programs, 301 Campbell Hall

Major Advisers: Mr. William Nestrick, Head Adviser (English), Mr. Bertrand Augst (Comparative Literature), Mr. Seymour Chatman* (Rhetoric), Mr. Gavrieli Moses* (Italian).

Group Major in Film

The group major in film is administered by the Division of Special Programs. It has been designed to place the history and theory of film in the larger context of humanistic studies. In the lower division, Film 1 is required; a student in good standing who is currently registered may earn credit by examination for this course. In addition, two foreign languages are to be studied through the intermediate level. One of these is to be chosen from among the following: French, Italian, Russian, German, Swedish or Japanese. Another language is to be chosen from the following: Portuguese, Polish, Czech, German, French or Spanish. In the upper division, students will take 45 units of course work. Among these courses the major will include three courses in the history of film; one of the silent film, one on the "classical" period (1929-1960), and one on contemporary film (post-1960). The choice of courses to fulfill this requirement should be made with reference to the languages studied. In addition, the student will include one course in the theory of film, one on an individual auteur, and two on film genres. Most of these requirements can be satisfied by courses offered in departments; courses listed below are to supplement these offerings.

Attention is called to Afro-American Studies 167A, Comparative Literature 159A-159B, English 173, French 160A-160B, Italian 125 and Rhetoric 123, 127, 132. The topics for some of these courses change; the student should consult the departments to see which courses may be repeated and the program office to determine which requirement a particular course meets.

Honors Program. To be eligible for admission to the honors program in film, a student must have attained senior standing with a grade-point average of 3.3 or higher on all University work and a 3.3 grade-point average or higher in courses in the major. Students in the honors program must take two quarters of Film H195A-H195B, with credit and grade awarded upon completion of the sequence, to complete an honors thesis for the honors program. Although the production of a film may be part of the preparation of the thesis, the thesis will be a substantial piece of writing on film criticism or film history.

Mr. Nestrick in charge (F, W, Sp)

198. Directed Group Study. (1-8) One to five hours of lecture per week. Prerequisites: Consent of the instructor and Film 100 or equivalent. Group studies of selected topics which vary from year to year. Field shall not coincide with that of any regular course and shall be specific enough to allow students to write an essay based on the study.

Mr. Nestrick in charge (F, W, Sp)

199. Supervised Independent Study for Advanced Undergraduates. (1-9) Prerequisites: Film 100 or equivalent. Open to film majors with the consent of the instructor, an adviser in the group major in Film. Reading and conference with the instructor in a field that shall not coincide with that of any regular course and shall be specific enough to enable the student to write an essay based upon his/her study. Must be taken on a pass/fail basis.

Mr. Nestrick in charge (F, W, Sp)

Folklore

Professors:
William R. Bascom, Ph.D. (Chairman)
Wolfram Eberhard, Ph.D. (Emeritus)

Associate Professor:
Michael N. Nagler, Ph.D.

Assistant Professors:
Mary P. Coote, Ph.D.
John F. Lindow, Ph.D.
Daniel F. Melia, Ph.D.
Donnie Wadd, Ph.D.

The Folklore Program

This program is designed to provide graduate students with a competent knowledge of both the materials of folklore and the various methods of studying these materials. The program is an interdisciplinary one in which faculty members from both the humanities and the social sciences participate. The scope of the courses is international. However, students may specialize in a particular genre, e.g., folk tale, 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 the graduate program in folklore is a strong undergraduate record in one of the broad fields with which folklore is closely affiliated. Since it is a study of the humanist expression which is handed down by tradition rather than by writing, it is related to all those departments that deal with literature, art, music. Since folklore also deals with the entire traditional culture of mankind 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 number) in folklore, and an M.A. thesis based upon fieldwork or 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. After an introduction to the discipline, students must take Anthropology 159, The Forms of Folklore, and Anthropology 160, 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 study, but French, Spanish or some language intimately connected with the M.A. thesis may be approved to satisfy the language requirement. 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 fieldwork and research in folklore.

Mr. Dundes (F, W)

266A–266B. The Folktales and Allied Forms. (3–3) One 2-hour meeting per week. The study of folk narrative including motif and type classifications, theories of myth and folklore, and methods of analyzing prose narrative.

Mr. Dundes (W, Sp)

299. Readings in Folklore. (3–6) Individual conferences to be arranged. The staff (Mr. Bascom, Mr. Dundes in charge) (Su, F, W, Sp)

RELATED COURSES IN OTHER DEPARTMENTS

The Forms of Folklore (Anthropology 159)
Narrative Folklore (Anthropology 160)
Folklore Seminars (Anthropology 260)
260A. Problems of folklore
260B. Psychology and folklore
260C. North American Indian folklore
260D. Additional seminars on special topics to be announced

Mythology (Classics 278)
Myth and Literature (Comparative Literature 216)
Children's Literature: Oral Interpretation (Librarianship 228C)

Theory of Dance: Ethnic and Social Dance (Physical Education 160A)

History of Oral Literature and Oral Interpretation (Rhetoric 210A, 210B)

Oral Tradition in Poetry (Rhetoric 225)

Scandinavian Mythology (Comparative Literature 160)

Scandinavian Folklore (Scandinavian 165)

The Scandinavian Ballad (Scandinavian 225)

The American Indian Music: (MUS 229)

Music of the South Asian Tradition (Music 332A)

Music of India (Music 332B)

Russian Oral Tradition (Slavic 229)

Slavic Folklore (Slavic 137)

Folklore and Society (Sociology 164)

Introduction to the Ballad (Spanish 108)

The Ballad (Spanish 208A, 208B, 208C)

French

Department Office, 4125 Dwainelle Hall

Professors:
Leo Bersani, Ph.D.
Alexandre E. Calame, Docteur ès Lettres

Associate Professors:
John F. LIndow, Ph.D.

Assistant Professors:
William R. Bascom, Ph.D. (Chairman)

L&S: French / 131
Alvin A. Easte, Jr., Ph.D.
Basil G. Gui, Ph.D.
Ivng Puter, Ph.D.
Walter E. F., Ph.D.
Clfford B. Blasse, Ph.D.
(Aeremurc)
Clairee Brenner, Ph.D.
(Emeritus)
Francis J. Carmony, Ph.D. (Emeritus)

Jacqueline de La Harpe, Docteur de Lettres
Emeritus
Edward F. Merven, Ph.D. (Emeritus)
Mauro M. Sandman, Lit.D. (Emeritus)
Ronald H. Wapole, Ph.D. (Emeritus)

Francis J. Carmody, Ph.D.
Alvfn A. Eustis, Jr., Ph.D.

LOWER DIVISION COURSES

1. Elementary French. Beginner’s Course. (5) Five 1-hour classes and at least one laboratory session per week. Prerequisite: course 1 or equivalent. (F, W, Sp)
2. Elementary French (Continuation of 1). (5) Five 1-hour classes and at least one laboratory session per week. Prerequisite: course 1 or equivalent. (F, W, Sp)
3. Intermediate French. (5) Five hours of lecture and one hour of laboratory per week. Prerequisite: course 2 or equivalent. (F, W, Sp)
4. Intermediate French (Continuation of 3). (5) Five hours of lecture per week. Prerequisite: course 3 or equivalent. (F, W, Sp)
5. Advanced French. (5) Five hours of lecture per week. Prerequisite: course 4 or equivalent. Composition, reading, and grammar review. (F, W, Sp)
6. Advanced French. (5) Five hours of lecture per week. Prerequisite: course 5 or equivalent. Composition, reading, and grammar review. (F, W, Sp)
7. Accelerated Beginning French. (10) Five 2-hour classes and five 1-hour laboratory sessions per week. An intensive course in beginning French, equivalent to French 1 and 2. (F, W, Sp)
8. Intermediate Conversation. (2) Three hours of lecture per week. Prerequisite: course 5 or equivalent. Advanced conversation. Recommended for prospective majors. (F, W, Sp)
9. Advanced Conversation. (2) Three hours of lecture per week. Prerequisite: course 5 or equivalent. Advanced conversation. Recommended for prospective majors. (F, W, Sp)
10. Practical Phonetics. (2) Two 1-hour classes per week. Prerequisite: course 1 or equivalent. Advanced French conversation. Recommended for prospective majors. (F, W, Sp)
11. 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 an examination of texts by modern French authors including Wittig, De Beauvoir, Le Duc, Colette. (F)
13. Composition and Grammar Review. (4) Three hours of lecture per week. Prerequisite: course 3 and 35. Students with an A or B in course 6 may proceed directly to course 103, those with a lower grade intend- ing to major in French must continue as transfer students intending to major in French who fail the validation examination, must take this course before proceeding to course 103. (F, W; Ms. Lasocki (Sp)

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 149 and 150 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 160-163 acquaint the student 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 as well as the relationship of the arts and 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 literature of the major, which share a common base in language 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 three 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 103D-103E-103F. Five courses from 150-189, including two from the series 180A-180B-180C, 198A-198B. 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 who have attained a grade-point average of at least 3.3 and a grade-point average of at least 3.3 in the major. Students in the honors program must complete two quarters of H189A-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 H189A-B course.

Graduate Study

The M.A. Program. A minimum of 36 units in French is required, including at least 15 units of graduate courses. With permission of the graduate advisor a maximum of 6 units of upper division or graduate work in other departments may be substituted for work in French, but the minimum of 18 units of graduate French courses remains the same. The aim of the program is to provide a comprehensive historical knowledge of French literature; to that end, candidates will be asked to familiarize themselves with the works on a departmental reading list. For purposes of study and testing, French literature is divided chronologically as follows: (1) beginnings to 1515; (2) 1516-1600; (3) 1601-1789; (4) 1789-1885; (5) 1886-present. The Department offers two plans of study for the M.A. in French. Plan A consists of at least 38 units divided equally among four of the chronological periods. From the remaining period the student will choose an author, topic, or genre of special interest to be the subject of a thesis, written in French, 50 pages long. If the student will 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 work in a seminar or a 296 course. The M.A.T. Program. A program leading to the Master of Arts in Teaching (French) degree. Course work will consist of twenty-four units in French and twenty-four units in Education and includes a written comprehensive examination. This examination will be conducted during the second year. For a complete description please refer to the Announcement of the School of Education.

The Ph.D. Program. Language requirements: a reading knowledge of two 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 advisor consider necessary. For further information, consult the graduate advisor 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.

112A-112B. Medieval Literature: from the Chanson de Roland to the Roman de la Rose. (4-4) Three hours of lecture per week. Prerequisite: two courses from 103, one of which must be 103A or 103C, or the equivalent. (W; Ms. Duggan (F, Sp)
114A. Late Medieval Literature: Johnsville to Villon. (4-4) Three hours of lecture per week. Prerequisite: two courses from 112, one of which must be 103A or 103C, or the equivalent. (W, Sp)
116A-116B-116C. Sixteenth Century Literature: Marel 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. (W, Sp)
117A-117B-117C. Seventeenth Century Literature: Racine to La Mettrie. (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. (W, Sp)
117A. The Baroque and Cornelle. (W, Sp)
117B. Classicism: Moliere and the Observers of Society. (W, Sp)
117C. Classicism: Racine and the Metaphysical Artists. (W, Sp)
118A-118B-118C. Eighteenth Century Literature: Free Thought, Enlightenment, Revolution. (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. (W, Sp)
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. (W, Sp)
120A. Romantic Drama and Poetry (Lamartine, Hugo, Vigny, Musset). (W, Sp)
119C. Second-empire ideas (Taine, Reman), novel (Flaubert), poetry (Baudelaire). (W, Sp)
120. Twentieth Century Literature: Tradition, Renewal, and Revolt. (4) Three hours of lecture per week. Prerequisite: Two courses from 103, one of which must be 103A-B-C, or the equivalent. Topics vary from year to year. Credit and grade awarded on completion of the sequence. Open to students who have received credit for course 41 with consent of instructor. Ms. Desanti (W); Ms. Smock (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, 103D or 103F, or the equivalent. Topics vary from year to year. Mr. Longpre (W); Mr. Rex (Sp)

122. Literary Criticism. (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 study of significant literary criticism in French literature. Specific topics will vary from year to year.

124A–124B. Modern Theater. (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. Studies in 20th century theater, including cinema. Mr. Augst (F)

126A–126B–126C. Senior Seminar. (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. Intensive study of a major author. Mr. Calame (F); Ms. Lasocki (Sp)

130. Writing in French. (4) Three hours of lecture per week. Prerequisite: two quarters of 103 or the equivalent. The development of a good prose style and an extended vocabulary. (F), Ms. Lasocki (W)

131A–131B. French and English: Translation and Stylistics. (4–4) Three hours of lecture per week. Prerequisite: two quarters of 103, one of which must be 103A, 103B or 103C, or the equivalent. Studies in translation and stylistics. (F), Ms. Smock (Sp)

135. Modern Notions of Utopia. (4) Three hours of lecture per week. Prerequisite: Two courses from 103, one of which must be 103D, 103E or 103F or the equivalent. An examination of certain large cultural concepts from a double point of view. The manifestations of, for example, the baroque or romanticism in the different arts of a single period will be looked at. Attention will also be paid to the history of the concept itself. Ms. Smock (Sp)

139. French Dialectology. (4) Three hours of lecture per week. Prerequisite: two quarters of 103, one of which must be 103A, 103B or 103C, or the equivalent. Topics vary from year to year. Mr. Finkelnbrat (W)

145A–145B–145C. French Literature in English Translation. (4–4–4) Three hours of lecture per week. Prerequisite: Three hours of English literature. Mr. Calame (F); Mr. Jian (Sp)

150A–150B. Women in French Literature. (4–4) Three hours of lecture per week. Prerequisite: Three hours of English literature. Open to students who have received credit for course 41 with consent of instructor. A study of women as portrayed in French literature and of their role in French society and thought. Specific topics will vary from year to year. Ms. Lasocki (F); Ms. Smock (W)


152. French Historical Writing. (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 development of concepts of history in French writing. The emphasis is on the concept of language and message. Ms. Desani (W)

156. French History from Many Points of View—Political, Sociological, Intellectual, and Artistic, Multilingual. (2) Three hours of lecture per week. Prerequisite: Two courses from 103, one of which must be 103D, 103E or 103F, or the equivalent. The concept itself. Mr. Jian (Sp)

160. A Concept in French Cultural 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. The concept itself. Mr. Jian (Sp)

162. Prospective in 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. Studies in contemporary and subsequent reaction to historical events or figures. Mr. Augst (W)

165. Modern Notions of Utopia. (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 certain large cultural concepts from a double point of view. The manifestations of, for example, the baroque or romanticism in the different arts of a single period will be looked at. Attention will also be paid to the history of the concept itself. Ms. Smock (Sp)

170A–170B. French Films. (4–4) Three hours of lecture and 1 hour of laboratory per week. Prerequisite: Two courses from 103, one of which must be 103D, 103E or 103F, or the equivalent. The development of French cinema. Mr. Augst (W)

170A. Medieval and Renaissance France; 180B: The 17th and 18th centuries; 180C: France Since the Revolution. Mr. Johnson (F); Mr. Pollock (W); Mr. Nye (Sp)

171. A Concept in French Cultural 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. The concept itself. Mr. Jian (Sp)

172A–172B. Psychoanalytic Theory and Literature. (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 development of psychoanalysis to literary texts. Concepts of fantasy, of the self, and of desire applied to texts by Racine, Balzac, Gautier, Baudelaire, Zola. Ms. Smock (Sp)

172B. Psychoanalytic Theory and Literature. (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 development of psychoanalysis to literary texts. Concepts of fantasy, of the self, and of desire applied to texts by Racine, Balzac, Gautier, Baudelaire, Zola. Ms. Smock (Sp)

173. Linguistics and Literature. (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 impact of linguistics on the theory of literature and the practice of literary criticism in recent years.

180A–180B–180C. Literature and Society. (4–4–4) Three hours of lecture per week. Prerequisite: Two courses from 103, one of which must be 103D, 103E or 103F, or the equivalent. The social contexts of literature. The impact of linguistics on the theory of literature and the practice of literary criticism in recent years. Ms. Huet (F); Mr. Calame (W)

201A–201B–201C. Historical Grammar. (4–4–4) One 2-hour class per week and one 1-hour class each week. The study of the development of the French language from its earliest sources to the present day. Mr. Augst (W); Mr. Calame (Sp)

202A–202B. French Syntax. (4–4) One 2-hour class per week. The study of the structure of the French language through close analysis of texts. Mr. Calame (W)

205A–205B. Literary Criticism and Literary Scholarship. (4–4) 205A: A study of various critical approaches to literature. Recent developments in French psychoanalytic thought. Mr. Bersani (F)

209. Morphological and Syntactical Analysis of English and French. (3–3) Three hours of lecture per week. A comparative analysis of French and English grammatical structures as well as of basic phonological differences. Designed primarily for MAT candidates. Mr. Jian (Sp)

*185. Literature and Colonialism. (4) Three hours of lecture per week. Prerequisite: Two courses from 103, one of which must be 103D, 103E or 103F, or the equivalent. Studies in the literature developed in French territory outside of Europe, with special focus on the effects of travel, exoticism, race, and civilization on the literature of European countries.

H198A–H198B. Honors Sequence. (2–4; 2–4) Prerequisite: overall GPA of 3.3 and GPA in French major of 3.3. Open to seniors with consent of major advisor. Students will write an essay on a topic relating to French literature or culture under the supervision of a member of the faculty, during two consecutive quarters of their senior year. Credit and grade awarded on completion of the sequence. The Staff (F, W, Sp)

199. Supervised Independent Study and Research for Advanced Undergraduates. (2–5) Enrollment is restricted by regulations listed on page 36. Additional restriction: restricted to seniors with an overall 3.0 average and at least a 3.0 average in French. Individual instruction only in areas not covered by regularly scheduled courses. A grade of passed/not passed will be assigned. The Staff (F, W, Sp)

Graduate Courses

201A–201B–201C. Historical Grammar. (4–4–4) One 2-hour class per week and one 1-hour class each week. The study of the development of the French language from its earliest sources to the present day. Mr. Augst (W); Mr. Calame (Sp)

203A–203B. French Syntax. (4–4) One 2-hour class per week. The study of the structure of the French language through close analysis of texts. Mr. Calame (W)

204. Oral Argumentation in French. (4) Formerly 263. Three hours of lecture per week. Study of narrative structures and theories of rhetoric in the French language through close analysis of texts. Mr. Calame (W)

205A–205B. Literary Criticism and Literary Scholarship. (4–4) 205A: A study of various critical approaches to literature. Recent developments in French psychoanalytic thought. Mr. Bersani (F)

209. Morphological and Syntactical Analysis of English and French. (3–3) Three hours of lecture per week. A comparative analysis of French and English grammatical structures as well as of basic phonological differences. Designed primarily for MAT candidates. Mr. Jian (Sp)

Note: For key to symbols, see page 36.
Delineations and survivals with reference to man
134 / L&S: Genetics
(4-4) 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. Bloch (F); Mr. Duggan (W)

211A-211B. Reading and Interpretation of Old French Texts. (4-4) Formerly 206A–206B. 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. Bloch (F); Mr. Duggan (Sp)

212A–212B–212C. Old Provencal Literature. (4-4-4) Three hours of lecture per week. Reading and interpretation of twelfth and thirteenth century texts written in the langue d'oc with special emphasis on troubadour lyric poetry.

(4-4) 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. Johnson (F)

220A-220B-220C. Studies in Sixteenth 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.

Ms. Huot (Sp)

230A–230B–230C. Studies in Seventeenth 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.

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. Approximate chronological limits: 1600–1650. Eurocentric and primarily French. Relations with other literatures and the fine arts. Definitions and survivals with reference to man, preciosity, and classicism.

Mr. Eustis (W)

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. Longree (W)

250A–250B–250C. Studies in Nineteenth 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.

Ms. Smock (F)

268A–268B. Modern Theatre and Cinema. (4-4) Two hours of lecture and 2 hours of laboratory (film showings) 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. Guy (F)


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, when major emphasis is 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 (Graduate Advisers in charge) (F, W, Sp)

16. French for Graduate Students, Beginning. (0) Three hours of lecture per week. Course must be taken on a satisfactory/unsatisfactory basis. (A) Preparation for graduate reading examinations in English. (B) Preparation for graduate reading examinations in all other disciplines.

(F, W, Sp)

26. French for Graduate Students, Advanced. (0) Three hours of lecture per week. Prerequisite: French 15 or equivalent. Must be taken on a satisfactory/unsatisfactory basis. (A) Preparation for graduate reading examination in French language. (B) Preparation for graduate reading examinations in all other disciplines.

(F, W, Sp)

291. Teaching French In College. (5) Two hours of lecture per week. Prerequisite: two years of college French. Students should consult the department's Announcement of Courses for offerings in the current academic year.

Mr. Prat (So)

291A–301B–301C. Teaching French In College. (5) Three hours of lecture and one hour of laboratory per week. Prerequisite: graduate students teaching at the college level. Required for all new Teaching Assistants. Must be taken on a satisfactory/unsatisfactory basis. 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)

IDS 117. Music and the Philosophers. (4) See Interdepartmental Studies for complete description of this course.

602. Genetics

Group Major Office, Division of Special Programs, 301 Campbell Hall
Undergraduate Major Adviser: Mr. Speth. Honors Program Adviser: Mr. Kelly.

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

The major program is administered through the Division of Special Programs. Students are referred to this office for all administrative matters, and this is where major students will file their study lists.

The group 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. However, they 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 8A–8B; Mathematics 16A–16B. Recommended: Physics 8C.

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 (5), and one of the following: Genetics 130 (4), or 140 (5), or 159 (4). 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 100 A–B–C (4–4–4)

Cell Biology and Physiology
Bacteriology 100B (4)
Bacteriology 103 (3)
Biology 153 (3)
Botany 130 (5)
Molecular Biology 110A (5)
Molecular Biology 110B (5)

Ecology
Biology 150 (4)
Biology 151 (4)
Botany 124 (10)
Botany 125 (3)
Botany 126 (3)
Entomology 105 (4)
Forestry & Conserv. 123 A-B-C-D (5-3-3-4)
Forestry & Conserv. 144 (4)

Organismal Diversity and Form
Bacteriology 100A (4)
Bacteriology 102 (4)
Botany 101 (5)
Botany 102 (5)
Botany 107 (5)
Botany 109 (5)
Plant Pathology 100 (4)
Plant Pathology 120 (4)
Zoology 105 (8)
Zoology 108 (4)
Zoology 109 (5-5)
Zoology 110A-B (5-5)
Zoology 143 (10)

Evaluation
Anthropology 102 (5)
Anthropology 108 (5)
Genetics 131 (5)

Organismal Diversity and Form

Note: Either Botany 124 or Zoology 143 may be used to fulfill simultaneously the Organismal Diversity and Form requirement and the Ecology requirement.

Honors 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 H187, is followed by at least two terms of Genetics H185 and terminates the following spring with Genetics H187, 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 H187.

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 named honors.

Eligible students who complete the program may be awarded Honors, High Honors, or Highest Honors. Awarding of honors is made by the thesis review committee and the honors adviser and is based solely upon the merits of the honors thesis.

IDS 117. Music and the Philosophers. (4) See Interdepartmental Studies for complete description of this course.
Geography

Department Office, 501 Earth Sciences Building

Professors:  
David J. M. Hooson, Ph.D.  
Clarence J. Glacken, Ph.D.  
Alden Reed, Ph.D.  
Hidger Otl. Sterngerb, Ph.D.  
James E. Eames, Jr., Ph.D.  
D. E. J. Conry, Ph.D.  
Robert J. Nietschmann, Ph.D.

Chancellor:  
Ph.D.

Associate Professors:  
Kilgard O'R. Stemberg, Ph.D.  
John Leighty, Ph.D.  
Alden Reed, Ph.D.  
A. L. D. Scud.  
Allan Pred, Ph.D. (Emeritus)

Assistant Professors:  
Robert J. Nietschmann, Ph.D.  
Robert R. Reed, Ph.D.  
Richard A. Walker, Ph.D.

Visiting Professors:  
Robert Bennett, Ph.D.  
Vincent Berdoulay, Ph.D.

Departmental Undergraduate Advisers:  
Mr. Byrne, Mr. Walker.

Departmental Graduate Advisers:  
Mr. Reed, Mr. Reed.

Advice concerning requirements for undergraduate and graduate students is offered by the departmental advisers; guidance in the student's special field of interest; and their activities; and, (c) significant geographical, economic, and political processes which affect the former 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, 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; (c) significant geographical units, 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 natural and human 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 COURSES

1. Introduction to Physical Geography. (3) Three 1-hour lectures and two 2-hour laboratory periods per week. The fundamentals of the physical structure of the earth; the influence of the physical environment on human activity; the relationship of human activity to the physical environment. (Sp) Mr. Granger.

2. Physical Geography. (4) Three hours of lecture per week. The physical structure of the earth; the influence of the physical environment on human activity; the relationship of human activity to the physical environment. (Sp) Mr. Granger.

3. Introduction to Cultural and Historical Geog-  

4. Cultural Geography. (6) Three hours of lecture per week. The physical structure of the earth; the influence of the physical environment on human activity; the relationship of human activity to the physical environment. (Sp) Mr. Granger.

5. Cultural Geography. (6) Three hours of lecture per week. The physical structure of the earth; the influence of the physical environment on human activity; the relationship of human activity to the physical environment. (Sp) Mr. Granger.

6. Cultural Geography. (6) Three hours of lecture per week. The physical structure of the earth; the influence of the physical environment on human activity; the relationship of human activity to the physical environment. (Sp) Mr. Granger.

7. Cultural Geography. (6) Three hours of lecture per week. The physical structure of the earth; the influence of the physical environment on human activity; the relationship of human activity to the physical environment. (Sp) Mr. Granger.

UPPER DIVISION COURSES

100. Principles of Cultural Geography: Culture and Rural Environments. (3) Three hours of lecture and one hour of discussion per week. Short history of cultural geography; major themes concerning the relation of culture to environment; cultural attitudes toward nature; processes in the formation of landscapes; gardens; and human settlement. (F) Mrs. Burkhamm (F).

101. Principles of Cultural Geography: Culture and Urban Environments. (3) Three hours of lecture and one hour of discussion per week. Processes in the formation of landscapes; gardens; and human settlement. (F) Mrs. Burkhamm (F).

102. The Relations between Nature and Culture. (3) Three hours lecture per week. A history of the great ideas in Western thought, from antiquity to the present, concerning the relationship of human culture to the natural environment. (F) Mr. Berdoulay (Sp).

103. The City in the Third World. (3) Three hours of lecture and one hour of discussion per week. Major themes concerning the origins and cultural roles of non-Western cities; the genesis and impact of colonial urbanism; the contemporary city in the Third World. (F) Mr. Reed (Sp).

106. Environmental Perception. (3) Three hours of lecture per week. Role of cognitive process in geography. Emphasis on the relation between perception and behavior, cultural landscapes and environmental perception. (F) Mr. Reed (Sp).

107. Political Geography. (3) Three hours of lecture per week. Spatial analysis of political systems. Impact of political organization upon the economic and cultural character of regions at both local and world scales. (F) Mr. Berdoulay (Sp).

110. Location Theory. (4) Three hours lecture per week. A review of theories pertaining to the locational pattern of agricultural activities, manufacturing, and business services. Application of non-optimal locational decision-making on real-world patterns. (F) Mr. Bennett (F).

111. Systems of Cities and Regional Development. (3) Three hours of lecture and one hour of discussion per week. Processes of city-system development. Processes generating large-city concentration and regional economies. Role of regional development problems and policies in economically advanced and underdeveloped countries. (F) Mr. Pred (Sp).

113. Historical Geography of Transportation. (4) Three hours of lecture per week. The influence of geographical factors in the creation, transformation, and maintenance of transportation technologies and patterns; the shaping of patterns of settlement and economy by transportation innovation; the role of transportation in regional development in Britain and Africa. (F) Mr. Vance (F).

114. Industrial Localization. (4) Three hours of lecture per week. Factors and trends in the geographic distribution of manufacturing industries. (Sp)

120. Morphogenesis of the Western City: Pre-Industrial Urban Geography. (3) Four hours of lecture per week. Historical development of the physical structure of western cities and urban morphology from the Middle Ages to the Industrial Revolution. Specific attention is given to the geographical expression of society in the pre-industrial city. (F) Mr. Vance (F).

121. Morphogenesis of the Western City: Urban Geography In the Industrial Age. (4) Four hours of lecture per week. Historical development of the physical and social structure of western cities and the shaping of urban morphology during and since the Industrial Revolution. Specific attention is given to the geography of retailing, wholesaling, and housing. (F) Mr. Vance (F).

125. Social Geography. (4) Three hours of lecture per week. The interrelationships of social and physical space with particular attention to the diffusion processes and environmental perception, attitudes, and behavior. Structure and process of the intrametropolitan and "urban field" scales of inquiry. (F) Mr. Bennett (F).

126. The Aging City. (4) Three hours of lecture per week. Problems of demographic and physical change in urban America; inner city decay and housing abandonment. (F) Mr. Luke (F).

NOTE: For key to symbols, see page 55.
130. Natural Resources and Population. (5) Formerly 130A. A study of the interactions of population growth, technology, and natural resources, with emphasis on current literature. Focus on such issues as agriculture and nutrition, energy use, world resource availability, and economic development.

Mr. Walker (F)

**131. Development and its Environmental Impact. (3 or 6) Three hours of lecture and one hour of discussion per week. Students will be exposed to new and emerging ideas concerning the use of natural resources. The emphasis will be on current literature. Focus on such issues as agriculture and nutrition, energy use, world resource availability, and economic development. (F; Mr. Byrne (Sp))

132. Perspectives on Nature Use and Preservation. (5) Formerly 130B. Changing ideas concerning the use of natural resources and the implications of these ideas for future management. Focus on current literature. Focus on such issues as agriculture and nutrition, energy use, world resource availability, and economic development.

Mr. Walker (W)

**133. Energy as a Resource. (5) Three hours of lecture per week. Factors influencing local and worldwide distributions of plants and animals, recent migration and biogeography. Emphasis on current literature. Focus on such issues as agriculture and nutrition, energy use, world resource availability, and economic development.

Mr. Byrne (Sp)

134. Man and Vegetation Change. (Formerly 108) Three hours of lecture per week. An historical review of man's role as an agent in vegetation change with special emphasis on North American examples. (F; Mr. Byrne (W))

150. California. (5) Four hours of lecture per week. Geographical regions of the state; agricultural, urban, and industrial expansion as related to population growth and cultural development. Ecological and current environmental issues.

(F; Mr. Parsons (W))

151. Western United States. (4) Three hours of lecture per week.

Mr. Parsons (Sp)

152. Historical Geography of the United States. (4) Three hours of lecture and one hour of discussion per week. The evolution of the regional economies and cultures of the United States as it is related to the development of the lands and the response here to the varying physical conditions.

Mr. Vance (F)

153. Geography of Canada. (4) Three hours of lecture per week.

Mr. Parsons (F)

154. Middle America. (3) Three hours of lecture per week. Mexico, Central America, and the West Indies. Mr. Nietschmann (Sp)

155. Spanish South America. (4) Three hours of lecture per week. The Andean and La Plata countries.

Mr. Parsons (F)

156. Brazil. (3) Four hours of lecture per week. Selected environmental and cultural themes in the contemporary landscape of Portuguese America, including a brief general survey of the problems that challenge the people of Brazil's major geographical regions.

Mr. Stemberg (W)

157A. The Nordeste. (Formerly 157B) Three hours of lecture and one hour of discussion per week. Pre-requisite: course 156 or consent of instructor. Problems-oriented themes in a regional context. Traditional and recent approaches to environmental problems of a diversified region, with emphasis on the "cultural policy"; water as a critical factor and its use in agriculture and industry.

Mr. Stemberg (W)

157B. Agricultural Frontiers in Brazil. (Formerly 157B) Three hours of lecture per week. Pre-requisite: course 156 or consent of instructor. Problems-oriented themes in a regional context. Environmental diversity and cultural variables in the characterization of present-day pioneer fronts, with emphasis on western Brazil.

Mr. Stemberg (W)

158. Environment and Man in the Amazon Basin. (4) Four hours of lecture per week. Physical, biological and cultural processes in the domain of the greatest fluvial network on earth. Vulnerability of complex ecosystems currently subjected to large-scale disturbances.

Mr. Stemberg (Sp)

159. Alaska. (3) Three hours of lecture and one hour of discussion per week. Pre-requisite: upper division standing.

Mr. Stemberg (Sp)

160. Mother Lode Country. (Formerly 159) Two hours of lecture per week. Pre-requisite: course 158 or consent of instructor. Special problems in the geology and history of the Mother Lode region.

Mr. Stemberg (W)

168. The Middle East. (3) Three hours of lecture per week. The human geography of the Middle East, from Egypt to Afghanistan. Physical, historical, and cultural background to current social and economic problems of individual countries and the area as a whole.

Mr. Stemberg (Sp)

169. South West Pacific. (3) Three hours of lecture and one hour of discussion per week. Australia, New Zealand, and the South Pacific islands.

Mr. Hooson (W)

170. The Arctic Lands. (3) Three hours of lecture per week. A survey of physical environments and resulting human problems in the arid regions of the world.

Mr. Oberlander (W)

171. The Humid Tropics. (4) Four hours of lecture per week. An analysis of the resources of the warm and wet lands of the equatorial regions; the economic potentials of the tropics and the obstacles to their exploitation in the physical and cultural environments.

Mr. Oberlander (W)

180. Field Geography. (6) One hour of lecture per week and nine hours of field work every Saturday. Pre-requisite: 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) Three hours of lecture per week and nine hours of field work every Saturday. Pre-requisite: course 121 or 125 or consent of instructor. Analysis of the structural components of the urban environment of the San Francisco-Oakland metropolitan area.

(F, Sp)

183. Cartographic Representation. (5) Two hours of lecture and six hours of laboratory per week. Prerequisite: upper division quantitative and qualitative data on thematic maps.

197. Introduction to Quantitative Methods in Geography. (5) Three hours of lecture and three hours of laboratory per week. Prerequisite: Statistics 126 or equivalent. Application of some elementary concepts of scaling and the measurement of relationships to geographically related problems. May include areal classification, spatial interaction, analysis of networks.

Mr. Bennett (W)

198. Geography of Human Health and Disease. (4) Three hours of lecture per week and five hours of field work per week. Special emphasis on the interaction 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. Romm (W)

Mr. Stemberg and Staff in cooperation with Staff of Dept. of International Health—Hooper Foundation, UCSF (F)

H195. 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)

199. 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 work required. Must be taken pass/fail or not passed basis.

The Staff (F, W, Sp)

200. Directed Group Study. (1–5) One hour of lecture and 3-6 hours of laboratory per week. Prerequisite: consent of instructor.

The Staff (F, W, Sp)

GRADUATE COURSES

Admission to graduate courses requires in all cases consent of the individual instructor. Students are not prerequisites to graduate courses unless so indicated.

200. Advanced Cultural Geography. (4) Three hours of lecture per week. Prerequisite: Statistics 126 or equivalent. The nature of the water environment of the San Francisco-Oakland metropolitan area.

Mr. Stemberg (F)

210. Problems in Modern Human Geography. (4) Three hours of lecture per week. Prerequisite: Geography 130 recommended, in addition to other upper division courses.

Mr. Members (F)
220. Advanced Urban Geography. (4) Three hours of lecture per week. Mr. Vance (Sp)

**230. Geographical Problems in Regional Development and Resource Utilization.** (4) Three hours of lecture per week. Physical, biotic, and cultural factors in the geographical tropics. Mr. Stearns (Sp)

**231. Seminar on Development and its Environmental Impact.** (2) One hour meeting per week. Prerequisite: required of and open only to graduate students concurrently enrolled in Geography 611. Model of ecologically maladjusted economic development, and the elimination of future options for quality growth in the emerging nations.

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 (Sp)

GRADUATE RESEARCH SEMINARS

251. Cultural Geography. (4) Three hours of lecture per week. Mr. Glacken (Sp)

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. Mr. Parsons (F)

256. Climatology. (4) Three hours of lecture per week. Mr. Granger (F)

**257. Geomorphology.** (4) Three hours of lecture per week. Mr. Oberlander (Sp)

258. Biogeography. (4) Three hours of lecture per week. Mr. Parsons (Sp)

**259. Urban Social Geography.** (4) Three hours of lecture per week. (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.

268. Geographical Aspects of Land Use Conflicts in California and the West. (4) Three hours of lecture per week. Mr. Walker (F)

**271. Latin America.** (4) Three hours per week. Mr. Stemberg (W)

272A~272B. The Geography of Food. (4~4) Three hours of lecture per week. Prerequisite: required of and open only to graduate students concurrently enrolled in Geography 611. Level of Chemistry 14 and Physics 5A-5B-5C. Grading will be on a satisfactory/unsatisfactory basis.

601. Individual Study for Master's Students. (1~6) Individual study for comprehensive or language requirements in consultation with the field adviser. Units may not be used to meet the requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis.

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 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)

**275. Soviet Union.** (4) Three hours of lecture per week. Mr. Hooson (Sp)

289. Problems in Geographical Thought (4) Three hours of lecture per week. Mr. Vance (Sp)

292. Advanced Field Study in Geography. (5~10) Three hours of lecture per week. Physical, biotic, and cultural factors in the geographical tropics. Mr. Stearns (Sp)

**295. History of Geography.** (4) Three hours of lecture per week. Mr. Hooson (W)

**298. Problems in Geographical Thought.** (4) Three hours of lecture per week. Mr. Hooson (Sp)

299. 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 satisfactory/unsatisfactory. 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 satisfactory/unsatisfactory. May be repeated for credit.** The Staff (F, W, Sp)

**299. Individual Research.** (1~8) Individual research for graduate students in consultation with staff members.

365. Seminar on the Teaching of Geography. (2) Two hours of lecture per week. The aims and methods of teaching geography at the college and university levels. All new teaching assistants are expected to enroll. Open to all graduate students in the department.

The Major in Geology

The major in geology includes the most rigorous basic courses in physical science and mathematics. It provides the background necessary for graduate study in geology and also satisfies the minimum academic requirement for registration as a geologist in the state of California.

Lower Division Courses. Geology 5; Paleontology 1; Chemistry 1A-1B; 1AC and 14; Physics 5A-5B-5C-5D; Mathematics 1A-1B-1C, 41 or (51A-51B) and 51C; Statistics 20.

Upper Division Courses. Geology 150, 102, 116A-116B, 118, 151; Computer Science 101; twelve additional units in upper division courses in geology, geophysics, paleontology, chemistry, physics, mathematics or engineering as approved by the major adviser.

Honors Program. Students with an overall grade-point average of 3.3 in the University, including 3.3 in the major, may apply for admission to the honors program through the student's major adviser not later than the end of the student's junior year. Candidates for graduation with honors in geology are required to take, in addition to the regular program, 6 units of Geology 199.

The Major in Geophysics

The major in geophysics is designed for students with facility in mathematics and an interest in geology; it provides a general background in the physical sciences, with emphasis on the physics of the earth.

Lower Division Courses. Chemistry 1A; Physics 5A-5B-5C-5D; Geology 5; Mathematics 1A-1B-1C, 5A-5B-5C-5D.

Upper Division Courses. Physics 105A~105B, 110A~110B~110C; Geology 150; Mathematics 120A-120B-120C; Geophysics 104A~104B, 121A~121B, 122A. Recommended: Geophysics 122B; Geology 116A~116B, 118, 119, 151; Computer Science 101.

Honors Program. Students with an overall grade-point average of 3.3 in the University, including 3.3 in the major, may apply for admission to the honors program. Application should be made through the student's major adviser not later than the end of the student's junior year. Candidates for graduation with honors in Geophysics are required to take Geophysics 122B and Geophysics 199 in addition to the regular program, and either write a research paper or take a comprehensive examination.

The Major in Engineering Geoscience

The College of Engineering with the cooperation of the Department of Geology and Geophysics offers a curriculum in engineering geoscience leading to the degree of Bachelor of Science (see section on Engineering Science in this Catalog).

Graduate Programs

The central objective of the graduate program is to encourage creative thinking and develop the capacity for independent and original research.

Student Background. The student is expected to have as a background:

1. Two years of college mathematics including at least one year of calculus at the level of Mathematics 51A, 51B, 51C and an introductory course in computer programming.
2. One year each of college chemistry and physics at the level of Chemistry 14 and Physics 5A-5B-5C.
3. For geology students, broad undergraduate training

NOTE: For key to symbols, see page 36.
**Geology**

**LOWER DIVISION COURSES**

Lower division courses in geology are designed to serve both general and specific interests in earth science, and they can be taken in any order. Credit is not allowed for both 5 and 10, which are alternative presentations of classical geology; enrollment is limited to 5.

1. **The Changing Earth.** (4) Three 1 1/2-hours of lecture per week. The Earth, its present and past states, with particular reference to the processes that change it. (F, W, Sp)

2. **The Environment of Man.** (4) Three 1-hour lectures and one 1-hour discussion and demonstration per period; occasional field trips. The impact of man's works on the environment, particularly on those processes that have contributed to the development of the environment; analysis of the geologic, geographic, and ecologic factors that determine the degree of human impact. (Sp, W)

3. **General Geology.** (5) Three hours of lecture and eight hours of laboratory per week. Prerequisite: Chemistry 1A and consent of instructor. Introduction to geology through field maps, with supplementary laboratory study. Minerals, rocks, geologic structures and processes. (F, Sp, W; F, W, Sp)

4. **Introductory Geology.** (4) Two 1 1/2-hour lectures and two 1-hour discussion periods per week. Prerequisite: not open to major geology. Introductory geology through laboratory study with at least one field trip. Minerals and surface processes which change the earth. (W)

**UPPER DIVISION COURSES**

Courses 105 and 110 are general interest courses with minimum prerequisites and are appropriate for non-science majors in the College of Letters and Science.

1. **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. (F, W, Sp)

2. **Field Geology.** (4) Two 4-hour field trips and one 1-hour discussion period per week. Prerequisite: Geology 150. Geology of the Berkeley Hills and vicinity. Not open to students who have completed course 5. (F)

3. **Optical Mineralogy.** (4) Two hours of lecture and two 3-hour laboratories per week. Prerequisite: course 5 or equivalent. (F, W, Sp)

4. **Igneous Petrology.** (4) Two hours of lecture and two 3-hour laboratory periods per week. Prerequisite: courses 150, and 102. Introduction to problems of origin and evolution of igneous rocks. Study of igneous rocks using petrographic microscopes. (W)

5. **Metamorphic Petrology.** (4) Two hours of lecture and two 3-hour laboratory periods per week. Prerequisite: course 150 and 102. Introduction to problems of origin and metamorphic rocks. Study of metamorphic rocks using the petrographic microscope. (F)

6. **Sedimentary Rocks.** (3–3) Two hours of lecture and three hours of laboratory per week. Prerequisite: course 105A. Course 150 and 102. (F, W, Sp)

7. **Physical Processes in Sedimentation; Sedimentary Rocks.** (4) Two hours of lecture and two 3-hour laboratory periods per week. Prerequisite: courses 150, and 102. Introduction to problems of origin and evolution of igneous rocks. Study of igneous rocks using petrographic microscopes. (W)

8. **Chemical Processes in the Formation of Sedimentary Rocks.** (4) Two hours of lecture and two 3-hour laboratory periods per week. Prerequisite: courses 150, and 102. (W)

9. **Physical Processes in Sedimentation; Sedimentary Rocks.** (4) Two hours of lecture and two 3-hour laboratory periods per week. Prerequisite: courses 150, and 102. Introduction to problems of origin and evolution of igneous rocks. Study of igneous rocks using petrographic microscopes. (W)

10. **Mineral Resources.** (4) Three hours of lectures and demonstrations per week, plus two 1-day and one 2-day field trips. Prerequisite: a college science course in geology or consent of instructor. Non-renewable resources. Geologic environments, economic mineral deposits and their impact on history and human affairs. (W)

11. **Evolution of Continents and Oceans.** (5) Three 1-hour lectures and two 1-hour discussion periods per week. Prerequisite: a college science course in geology. The structure and evolution of the surface of the earth. (F, W, Sp)

12. **History of California.** (4) Three hours of lecture and discussion per week. Prerequisite: a college course in geology. Geologic framework and history of California; the geology of California in relation to man. (F, W, Sp)

13. **Stratigraphy and Structure.** (3) Two 1-hour lectures and discussion periods per week. Prerequisite: consent of instructor. Interpretation of sedimentary rocks and geologic maps with respect to structural history. (F)

14. **Stratigraphy and Structure.** (3) Two 1-hour lectures and discussion periods per week. Prerequisite: course 112A—may be taken concurrently. Independent study for advanced undergraduate students in the literature of geology; limited to a given time interval over an extensive region, such as a state. Maps and cross-sections will be constructed and an interpretation of the structural history will be made. (F, W, Sp)

15. **Geological Structures and Maps.** (3–3) Two hours of lecture and two hours of laboratory per week. Prerequisite: courses 5 or 101. (F, W, Sp)

16. **Classical and Continental Geology.** (4) Three hours of lecture and discussion per hour. Prerequisite: courses 5 or 101. (F, W, Sp)

17. **Science of Geologic Maps and Air Photographs.** (2) Two hours of lecture and 1 hour of laboratory per week. Prerequisite: courses 5 or 101. (F)

18. **Modern Geology of the Earth.** (4) Three hours of lecture and one 1-hour discussion period per week. Prerequisite: courses 5 or 101. (Sp, W, F; F, W, Sp)

19. **Paleontological Geology.** (4) Three hours of lecture and one 1-hour discussion period per week. Prerequisite: courses 5 or 101. (F, W, Sp)

20. **Palaeozoic and Mesozoic Geology.** (4) Three hours of lecture and one 1-hour discussion period per week. Prerequisite: courses 5 or 101. (F, W, Sp)

21. **Quaternary Geology.** (4) Three hours of lecture and one 1-hour discussion period per week. Prerequisite: courses 5 or 101. (W, Sp)

22. **Pleistocene History.** (4) Three hours of lecture and one 1-hour discussion period per week. Prerequisite: courses 5 or 101. (F, W, Sp)

23. **Historical Geology.** (4) Three hours of lecture and one 1-hour discussion period per week. Prerequisite: courses 5 or 101. (W, Sp)

24. **Geographic Environment.** (4) Three hours of lecture and one 1-hour discussion period per week. Prerequisite: courses 5 or 101. (F, W, Sp)
205C. Processes of Ore Deposition. (20) Ten days in the field. Prerequisite: course 205A-205B. Field examinations of ore deposits. Mr. McEvilly (So)

209. Stratigraphy and Tectonics. (3) One 3-hour meeting per week. Prerequisite: course 112 or consent of instructor. Regional tectonic interpretation as deduced from the study of stratigraphy, sedimentation, and geomorphology. Mr. Carmichael (Sp)

210. Advanced Field Geology. (4) Four weekends of field study with mapping and one three-hour laboratory per week. Prerequisite: consent of instructor. Principles and problems in geochemistry. Mr. Salseby (Sp)

211. Advanced Igneous Petrology. (3) Formerly numbered 213A. One two-hour lecture and one three-hour laboratory period per week. Prerequisite: consent of instructor. Rates and processes of erosion. Mr. Medaris (Sp)

212A. Environmental Analysis of Pleistocene Sedimentary Rocks. (4) One 2-hour lecture and one 3-hour laboratory period per week; three 1-day field trips. Prerequisite: consent of instructor. Analysis of the environmental interpretation of nonmarine Pleistocene sedimentary rocks. Directed primarily for paleontologists and archeologists who intend to do field work in Pleistocene rocks.

225. Current Literature in Geomorphology. (3) Three hours of lecture per week. Prerequisite: consent of instructor. Review and discussion of current literature in hydrology, fluvial processes, sediment transport, chemical weathering, and related geomorphology. Written and oral presentations. May be repeated for credit. Mr. Leopold (W)

231. Mineral-Solution Equilibria. (4) Three hours of lecture per week. Prerequisite: consent of instructor. High temperature solution chemistry, theoretical prediction of equilibrium constants and activity coefficients using crystal structure and determination of solubility and estimation of thermodynamic properties of minerals, phase relations in geologic systems, etc., with emphasis on computer applications and independent study.

232. Mass Transfer and Kinetics in Geochemical Processes. (4) Three hours of lecture per week. Prerequisite: Geology 231 or equivalent. Computer modeling of geochemical processes including large numbers of components, phases and reactions with emphasis on mass transfer, growth of crystals and models of mass transfer resulting from weathering, diagenesis, metamorphism, adiabatic expansion of vein fluids, hydrothermal carbonatite, etc.

235. X-Ray Crystallography. (2) Two hours of lecture per week. X-ray diffraction techniques, both powder and single crystal methods, and their use in identification and determination of lattice constants and crystal structure. Application to basic problems of crystal chemistry. Mr. Slabbel (W)

235A. X-Ray Crystallography Laboratory. (3) Formerly 235. Two 3-hour labs per week. X-ray diffraction laboratory with instruction in the use of all important techniques. To be taken concurrently with 235. Mr. Slabbel (F)

236. Advanced Mineralogy. (4) One 2-hour lecture and one 2-hour laboratory per week. Basic concepts of X-ray crystal structure and determination of crystallographic and chemical structure. Structure refinement and determination of site occupancies. Microstructure of minerals (planar, linear and point defects; imaging techniques with the transmission electron microscope); geometrical significance of crystal structure (microwave anisotropy); and orientation techniques. Mr. Wenk (W)

280. Research. (2-12) The Staff (F, W, So, Su)

290. Seminar. (2-6) Topics will be announced each quarter. The Staff (F, W, Sp)

101. The Use of the Electron-Microprobe. (8) Eight hours of laboratory per week. Prerequisite: graduate standing; consent of instructor. Theory and operation of an electron-microprobe and ancillary equipment, for analysis of inorganic solids. May be repeated for credit. Mr. McEvilly (F, Sp)

601. Individual Study for Master's Students. (1-6) Individual study for the comprehensive or language examination. May be used for unit or residence requirement for the doctorate. Mr. Wang (Sp) Alternate years

104A. Mathematical Methods in Geophysics. (4) Three hours of lecture per week. Prerequisite: Mathematics 51A-51B-51C. Linear vector spaces, tensor analysis, and integral equations. Deterministic and statistical, under- and over-determined, and linear and nonlinear equations. Problems of crystal chemistry, uniqueness, construction, appraisal, resolution, and trade-off curves. Applications to gravity, magnetics, conduction, seismology, and planetary geophysics. Mr. Johnson (W)

104B. Mathematical Methods in Geophysics. (4) Three hours of lecture and computer laboratory per week. Prerequisite: Mathematics 51A-51B-51C. Fourier and time-series analysis; spherical harmonics; transforms, fast-Fourier transform computations; differential equations of geophysics. Examples from seismology, geodynamics, gravity, heat flow, and tidal theory. Mr. Bolt (W)

120. Mechanics of Earthquakes and Faulting. (3) Three 1-hour lectures per week and one field trip to San Andreas fault. General discussion of earthquake occurrence; seismicity and global tectonics; characteristics of earthquake sources; implication to geological hazards. Mr. Johnson (F)

121A-121B. Seismology. 121A (5) Two 1-hour lectures and one 3-hour laboratory period per week. Prerequisite: Physics 4A-4B, Mathematics 51A-51B-51C. Fourier theory; source models; expansion in multipoles; seismic waves. Estimation of seismic motion at a site. Mr. Bolt (F), Alternate years

121B (4) Two 1-hour lectures and one 3-hour laboratory period per week. Prerequisite: Physics 4A-4B, Mathematics 51A-51B-51C. Paths and types of seismic waves; travel times; velocity distributions; reflection and refraction; seismic prospecting. Sequence beginning fall. Mr. Johnson (Sp)

122A. Physics of the Earth. (4) Three hours of lecture per week. Prerequisite: either course 104B or consent of instructor. Time series: data analysis and interpretation; source models; seismic waves. Determination of the earth's gravitational field; internal constitution; heat transfer and temperature distribution. Mr. Wang (Sp)

122B. Physics of the Earth. (4) Three hours of lecture per week. Prerequisite: either course 104B or a course in partial differential equations. The earth's gravitational field; internal constitution; heat transfer and temperature distribution. Mr. Verhoogen (W)

130. Strong Motion Seismology. (3) Three 1-hour lectures per week. Prerequisite: Mathematics 51C or equivalent and consent of instructor. Generation of ground motion, characteristics of seismic waves. Estimation of ground motion at a site. Ground motion spectra, influences of soils and geologic structures. Seismic risk mapping. Mr. Bolt (W)

140. Mechanics of Geophysical Fluids. (4) Three hours of lecture per week. Prerequisites: Mathematics 1120 or 1212A or 1212B, or consent of instructor. Dynamics of fluids in a geophysical context, hydrodynamics, geophysical fluid dynamics. Dimensional analysis, scaling, elementary solutions involving large and small viscosity, rotation, buoyancy. Introduction to magnetohydrodynamics.

199. Supervised Independent Study. (1-5) Enrollment is restricted to students on page 36, plus any additional restrictions established by the instructor supervising the work. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

GRADUATE COURSES

204A-204B-204C. Elastic Waves. (4-4-4) Three 1-hour lectures per week. Prerequisite: Geophysics 104 or equivalent; Geophysics 121A; Physics 106A.

210A. Strain; Inelastic and finite strain; wave motion in isotropic solids; water waves; effects of anelasticity and anistropy; propagation in layered media. Sequence beginning fall. Mr. McEvilly (W)

210B. Spherical waves; terrestrial oscillations; Lamb's model; earthquake sources. Mr. Johnson (Sp) Alternate years

206. Geophysical Inverse Methods. (4) Three hours of lecture per week. Prerequisite: Geophysics 104A or equivalent. Survey of the methods available for geophysical problems. Deterministic and statistical, under- and over-determined, and linear and nonlinear equations. Concepts of uniqueness, uniqueness, construction, appraisal, resolution, and trade-off curves. Applications to gravity, magnetics, conduction, seismology, and planetary geophysics. 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)

217. Advanced Seismology. (4) Two 1-hour lectures and two 3-hour laboratory periods per week. Mathematical theory of the pendulum and other seismographs. Techniques of modern seismometry. Mr. McEvilly (W), Alternate years

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. Bolt (Sp)

219. Seminar in Geophysics. (3) Two 1 1/2-hour discussion periods per week. Critical study of problems in current geophysical research. Content will vary. Mr. Banerjee (W), Mr. Wang (Sp)

240. Geophysical Fluid Mechanics of the Earth's Interior. (4) Four hours of lecture and discussion per week. Prerequisite: Geophysics 140 or equivalent. Topics in the dynamics of the manila and core. Free convection, rotating systems, differential heating, motion of a conducting fluid in a magnetic field.

285. Research. (2-12) The Staff (F, W, Sp, Su)

601. Individual Study for Master's Students. (1-8) Individual study and 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, So, Su)

602. Individual Study for Doctoral Students. (1-8) Individual study and requirements in consultation with the field adviser. Visiting students are not admitted. Units may not be used for unit or residence requirement for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, So, Su)

IDS 145. Physical Problems about the Earth. (4) See Individual Study. For the comprehensive description of this course.

NOTE: For key to symbols, see page 36.
The program leading to the Ph.D. in literature offers various directions of study including literary history, literary theory, methodology, genres, authors, and studies involving related disciplines such as other literatures, aesthetics, musicology, sociology, linguistics, psychology, and folklore.

The graduate program in its entirety should lead the student to develop intellectual independence and an imaginative approach to the field.

Prerequisite for admission to full graduate standing. A B.A. degree (or its equivalent) with an undergraduate major in German. Students admitted on the basis of their overall scholarship records, but with deficiencies in their preparation in German, are expected to make these up by additional coursework.

The Master of Arts program requires that the student gain competence in at least three graduate courses per academic year.

Master of Arts: Literature

Requirements: 36 units in German (Group II, General Catalog) with a B grade or better, including at least 18 graduate units (14 of which must be in literature).

The M.A. program involves:
1. a study of essential aspects of German literature and culture. Students are expected to work in three periods of German literature (Middle Ages, 1500-1750, 1750-present). At least one research seminar is required.
2. a proseminar (200) on the methods and methodology of "Germanistik" as a field. This course will familiarize students with the basic tools of the profession and will further 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 them a graduate course.
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 some 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 essential. 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 written examination with emphasis on the descriptive grammar (phonology, morphology, and syntax) of German and the history of the German language in all its aspects. A reading list is available for general guidance.
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 adviser regarding the best 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 deal primarily with the 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 presenting 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 per week. Not open to students who have completed German 1A, 1B, 2A, 2B.
   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 the equivalent. Not open to students who have completed German 1A, 1B, 2A, 2B.
   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 the equivalent. Not open to students who have completed German 1A, 1B, 2A, 2B.
   Mr. Mueller in charge (F, W, Sp)

4. Intermediate German. (6) Five 1-hour class meetings and two 1-hour sessions in the Language Laboratory per week. Prerequisite: course 3 or the equivalent. Not open to students who have completed German 1A, 1B, 2A, 2B.
   Mr. Mueller in charge (F, W, Sp)

4R. Intermediate German (Emphasizing Reading). (6) Five 1-hour class meetings and two 1-hour sessions in the Language Laboratory per week. Prerequisite: course 3 or the equivalent. The purpose of this course is to serve those students who want to develop their reading ability rapidly so that the study of literature or the translation and analysis of scientific or other German prose texts can be carried out as soon as possible.
   Mr. Mueller in charge (F, W, Sp)

5. Advanced German. (6) Five 1-hour class meetings per week. Prerequisite: course 4, 4R or the equivalent.
   Mr. Mileck in charge (F, W, Sp)

**11A. Elementary German. Intensive Course. (10) Five 2-hour class meetings and two 1-hour sessions in the Language Laboratory per week. This course is equivalent to courses 1 and 2. Not open to students who have completed German 1A, 1B, 2A, 2B.
   Mr. Mueller in charge (F, W, Sp)

**12B. Intermediate German. Intensive Course. (10) Two 2-hour class meetings and two 1-hour sessions in the Language Laboratory per week. Prerequisite: course 2 or 12A or the equivalent. This course is equivalent to courses 3 and 4. Not open to students who have completed German 3, 4, 14C, 14D, 3R, 4R.
   Mr. Hitten 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 study list requirement. If a student completes more than he contracts for, he is given credit for them.
   Mr. Mueller in charge (F, W, Sp)

**39. German Literature In Translation. (4) Two 1-1/2 hour lectures and one hour of discussion per week. Topic varies from year to year. Ms. Goldstein

40. Women in German Literature. (4) Three hours of meeting per week. A study of women as portrayed in literature, and of women writers. Topic varies. Topic for Fall to be announced. Topic for Spring to be announced.
   Staff (F, Sp)

UPPER DIVISION COURSES

Group I

All German 160 courses are given in English and are open to all upper division and graduate students.

160. Issues and Problems in German Literary and Cultural History. (2-5) Two to five hours of lecture per week. May be repeated for credit when topic changes. 1976-77 topics:
   160A. Brecht I. (4) Two 1-1/2 hour lectures and one hour of required tutorial per week. Ms. Goldstein (W)
   160B. Brecht II. (4) Two 1 1/2-hour lectures and 1 hour of required tutorial per week. Ms. Goldstein (Sp)
   160C. Hermann Hesse. Man and Art. (5) Three 1-hour lectures and 1 hour of discussion per week. Mr. Mickle (F)

161. The Historical Folk-Narrative of Europe. (4) Formerly 1912. Three hours of lecture per week. Prerequisite: reading knowledge of German language desirable. Open to students who have received credit for course 125 prior to Fall 1975. The fairy tale (Märchen) and its analysis according to various methods (geographic-historical, sociological, mythological, psychological, structural) provide a specific point of departure for the study of historical folk-narrative of Europe as a whole.
   Mr. Tubach (Sp)

**162. Contemporary German Culture and Political Institutions. (4) Five 1-hour meetings per week. Ms. Goldstein

184. Yiddish Literature In Translation: Culture of the Old Country and the New World. (4) Three hours of lecture per week. Literary works will be studied as aesthetic, social and historic documents to illuminate the nature of societies and cultures in which they were created and enjoyed. Films by Jewish communities in Eastern and America will supplement the readings.
   Mr. Goldstein (Sp)

Group II

Prerequisite: unless otherwise stated, five courses (25 units) of lower division German language courses, or their equivalent.

100. Introduction to German Literature. (4) Three 1-hour lectures per week. Designed primarily for students majoring in German.
   Ms. Tennant (F)

A. Language/Linguistic Courses

101A-101B. Advanced German Grammar and Composition. (4-4) Three 1-hour meetings per week. Not open to native speakers, except with consent of instructor.
   Staff (F, W, Sp)

102A-102B-102C. Advanced German Conversation. (3-3-3) Three hours of lecture per week. Each course in the sequence may be repeated for credit up to 3 times. Total number of units to not exceed 9. Open to graduate students with consent of instructor.
   102A: Staff (F)
   102B: Staff (W)
   102C: Staff (Sp)

103A. Introduction to Descriptive German Grammar. (2) Two 1-hour lectures per week. Phonetics and phonology.
   Staff (F)

103B. Introduction to Descriptive German Gram...
G. Undergraduate Courses

**1155. Philosophical Approaches to German Literature.** (4) Three 1-hour lectures per week. Prerequisite: consent of instructor. Specific topic to be announced. Staff (Sp)

**1156. Sociological Approaches to German Literature.** (4) Three 1-hour lectures per week. Prerequisite: consent of instructor. Specific topic to be announced. Mr. Brinkmann (Sp)

**1157. Psychological Approaches to German Literature.** (4) Three 1-hour lectures per week. Prerequisite: consent of instructor. Specific topic to be announced. Mr. Kudszus (Sp)

**1159. Special Topics.** (4) Two 1/2-hour lectures per week. Prerequisite: consent of instructor. Topic to be announced. May be repeated for credit when topic changes. Mr. Jaszi, Mr. Tubach (Sp)

160. Issues and Problems in German Literary and Cultural History. May be repeated for credit when topic changes. 1976-77 topics:

160A. Brecht I. (4) Two 1/2 hour lectures and 1 hour of required tutorial per week. Ms. Goldstein (W)

160B. Brecht II. (4) Two 1/2 hour lectures and 1 hour of required tutorial per week. Ms. Goldstein (Sp)

160C. Hermann Hesse. Man and Artist. (5) Three 1-hour lectures and 1 hour of discussion per week. Mr. Mileck (W)

H195A-B. Honors Seminars for Undergraduates. (4-6) 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 honors programs; however, if enrollment warrants and instructor consents, students may be admitted. Topics vary from year to year.

H195A. Topic to be announced. Ms. Kudszus (F)

H195B. Topic to be announced. Mr. Jaszi (W)

H196. Honors Studies in German. (3) Supervised independent study and research course for honors students who are writing honors theses for completion of the requirements for the Honors Program. May be repeated up to a maximum of four units. Prerequisites: H195A-B. Staff (Sp)

196. 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 36. Additional limitation: overall 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. Prosseminar in German Literature. (3) Three hours of seminar and one hour of tutorial per week. Prerequisite: graduate standing. Introduction to the bibliography, history, and methods of German studies (Germanistik). Recommended primarily for M.A. candidates. Mr. Seeba (F)

**203. Studies in Middle High German Literature.** (4) Two hours of lecture and one hour of required tutorial per week. Prerequisite: consent of instructor. Staff (W)

**206. German Literature of the Renaissance and Reformation.** (4) Three hours of meeting per week. Mr. Spahr (Sp)

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. Mr. Spahr (Sp)

210A. Middle Ages. Mr. Tubach (F)

210B. The Baroque. Mr. Spahr (W)

210C. Romanticism and Realism. Mr. Jaszi (Sp)

212. Lessing. (4) Three hours of meeting per week. Mr. Hillen (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. Weisinger (Sp)

224. Schiller. (4) Three hours of meeting per week. Staff (Sp)

227. German Romanticism. (4) Three hours of meeting per week. Mr. Goldstein (F)

**230. Heinrich Von Kleist.** (4) Three hours of meeting per week. Mr. Politzer (W)

**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: Keller, Meyer. Ms. Bonwit (W)

**236B. German Realism.** (4) Two hours of lecture per week. Topic: Fontane, Storm, Raabe. Ms. Bonwit (W)

237. German Oral Style. (4) Four class hours per week. Prerequisite: course 102 or equivalent. The course is designed for future teachers and all others who wish to have a comprehensive oral command of German. Conducted entirely in German with intensive practice in speaking and understanding the language. Required for all M.A.T. candidates.

239. German Naturalism. (4) Three hours of meeting per week. Staff (W)

**242. Hoffmannsthali and the Austrian Drama of the Twentieth Century.** (4) Three hours of meeting per week. Staff (Sp)

**245. Interpretation and Criticism of German Poetry.** (4) Three hours of meeting per week. Mr. Kudszus (Sp)

248A—248B—248C. Twentieth Century German prose. (4) Two to three hours of meeting per week. Staff (Sp)

248A. Hermann Hesse. Mr. Mileck (W)

248B. Thomas Mann. (4) Mr. Mileck (Sp)

248C. Franz Kafka. (4) Mr. Politzer (F)

**250. Aspects of German Literary and Cultural History.** (4) Three hours of lecture per week. Literary and cultural patterns of Germany and America. A research paper and several brief lectures are required of the student to develop his ability to teach cultural and literary materials. Mr. Tubach (W)

250A. Seminar in German Literature. (4) Two hours of lecture and one hour of required tutorial per week. Prerequisite: consent of Instructor. May be repeated for credit when topic changes.

250A. Böchner. Ms. Bonwit (F)

250B. Hauptmann. Mr. Spahr (Sp)

250C. Hoffmann, Kafka Mr. Jaszi, Mr. Kudszus (W)

250D. Money in the Novel Ms. Goldstein (W)

250E. The Mystic Eckhart Mr. Spahr (W)

250F. Hermeneutics Ms. Seeba (W)

**261A—261B. Seminar in German Literature, (4—4) Three hours of lecture per week. Credit and grade will be awarded upon completion of the full sequence. Topic will vary from year to year.**

261A. Die Deutsche Bildungsroman. Miss Bonwit (F, W)

265. History and Interpretation of German Lyric Poetry. (4) Three hours of lecture per week. Prerequisite: graduate standing. A 3-quarter series of the history and interpretation of German lyric poetry from the Middle Ages to the Modern period.

265A: The Medieval Period. Mr. Politzer, Mr. Tubach (F)

265B: The Classical Period. Mr. Politzer, Mr. Jaszi (W)

265C: The Modern Period. Mr. Politzer, Mr. Kudszus (Sp)

Linguistics

270. Introduction to the History of the German Language. (4) Three 1-hour lectures per week. Staff (W)

271. Historical Phonology and Morphology of German. (4) Two 1 1/2-hour lectures per week. Required of all candidates for the M.A. with linguistic emphasis. Mr. Pendel (Sp)

273C. Gothic. (4) Two 1 1/2-hour meetings per week. Mr. Pendel (F)

276. Old High German. (4) Three 1-hour meetings per week. Mr. Pendel (W)

282. Old Saxon. (4) Three 1-hour meetings per week. Mr. Pendel (Sp)

285. Descriptive German Grammar. (4) Three class hours per week. Prerequisite: course 145. Deals with the grammatical structure and the sounds of Modern German in contrast to the corresponding features of American English. Required of all M.A.T. candidates. Mr. Brink (Sp)

290. Seminar in Germanic Linguistics. (4) Three hours of lecture per week. Prerequisite: consent of instructor.

290A. German Dialects. A Study of the Methods of Dialectology as Applied to the Dialects of Modern German. McGraw (W)

290B. Problems in German Syntax. Beeler (F)

290C. Early New High German (Semantics and Stylistics). Mr. Spahr (Sp)

299. Individual Study for Graduate Students in Literature or Linguistics. (1-8) Prerequisite: graduate standing. Primarily for post-M.A. students engaged in the completion of a restricted field, involving the writing of a report. The Staff (F, W, Sp)

602. Individual Study for Doctoral Students. (4) Hours to be arranged. Prerequisite: M.A. in German. Independent study in consultation with graduate advisor to provide an opportunity for Ph.D. candidates to prepare for the qualifying examination. Must be taken on a satisfactory/unatisfactory 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

200. 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 senior and graduate students.

301A—301B—301C. The Teaching of German in College. (2—1—1) Lecture and demonstration class. Language Laboratory. For all new teaching assistants. Open to all graduate students. Credit and grade will be awarded upon completion of the full sequence.

303A—303B—303C. The Teaching of German. (2—1—1) One class hour per week 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. Mr. Mueller (F, W, Sp)

303X. The Teaching of German. (4) Three hours of lecture 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 303A—303B—303C. Mr. Mueller (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.

10. Elementary German. (0) Mr. Mueller (in charge) (F, W, Sp)

20. Intermediate German. (0) Mr. Mueller (in charge) (F, 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
3. Intermediate Dutch. (5) Five hours of lecture and one hour of discussion per week. Prerequisite: course 2 or equivalent. Staff (Sp)

120. Advanced Dutch Conversation. (3) Three hours of lecture per week. Prerequisite: course 110 or consent of instructor. A thorough review of the grammar and an introduction to Dutch literature. 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 the development of oral language style. Staff (Sp)

1**140A-1**140B-1**140C-1**140D-1**140E-1**140F. Readings in Dutch Literature. (2-2-2-2-2-2) Two hours of lecture and two hours of tutorial per week. Prerequisite: course 110 or consent of instructor. This course is designed to analyze Dutch texts from Middle Dutch to contemporary literature. Topics vary from quarter to quarter. Staff (F, W)

150. Introduction to the Literature of the Netherlands. (4) Three hours of lecture and one hour tutorial per week. Prerequisite: course 110 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. Given in Dutch. Mr. Slottman (F)

1**150. Literature of the Lowenhals in English Translation.** (4) Four 1-hour lectures per week. Study of the major contemporary Dutch and Flemish writers and their works.

170. The Netherlands: Culture and Institutions. (4) Four 1-hour lectures per week. A historical study of the cultural contributions of the Netherlands and an analysis of the political system. Special emphasis on the social and political aspects of the contemporary scene. Lectures in English. Staff (F)

1**170. Middle Dutch.** (3) Three hours of lecture and one tutorial per week. Prerequisite: knowledge of English. A linguistic analysis of Middle Dutch and reading of selected medieval Dutch texts. Staff (F)

190. Senior Thesis. (2) Two hours of lecture per week. Prerequisite: courses 140, 150 or 160. A major research paper in the areas of Dutch literature, culture, or the area of linguistics required of all students who have Dutch as their major course of study. Staff (F, W, Sp)

H198. Honors Studies in Dutch. (1-6) Supervised independent study and research course for honors students which may be repeated up to a maximum of six units. Mr. Snapper (F, Sp)

180. Directed Group Study. (1-4) One to four hours of lecture per week. Staff (F)

199. Special Studies in Dutch. (1-4) Enrollment is restricted by regulations listed on page 3-8.0. No course may be repeated up to a maximum of at least 3.0. Must be taken on a passed or not passed basis. Staff (F, W, Sp)

299. Individual Studies in Dutch for Graduate Students. (1-8) Prerequisite: graduate standing. Intended for graduate students engaged in exploration of restricted field, involving the writing of a research paper. Mr. Snapper (F, Sp)

RELATED COURSES IN OTHER DEPARTMENTS


History

Department Office, 3229 Dwaine Hall

Professors:

Richard M. Abraham, Ph.D.
Thomas G. Barnes, Ph.D.
Gunnar P. Barth, Ph.D.
Bretton E. Beson, Ph.D.
Robert J. Brentano, Ph.D.
Woodrow W. Borah, Ph.D.
Natalie Z. Davis, Ph.D.
Agnes D. Shepard
Erich S. Grace, Ph.D.
Roger Hahn, Ph.D.
Fatu Halipern, Ph.D.
J. Lawrence Halnon, Ph.D.
Winthrop D. Johnson, Ph.D.
Raymond K. Kish, Ph.D.
James F. King, Ph.D.
Irma M. Lapidus, Ph.D.
Lawrence Winer, Ph.D.
Leon F. Littke, Ph.D.
Martin E. Mallo, Ph.D.
Henry F. May, Ph.D.
Thomas R. Metcalf, Ph.D.
Robert L. Middelkoop, Ph.D.
Nicholas V. Rasiuk, Ph.D.
D. Ph.D.
Sheldon Rothblatt, Ph.D.
Wolfgang Sauer, Ph.D.
Ewen Schlatter, Ph.D.
H. F. Frank Schurman, Ph.D.
Raphael S. Siegel, M.A.
Gerald E. Caspary, Ph.D.
Diana S. Clements, Ph.D.
Jean de Vries, Ph.D.
Samuel Haber, Ph.D.
A. F. Criswell, Ph.D.
Paula S. Fasal, Ph.D.
Lynn A. Hunt, Ph.D.
Professor:

John T. Noonan, Jr., Ph.D.
L.L.B. (Law)

Acting Assistant Professor:

John E. Lesch, M. Sc.

Department Major Advisers: Consult Undergraduate Office.

The Major

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 courses in European history, at least one of which must be in a period before 1600. One at least must be from the following: 4A, 4B, 4C, 4D, 4E, 4F to obtain the 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 European history.

2. In the junior and senior years: four upper division lecture courses to be selected from the following—all upper division lecture courses offered by the Department of History, Economics 111 and 115, Economics 113, History 103 (Proseminar) in two different fields of history. In European history, at least one of which must be in American, Latin American, African, or Asian History.

3. In the junior and senior years: four additional upper division courses, at least one of which must be chosen from the following: History 17C, 17D, 17A, 18A, 18B, 19A, 19B, 49A, 49B; one may be a seminar (History 39) in American, Latin American, African, or Asian History.

4. In the junior and senior years: four upper division lecture courses to be selected from the following—all upper division lecture courses offered by the Department of History, Economics 111 and 115, Economic History of Europe, and Economics 113 (Economic History of the United States). In addition, two sections of History 103 (Proseminar) in two different fields of history (Ancient or Medieval Europe to 1600, Europe since 1600, British, U.S., Latin America, Asia, Africa, Middle Eastern, and Science, and History 10A–10B (Introduction to Historical Method) in one of the fields selected for History 103.

Upper Division Honors Program. A departmental Honors Committee is in charge of the honors program. The program is intended 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 chairperson 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 an honors essay, which is normally 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 take History H198A–H198B or, with consent of the instructor, a two-semester graduate research seminar, History 285. After completing their essays, they will receive a grade which will be assigned on the basis of their quality. 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 diploma.

Teaching Training. See the Announcement of the School of Education.

Higher Degrees. Students planning to work toward the degrees of M.A. and Ph.D. should address inquiries to the Graduate Admissions Secretary, Department of History. The deadline for receipt of applications for graduate admissions is January 15; February 15 is the deadline for receipt of supplementary materials (transcripts, letters of recommendation from two professors who have instructed the applicant in history, results of the Aptitude Test in the Graduate Record Examination). This deadline will be admitted for the fall quarter only. The deadline, however, for receipt of applications for graduate admissions from applicants applying also for fellowships is December 1 for both applications and supplementary materials. (Three letters of recommendation are required for fellowship/admission candidates.)

Further Information. The Schedule of Classes issued prior to each quarter and the Department Catalog issued at the beginning of the fall quarter provide further detailed information about the courses offered by the History Department, including when and by whom each course will be given.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSES

4. European Civilization. Two 1-hour lectures and two 1-hour section meetings per week. Introductory study of periods of major historical significance in the history of European civilization. Emphasis on class discussions, readings in the sources, and writing of essays.

4A. Ancient. (5) Mr. Sealey (Sp)
4B. Medieval. (5) Mr. Caspary (F)
4C. Renaissance and Reformation. (5) Mr. Stern (W)
4D. Enlightenment and Revolutions. (5) Mr. Herr (Sp)
4E. Modern Europe. (3) Three hours of lecture and one 1-hour section meeting per week. A survey of modern Europe primarily for students not going on in history.

17. Introduction to the History of the United States with Emphasis on Society and Culture.

1**17A. From Colonial Settlement to the Civil War.** (3) Three hours of lecture per week.

1**17B. From the Civil War to the Present.** (3) Three hours of lecture per week.

17C. From Colonial Settlement to the Civil War. (5) Three hours of lecture and two hours of discussion per week. Mr. Jordan (F)

17D. From the Civil War to the Present. (5) Three hours of lecture and two hours of discussion per week. Mr. Litwack (W)

18A-18B. Latin-American History. (5–6) Three hours of lecture and one 1-hour section meeting per week. Prerequisite: sophomores standing.

18A: Mr. King (F)
18B: Mr. King (W)

19A–1**19B. Asian History.** (5–6) Two 1-hour lectures and one 2-hour section per week. Prerequisite: sophomores standing. The course will enroll in sections conducted by faculty members and limited to 20, all sections meeting together for weekly lectures by one instructor. Work in sections includes reading, discussion, and research paper. Mr. Slottman (F)

NOTE: For key to symbols, see page 35.
cussion, reports on historical problems. Grading based on section and lecture work. For an indication of the title of each section to be offered see the department catalog at the beginning of the quarter.

19A: Mr. Trisch (W)

33A–33B–33C. American Studies. (5–5–5) One 1-hour lecture and one 2-hour seminar per week. Prerequisites: open to sophomores; limited to fifteen students. Students must register with the three instructors during registration. An honors course in the study of American culture. The class will study significant ideas and material from history, literature, political science, philosophy, and other fields. The course will emphasize discussion and the writing of 20th century occasional joint meetings with the staff and students of the two equivalent courses. (English 33A–33–33C and Political Science 33A–33B–33C.)

39. Seminars for First Year Students and Sophomores. (5) One 3-hour meeting per week. Seminars in the various fields of history designed to introduce beginning undergraduates to problems of historical methods and interpretations. Work in the course will include research and a research paper. Limited to fifteen students per section. May be repeated once for credit but not with the same instructor. Prerequisite: prior consent of instructor. For precise schedule of offerings see department catalog during pre-enrollment week each quarter.

*48A–48B. Studies in American History. (5–5) Four hours of meeting per week. Intended to introduce students to the methods and methods of study and the field of American history. Relies almost completely on the use of primary materials. Mr. Levine (F)

UPPER DIVISION COURSES

Group I—Unrestricted Courses

(Open to all students in the upper division; prerequisites as noted. Unless specified, courses need not be taken in sequence.)

102A–102B–102C. History of Christianity. (5–5–5) Three hours of lecture and one hour required section per week. Christianity as an institutional and intellectual force in the development of western culture and as it has responded to changing social and cultural needs from antiquity to the present. 102A: beginnings to ca. 1000 A.D., 102B: 1000 to ca. 1650, 102C: 1650 to the present. Mr. Bouwsma (F, W)

110A–110B–110C. Ancient Greece. (5–5–5) Three hours of lecture and one hour of optional discussion per week.

110A. Bronze Age – ca. 500 B.C. Mr. Sealey (F)

110B. Ca. 500 B.C. – 336 B.C. Mr. Sealey (F)

110C. 336 B.C. – 30 B.C. Mr. Sealey (F)

111A–111B. Ancient Rome. (5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Sellers (Sp)

112. The Age of Cicero. (5) Three hours of lecture and 1 hour of consultation per week. Examination of events, forces, trends involved in fall of Roman Republic in crucial years between deaths of Sulla and Cicero. Analysis of oratory, speeches, essays and correspondence. Political, social, economic struggles in light of intellectual and cultural currents.

114A–114B. Byzantium. (5–5) Three hours of lecture and one hour of consultation per week.

115A–115B. Medieval Europe. (5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Binson (F)

117A–117B. Medieval European Intellectual History. (5–5) Three hours of lecture and one hour of consultation per week. Mr. Caspary (W)

119. Society and the States in Early Modern Europe. (5) Three hours of lecture and one hour of discussion per week. Prerequisites: History of Western Civilization I and II. Emphasis on social and political perspectives of the 16th and 17th centuries. Limited to 50 students. Mr. Davis (F)

120. The Renaissance. (5) Three hours of lecture and 1 hour of consultation per week. Mr. Brucker (Sp)

121. The Reformation. (5) Three hours of lecture and 1 hour of consultation per week. Mr. Brucker (Sp)

122. Age of Absolutism and Enlightenment. (5) Three hours of lecture and 1 hour of consultation per week.

123. Modern Europe (1789–1870). (5) Three hours of lecture and 1 hour of consultation per week. Mr. Herring (W)

124. Modern Europe (1870–1914). (5) Three hours of lecture and 1 hour of consultation per week. Mr. Herring (W)

125. Modern Europe (1914–Present). (5) Three hours of lecture and 1 hour of consultation per week. Mr. Herring (W)

126. European Economic History. (5) Three hours of lecture and one hour of consultation per week. Mr. Meisner (W)

127A–127B. European Diplomatic History. (5) Three hours of lecture and one hour of discussion per week. European international relations in the 19th and 20th centuries. Prerequisites: emphasis on political and economic forces shaping foreign policy and the international system.

128A–128B–128C. European Intellectual History Since 1300. (5–5–5) Three hours of lecture and one hour of discussion per week. Mr. Dobbins (W, Sp)

130A. Ancient and medieval science. Mr. Hahn (F)

130B. Scientific Revolution (1450–1750). Science since 1750. (Sp)

131. Topics in the History of the Physical Sciences. (5) Three hours of lecture and 1 hour of consultation per week. Mr. Dobbins (W, Sp)

132. Topics in the History of Biological Sciences. (5) Three hours of lecture and 1 hour of consultation per week.

133. Astronomy and Astrology in Early Modern Europe. (5) Three hours of lecture and 1 hour of discussion per week. Prerequisite: strong grasp of plane geometry. Mr. Heilbron (Sp)

135A–135B. European Jewish History Since 1750. (5) Three hours of lecture and one hour of optional discussion per week.

135A. From 1750 to 1917 Mr. Slottman (Sp)

135B. Since 1917 Mr. Webster (W)

136. Russia. Three hours of lecture and 1 hour of consultation per week. Mr. Riasanovsky (W)

136A. Russia to 1613. (5) Mr. Riasanovsky (F)

136B. Russia 1613–1801. (5) Mr. Zeinik (W)

136C. Russia 1801–1917. (5) Mr. Riasanovsky (W)

136D. Russia 1917 to Present. (5) Mr. Zeinik (Sp)

137A–137B. Russian Intellectual History. (5–5) Two 1 1/2-hour discussion group meetings and one hour of consultation per week. A two-quarter pro-seminar course in intellectual history, with attention also to literature and philosophy: eighteenth century to 1917. Open to qualified graduates and undergraduates. Limited to 30 students. Mr. Slottman (Sp)

142. The Netherlands. (5) Three hours of lecture and one optional hour of discussion per week. Mr. Dobbins (W)

143. Modern Germany. (5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Slottman (Sp)

144. Modern Italy. (5) Three hours of lecture and 1 hour of consultation per week. Mr. Webster (W)

150A–150B–150C. Modern England. (5–5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Brentano (Sp)

151A–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.

151A. Britain, 1465–1603. Mr. Barnes (F)

151B. Britain, 1603–1714. (Sp)

151C. Britain, 1714–1832. (F, W)

151D. Britain, 1832 to Present. Mr. Robtall (Sp)

154. British Empire and Commonwealth. (5) Three hours of lecture and one hour of optional discussion per week. Mr. Motela (W)

155. Modern Ireland. (5) Three hours of lecture and one hour of discussion per week. Mr. Ormrod (Sp)

156. The Age of Cato. (5) Three hours of lecture and one hour of consultation per week. Mr. Ormrod (W)

159. The Age of Cicero. (5) Three hours of lecture and one hour of consultation per week. Mr. Riasanovsky (W)

160A–160B–160C. Ancient Greece. (5–5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Hahn (F)

161A–161B–161C. Ancient Rome. (5–5–5) Three hours of lecture and one hour of consultation per week. Mr. Sellers (Sp)

162. The United States, 1787–1845. (5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Baker (Sp)

163A–163B. Caribbean Area. (5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Hahn (F)

164. Modern Argentina. (5) Three hours of lecture and 1 hour of consultation per week.

165A–165B. The Colonial Period and American Revolution. (5–5) Three hours of lecture and 1 hour of consultation per week.

165A. The Colonial Period. Mr. Satterwhite (F)

165B. The American Revolution. Mr. Middelkauff (Sp)

166. The United States, 1787–1845. (5–5) Three hours of lecture and 1 hour of consultation per week. Mr. Bora (W)

167A. Era of Sectional Conflict. (5) Three hours of lecture and 1 hour of consultation per week. Mr. Sellers (Sp)

167B. Reconstruction and the New Nation. (5) Three hours of lecture and 1 hour of consultation per week.

168A–168B–168C. Recent United States History. (5–5–5) Three hours of lecture and one hour of discussion per week. Mr. Abrams (F)

168C. World War I–World War II. Mr. Abrams (Sp)

169A–169B. History of Black People and Race Relations in the United States, 1850 to the Present. (5–5) Three hours of lecture and one hour of consultation per week. History of Afro-American: their African backgrounds, slave experience, social and cultural impact since emancipation. The course will consider race relations, particularly between Blacks and whites in America.

170A. 1850 to 1885. Mr. Abrams (F)

170B. World War I–World War II. Mr. Abrams (Sp)

171. California. (5) Three hours of lecture and one hour of consultation per week. Mr. Bora (F, Sp)

173A–173B. Diplomatic History of the United States, (5–5) Three hours of lecture and 1 hour of consultation per week.

174A–174B. Social History of the United States.
(5-5) Three hours of lecture and one optional hour of discussion per week.

174A. 1607-1865 Miss Pass (W)

174B. Since 1865 Miss Pass (Sp)

175A-175B. Intellectual History of the United States. (5-5) Three hours of lecture and one hour of discussion per week. Mr. Haber (F, W)

176. Religion in American Society. (5) Three hours of lecture and one hour of optional discussion per week. Prerequisite: previous work in American history essential; some knowledge of European history desirable. American religious history from the beginnings; to the present; emphasis on the relation between doctrine and social effect. The course will treat varieties of Protestantism primarily, with some attention to Catholicism, Judaism, Eastern religions, and non-theistic humanism. Mr. May (W)

*177A-177B. The Age of the City. (5-5) Three hours of lecture and 1 hour of discussion per week. A social history of urban life in America, with emphasis on the nineteenth century.

180A-180B. Africa. (5-5) Three hours of lecture and 1 hour of consultation per week. Mr. Kent (W)

181. Northwest and West Africa to 1900. (5) Three hours of lecture and one hour of consultation per week. Emphasis will be placed on two important themes: development of regional trading network, and cultivation of Islamic tradition and institutions. Reading knowledge of Arabic or one of the following courses: History 182A, 182B, 183A, 183B; or prior consent of instructor.

182A-182B. Islamic History. (5-5) A history of the Middle East from the 7th to the 13th centuries; the Arab conquests of the Islamic Empires, the successor states, and the formation of Islam as a religion and culture. Three hours of lecture and 1 hour of consultation per week.

183A-183B-183C. The Middle East. (5-5-5) Three hours of lecture and one hour of discussion per week. 183A. The establishment of Turkish power in the Middle East, Iran, Turkey, the Ottoman and Safavid Empires. 183B. The Ottoman Empire and its provinces in decline; Qatar Arabs. 183C. The Arab world, Iran, and Turkey from the 19th century to the present.

184A-184B-184C. China. (5-5-5) Three hours of lecture and one hour of discussion per week.

184A. Early China. Mr. Keytey (W)

184B. China: Early Period. Mr. Tu (W)

184C. Modern China. Mr. Waksman (Sp)

185A-185B-185C. Japan. (5-5-5) Three hours of lecture and 1 hour of consultation per week.

186. Chinese Historical Texts: The Early Period. (5) Three hours of lecture and one hour of discussion per week. Emphasis will be placed on four major Chinese historical texts, some familiar with classical texts, such as the Mencius. An introduction to Chinese historical texts, grammar, and commentaries, and modern scholarly aids. Emphasis is on rigorous translation and the use of the texts as historical sources.

187A-187B-187C. India. (5-5-5) Three hours of lecture and one hour of discussion per week.

188A. Inner Asia from the Second Millenium, B.C. to the Fourteenth Century, A.D. (5) Three hours of lecture and one hour of discussion per week. Origins and development of nomadic societies; dynamics of Inner Asian frontiers of China, Iran, Rome, the Caliphate and Russia; history of the Svyatovits, Huns and Turks; rise of the Mongols.

188B. Inner Asia from the Fourteenth Century to the Present. (6) Three hours of lecture and one hour of discussion per week. Dynamics of nomadic societies as exemplified by the Mongol Empire; late medieval and early modern history of the Mongols and Turks; History of Russia by Russia and China; history of Inner Asia; impact of modernization, nationalism and communism on Inner Asia. 188A not prerequisite to 188B.

199. Supervised Independent Study and Research. (1-5) Enrollment is restricted by regulations listed on p. 36. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

GRADUATE COURSES

Group I. Bibliography and Historiography Courses

220. Advanced Studies in the Sources and General Literature of the Several Fields of History. (5) One 2-3 hour meeting per week. For precise schedule of offerings see departmental catalog during pre-enrollment week in each quarter. 220A, Ancient: 220B, European; 220C, English; 220D, United States; 220E, Latin America; 220F, Asia (for M.A. candidates); 220H, Africa; 220K, Caribbean; 220L, Legal History; 220S, History of Science; 220T, Economic History; 220U, Studies in Comparative History.

291A-291B. Palaeography and Other Auxiliary Sciences. (5-6) One 2-3 hour meeting per week.

292. Numismatics. (5) Two 1 1/2-hour meetings per week. The use of coins as an historical source; theory and practice. Open to graduates and undergraduates. Mr. J. Smith (Sp)

293. Historical Method and Theory. (5) One 2-3 hour meeting per week. Designed especially for candidates for higher degrees in History. Stress is laid on practical exercises. For precise schedule of offerings see departmental catalog during pre-enrollment week in each quarter.

294A-294B. Quantitative Approaches to History and Demographic History. (5-6) One 2-3 hour meeting per week.

294A. Quantitative Approaches to History: Study and application to history of quantitative methods and statistics.
humanities

field major office, division of special programs, 301 campbell hall

field major in humanities

at the present time the humanities field major is under-going revision. students interested in the major should contact the special programs office for further information. all students currently enrolled in the humanities field major are expected to complete the major requirements by the end of the winter quarter 1978.

major program

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-course sequence in important areas of world literature or philosophy before 1900, relating to the origins and development of the major topics of concentration of the student; (b) one course on some aspect of the history of religion, similarly related; (2) a minimum of 17 units including either (a) three courses representing the high points of a humanistic philosophical tradition and one course on a related literary author or literary area; and (d) at least two related courses in arts or sciences or social sciences. recommended: prospective majors who have not completed humanities 1a-1b, 2a-2b, 2c with a grade of c- or higher are urged to elect humanities 100 before enrolling in humanities 103a-103b.

although the foregoing requirements will normally be satisfied by courses in the college of letters and science, the board of advisors 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, upon approval of the advisor, 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) complete at least one approved upper division course beyond the intermediate level in the original language or partial total satisfaction of the requirement in a greek or roman author, (b) demonstrate a working knowledge of a second language, either through written examination or through completion of an approved upper division course beyond the intermediate level in the language, (c) write an honors thesis (course h198) under the direction of a member of the faculty, and (d) achieve a 3.3 grade-point average in the honors program, in the major, and in all work completed in the university.

teaching credential. students primarily interested in teaching in the humanities at the senior high school and junior college levels are advised to seek information concerning the m.a.t. program in comparative literature. students primarily interested in human studies and teaching at the junior high school level should inquire from the chair of the teacher training committee of the division of special programs.

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 material with special attention to literature, philosophy, and the motion pictures. particularly designed for the general student or prospective major who has satisfied the requirement in composition but has not completed courses 1a-1b and 2a-2b at berkeley. (f, w, sp)

*103a-103b. alms and materials of the humanities. (4-5) 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 province and the goals of the humanities in comparison to those of other disciplines. credit and grade will be awarded upon completion of the sequence. mr. dillon (f, w, sp)

*190. 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. (f, w, sp)

*191a. evasions: studies in escape literature. (4) four hours of lecture per week. prerequisite: upper division standing or instructor's permission. a study of the various genres of escape literature — science fiction, spy novels, mysteries — in their different relations to society and social attitudes. /*191b. honors course. (1-5) meetings to be arranged. requirements consistent with the instructor. directed group study on special topics approved by the division. (f, w, sp)

*198. directed group study for upper division students. (1-6) meetings to be arranged. prerequisites consistent with the instructor. directed group study on special topics approved by the division. (f, w, sp)

*199b. honors course. (1-5) 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 or modern greek or classical latin. preparation and writing of an honors thesis under the supervision of a member of the faculty. (f, w, sp)

*199. supervised independent study and research. (1-5) meetings to be arranged. enrollment is restricted by regulations on page 36. must be taken on a passed/not passed basis. (f, w, sp)

italian

department office, 5125 dwinelle hall

professors: louis george clayb, ph.d. gustavo costas, dottore in filosofia nicola j. perella, ph.d. andre garrard, dottore in lettere

assistant professor: gavriel moses, ph.d.

lecturers: catherine feucht, b.a. cecilia ross, ph.d.

major adviser: dr. stefanini.

graduate adviser: dr. costa.

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 in 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 must be taken in residence including: 101a-101b and 103a-103b or their equivalents.

shipping policies, demography, computers),

*1284d. demographical history: the use of population materials for the study of social history.

group ii. research seminars

285. research seminars. (5-6) one to 3-hour meeting per week. the following research seminars extend over two consecutive quarters. a final grade will be assigned upon completion of both quarters' work. for precise schedule of offerings see department catalog during pre-enrollment week each quarter. 285a, ancient greece and rome; 285b, europe; 285c, england; 285d, united states; 285e, latin america; 285f, asia; 285h, africa; 285k, caribbean; 285l, legal history; 285m, history of science; 285n, economic history; 285u, studies in comparative history.

group iii. individual research and study

296. directed dissertation research. (3-12) open to qualified students directly engaged upon the doctoral dissertation. to be taken on a satisfactory/unsatisfactory basis. may be repeated for credit. the staff (f, w, sp)

299. independent study for graduate students in history. (3-8) formerly numbered 290 and 294. the staff (f, w, sp)

601. individual study for master's students. (1-8) individual study, in consultation with the graduate advisor, to prepare student's language examinations and the master's examination. may not be used for unit or resident 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 graduate advisor, to prepare students for language examinations and the doctoral examination. 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)

history of science

the following courses are acceptable for major credit in history and most of them are acceptable for major credit in philosophy as well. (for details see the cross-listings in the philosophy and history sections of this catalog): 103a, 103b, 130a, 130b, 130c, 280s, 285s. students interested in graduate programs in the history of science should consult the advisor.

related courses

economic history. the following courses are acceptable for major credit in history. (for details see the listing in economics. students interested in graduate programs in economic history should consult the advisor.)

economic history of europe (economics 111-115, 1-5).

economic history of the united states (economics 113, 5).

topics in economic history (economics 210a-210b-210c-210d, 5-5-5-5).

medieval studies. please see index for further information on medieval studies.

ids 213. renewal ideas and movements from the age of the barbarian invasions to the carolingian age. (4-5) see interdepartmental studies for the complete description of this course.

other interdepartmental studies courses.

ids 44a-44b-44c. topics in western civilization. (5-5-5).

ids 137. the high renaisance under pope julius ii, 1503-1513. (6).

ids 139. michelangelo and his age, 1475-1564. (5).

ids 160. philosophes of china. (3)

see interdepartmental studies for the complete descriptions of these courses.
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 H195 for two quarters and a comprehensive examination. The award of honors is determined by the major adviser. In addition, the student must have an overall grade-point average of 3.30 or higher on all work completed in the University.

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 departmental office.

Doctor of Philosophy in Italian. The program for the Ph.D. degree in Italian is open to students holding a B.A. in Italian or in a program in which Italian was the major field of study. The student admitted to the program must complete an examination preparation for (1) a preliminary examination on Italian literature 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 a pass in a comprehensive examination or by prescribed course work in (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 Literatures. (For this program, consult the publication issued by the Graduate Division of 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. Mrs. Feucht 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 the equivalent. Mrs. Feucht in charge (F, W, Sp).

3. Intermediate Italian. (5) Five 1-hour meetings per week. Prerequisite: course 2 or the equivalent. Mrs. Feucht in charge (F, W, Sp).

4. Intermediate Italian. (5) Five 1-hour meetings per week. Prerequisite: course 3 or the equivalent. Mrs. Feucht 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. Mrs. Feucht in charge (F, W, Sp).

13A–13B–13C. Conversation, (2–2–2) Two 1-hour meetings and one laboratory hour per week. Mrs. Brown in charge (F, W, Sp). Beginning conversation—open to students who are completing Italian 1 or who have completed Italian 13A. Intermediate conversation—prerequisite: course 1 or 13A. 13C. Intermediate conversation—prerequisite: course 2 or 14B. Mrs. Ross in charge (F, W, Sp).

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 as 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, whenever the minimum 12-unit study list requirement per quarter must be met. Mrs. Feucht in charge (F, W, Sp).

UPPER DIVISION COURSES


102. Advanced Conversation. (4) Three hours of lecture per week. Prerequisite: course 2 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. Mrs. Ross (Sp).

103A–103B. Introduction to Italian Literature. (4–4) Three 1-hour meetings per week. Designed primarily for juniors majoring in Italian. An introduction to the chief currents and authors of Italian literature with selected readings. 103A: (F); 103B: (W).

105A–105B–105C. Dante’s Divine Comedy. (4–4–4) Three 1-hour meetings per week. Mrs. Stefanini (F), Mrs. Stefanini (W), Mrs. Stefanini (Sp).

109A. Medieval. Mrs. Stefanini (F).

109B–110B. Dante’s Divine Comedy. (4–4–4) Three 1-hour meetings per week. Mrs. Stefanini (Sp).

110B. Boccaccio’s Decameron and Petrarch’s Rime. Mrs. Stefanini (Sp).

111. Italian Literature of the Fifteenth Century. (4) Three 1-hour meetings per week. Mrs. Stefanini (F), Mrs. Stefanini (W), Mrs. Stefanini (Sp).

112A–112B. Italian Literature of the Sixteenth Century. (4–4) Three 1-hour meetings per week. Mrs. Stefanini (Sp).

112A. The High Renaissance. Mr. Ferruolo (F).

112B. The Late Renaissance. Mr. Ferruolo (W).

113B. Italian Literature of the Seventeenth Century. (4) Three 1-hour meetings per week. Mr. Perella (Sp). The main topics of Baroque Prose and Poetry. Emphasis will be on Marino, Tassoni, Campanella, Galileo, and Serpi. Mrs. Moser (Sp). The Staff (Mr. Stefanini in charge) (F, W, Sp).

114. Italian Literature of the Eighteenth Century. (6) Three 1-hour meetings per week. Mr. Costa (F), Mrs. Stefanini (W), Mrs. Stefanini (Sp).

115A–115B. Italian Literature of the Nineteenth Century. (4–4) Three 1-hour meetings per week. Mrs. Stefanini (F), Mrs. Stefanini (W), Mrs. Stefanini (Sp).

115A. From Neoclassicism to Romanticism. Mr. Perella (F).

115B. Romanticism. Mr. Perella (W).

115C. Main trends in poetry and prose from 1850 to 1900. Mr. Perella (F).

117A–117B–117C. Italian Literature of the Twentieth Century. (4–4–4) Three 1-hour meetings per week. Mrs. Stefanini (F), Mrs. Stefanini (W), Mrs. Stefanini (Sp).

117A. Fiction. Mr. Costa (W).

117B. Poetry. Mr. Costa (F).

117C. Theatre. Mr. Costa (Sp).

118. Special Study for Honors Candidates. (2–4) Individual conferences to be arranged. To be taken for the senior year. The Staff (Mr. Stefanini in charge) (F, W, Sp).

198. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations listed on page 36. Restricted to senior honor students with a 3.0 overall grade-point average or better. Must be taken on a passed or not passed basis. The Staff (Mr. Stefanini in charge) (F, W, Sp).

UPPER DIVISION COURSES IN ENGLISH

1125. Film and Literature (In English). (4) Four hours of lecture and one 1-hour discussion section per week. The interaction of film-style with literary and poetic structure, studied through movements, trends, techniques, and the works of outstanding Italian film directors. Some significant films will be shown and discussed. Mrs. Missouri (F, W, Sp).

1126. Women in Italian Literature. (4) Three hours of lecture per week. The treatment that female characters have received in Italian literature from the Origins to the present age, and the contributions of women writers to Italian literary life. Mrs. Rossi Clubb (F).

1182. Dante’s Divine Comedy. (4) Three 1-hour meetings per week. An introduction to the thought and writings of Dante Alighieri with emphasis on a critical reading of the Divine Comedy. Mrs. Clubb (F).


150. Machiavelli. (4) Three 1-hour meetings per week. The political and literary works in the context of the political and cultural life of his age. Mr. Ferruolo (Sp).

1160. Italian Culture during the Fascist Period (1922–45). (4–4) Three 1-hour meetings per week. Prerequisite: consent of instructor. This course, in which participation of several disciplines will be involved, will examine the cultural climate of the Fascist regime through a study of the literature, plastic arts, movies, politics, economics, and the social life of that age. Mrs. Costa (Sp).

1202. Minor Medieval Authors. (4) One 3-hour meeting per week. Lyric, religious, didactic, and satirical poetry; chronicles, novelle, and treatises. Mrs. Stefanini (W).

1203. Bibliography and Methods of Research. (4) Three hours of lecture per week. Introduction to tools of bibliographical research and library facilities. Required of all candidates for the M.A. in Italian. Mrs. Costa (Sp).

1205. History of the Italian Language. One 3-hour meeting per week. Mrs. Stefanini (Sp).

1209. Seminar on Dante. (4) One 3-hour meeting per week. Mrs. Stefanini (F).

211. Seminar on Petrarch. (4) One 3-hour meeting per week. Mrs. Clubb (Sp).

213. Seminar on Boccaccio. (4) One 3-hour meeting per week. Mrs. Stefanini (Sp).

217. Studies in the Renaissance. (4) One 3-hour meeting per week. Mrs. Stefanini (Sp).


217C. Ariosto. Mrs. Clubb (Sp).

217D. Tasso. Mrs. Clubb (Sp).

218. The Age of the Baroque. (4) One 3-hour meeting per week. Mrs. Perella (Sp).

219. The Age of Enlightenment. (4) One 3-hour meeting per week. Mr. Costa (W).

221. Studies in the Nineteenth Century. (4) One 3-hour meeting per week. Mrs. Stefanini (Sp).

221A. Romanticism. Mrs. Stefanini (Sp).

221B. Leopardi. Mrs. Stefanini (Sp).

221C. Manzoni. Mrs. Stefanini (F).

223. Studies in the Twentieth Century. (4) One 3-hour meeting per week.

NOTE: For key to symbols, see page 36.
Linguistics

Department Office, 2337 Dwainelle Hall

Professors:
  Walter C. Chafe, Ph.D.
  (Acting Chairman, W, Sp)
  Charles J. Fillmore, Ph.D.
  George Lakoff, Ph.D.
  Robin Lakoff, Ph.D.
  Yakov Malkiel, Ph.D., L.H.D.
  James A. Marcus, Ph.D.
  John C. R. Matisoff, Ph.D.
  William S-Y. Wang, Ph.D.

Assistant Professor:
  Carol F. Justus, Ph.D.

Senior Lecturers:
  Jose O. Sawyer, Ph.D.

Department Major Advisors: Mr. Sawyer, Ms. Lakoff, Mr. Wang.

Graduate Advisors: Mr. Fillmore, Mr. Lakoff, Mr. Mati- isoff.

The Major

Required: Linguistics 20, 110, 120, 145, plus 26 additional units of which at least 22 must be upper division courses. These upper division courses are suggested as ways of pursuing specialized interests. They are meant to be suggestive rather than restrictive, and are by no means mutually exclusive. Other combinations may be arranged in consultation with the major advisor. In each case electives must be added to produce the required unit totals.

Linguistic theories and methods: Linguistics 116, 120, 121, 122.

Data collection and analysis: Linguistics 115, 122, 125, 135, 175.

Indo-European studies: Linguistics 165, 167, Sanskrit 100A–100B–100C, and courses in Latin and/or Greek.

The structure of a particular language: courses dealing with the structure of one language selected from Linguistics and/or a foreign language department (including Classics).

The ties between linguistics and a related discipline: courses dealing with language selected from a single department such as Anthropology, Philosophy, Psychology, or Rhetoric.

The Department believes that a student majoring in linguistics should also achieve a more than superficial acquaintance with some related but independent field, and therefore strongly recommends the election of three nonlinguistic courses within any of the following areas: Anthropology Group II (sociocultural anthropology) and/or Group IV (area courses); English literature; mathematics and/or computer science; philosophy; psychology; rhetoric; or the literature of a foreign language.

Honors Program. With the approval of the major advisor, a student with a grade-point average of 3.3 or higher, both overall and in the major, may apply for admission to the honors program. Students are limited to 2 more units per quarter for at least two quarters. Under the direction of a faculty member, students carry out an approved program of independent study in which they attain a reasonable mastery of an appropriate linguistic topic. As evidence of each quarter's work, they must submit an acceptable term paper summarizing critically the material they have covered.

Graduate Programs

Preparation for Graduate Study in Linguistics. Students in linguistics should have had an undergraduate major in linguistics, a foreign language, or some equivalent acceptable to the Department. They should be prepared to pass the required language reading examinations early in their graduate career.

Master's Degree in Linguistics. Students may follow either "Plan I" or "Plan II" for the master's degrees, as specified by the Graduate Division:

Plan I requires at least 30 quarter units and a thesis. At least 12 of these units must be in graduate courses (200 series) in the major subject. Course units are not granted for the thesis.

Plan II requires at least 36 quarter units of upper division courses in the major subject. Course units are not granted for the thesis.

Students under both plans are guided by their graduate advisors regarding distribution of course work among the departments.

Doctor's Degree in Linguistics. The program follows Plan B, as described in The Doctor's Degree section (see index). Information on further requirements is obtainable from the Department office.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSE

20. Language and Linguistics. (6) Three 1 1/2-hour lectures and one 1 1/2-hour section meeting per week. Prerequisite: English 151. An introduction to the scientific study of language. The nature of language structure. How languages are alike and how they differ. Language change and the reconstruction of languages and dialects at earlier stages. The languages of the world and their relationships. The field of linguistics and its relation to other fields. Mr. Sawyer (F); Mr. Pollock (W)

UPPER DIVISION COURSES

Upper division status or consent of instructor is prerequisite to all upper division courses. Graduate students may enter upper division courses with consent of the instructor without meeting all of the prerequisites.

105. Basic Elements of Syntax and Semantics. (5) Two 1 1/2-hour lectures and one 1 1/2-hour discussion section per week. Prerequisite: course 20 (may be taken concurrently). An introduction to syntax and semantics. This course is designed primarily for students who do not intend to specialize in syntax or semantics. Ms. Lakoff

110. Introduction to Phonetics and Phonology. (5) Two 1 1/2-hour lectures and one 1 1/2-hour section meeting per week. Prerequisite: course 20 (may be taken concurrently). The use of phonetic symbols. Distinctive features. Underlying and phonetic representations and phonological rules. Mr. Chafe (F)

113. Experimental Methods in Linguistics. (4) Two 1 1/2-hour lectures per week. Prerequisite: course 110 or consent of instructor. The conduct of linguistic experiments in the areas of physiological and acoustic phonetics, perception, and the testing of phonological and syntactic rules. Mr. Okela

114. The Biological Basis of Language. (5) Two 1 1/2-hour lectures and one 1 1/2-hour discussion section per week. The dependence of language on biological attributes, considered by comparison of human and nonhuman communication. The physiological control of speech production and reception. Hereditary and environmental factors in language development. Language in the context of overall behavior. Mr. Wang (W)

119. Articulatory Phonetics. (5) Three 1 1/2-hour lectures and one 1 1/2-hour section meeting. Prerequisite: course 20 (may be taken concurrently). An introduction to under- and phonetic representations and the form of the phonological rules. Mr. Wang (W)

120. Introduction to Syntax and Semantics. (6) Fixed: 1 1/2-hour lectures and one 1 1/2-hour discussion section per week. An introduction to the study of meaning and sentence structure, beginning with transformational grammars and extending to current approaches. Issues relating to psychology, philosophy and social interaction will be discussed. Mr. Lakoff (F)

121. Grammar and Logic. (5) Three 1 1/2-hours of lecture and 1 1/2-hour discussion per week. Prerequisite: course 20. An introductory course to logical rules. Cor-respondence rules, global rules, transderivational rules, noncontextual rules. The relation between grammar and logic. Determining the ability to produce and transcribe sound symbols. Discussion by native speakers and use of tape in the Language Laboratory. Mr. Sawyer (W)

122. Linguistic Analysis. (5) Three 1 1/2-hour lectures and one 1 1/2-hour section meeting per week. Prerequisite: course 110, 120 (may be taken concurrently). Methods and practice in the analysis of linguistic data. Mr. Fillmore (Sp)

123. Pragmatics. (4) Two 1 1/2-hour lectures per week. Prerequisite: Linguistics 105 or 120 or consent of instructor. The relation between language use and the real world. Some topics to be emphasized are: conversational logic, speech act theory, politeness, social role, psychological perception of oneself and language variation in language use. Ms. Lakoff (W)

125. Morphology. (4) Three 1 1/2-hour lectures per week. Prerequisite: course 20. Analysis of word structure, including inflection, derivation, and compounding, in various languages. Mr. Chafe (F)

136. Linguistic Structures. (4) Three 1 1/2-hour lectures per week. Prerequisite: course 20. An examination of various linguistic subsystems (e.g. interrogatives, pronominal systems, relative clause formation in different languages).

145. Comparative and Historical Linguistics. (4) Three 1 1/2-hour lectures per week. Prerequisite: course 110. Methods of reconstruction. Types and ex- plained; sound chains and language change; the historical development of language relationships and subgroupings. Dial- ectology.

151. Introduction to Field Methods. Two 1 1/2-hour lectures per week. Prerequisite: consent of instructor. Training in the discrimination and transcription of the sounds of a particular language. Methods and practice in collecting and processing language data. Mr. Sawyer (W)
Three 1-hour lectures per week. Applications of linguistics to language teaching, the teaching of reading and writing, lexicography, and other practical concerns. Mr. Sawyer

*285. Introduction to Computer Linguistics. (4) Two one and one half hour lectures per week. A survey of the impact of computers and computational models on linguistics. Particular areas to be covered include linguistic theory, logic and data analysis and computational generation, but the emphasis will be on computational models of syntactic & semantic processing.

184. Language and Cognition. (4) Two 1 1/2-hour lectures per week. Prerequisite: course 20. The relation between language and such cognitive phenomena as perception, conceptualization, thought, and memory. Mr. Chafe (F)

185. Indo-European Comparative Linguistics. (5) Three 1 1/2-hours of lecture and 1 1/2-hours of section meeting per week. Prerequisite: course 110 (may be taken concurrently). Mr. Malikel (Sp)

187. Indo-European Morphology and Syntax. (4) Three 1 1/2-hours per lecture. Prerequisite: course 155. Introduction to the basic morphological classes of Proto-Indo-European. Some attention will be paid to problems of word order. (W)

175. American Indian Languages. (4) Three 1 1/2-hour lectures per week. (W)

180. Special Study for Honors Candidates. (2-5) The Staff (F, W, Sp)

186. Directed Group Study and Research. (1-5) Group study of a linguistic topic not included in the regular department curriculum. The Staff (F, W, Sp)

187. Supervised Independent Study and Research. (1-5) Enrollment is restricted by regulations listed on page 36. Must be taken on a pass/fail basis. The Staff (F, W, Sp)

189. Group Major Office, 731 Evans Hall

Graduate Courses

Senior standing and permission of the instructor are prerequisite to all graduate courses in Linguistics. (Some courses may be repeated with consent of instructor.)

*201. Problems in Diachronic Analysis. (4) Two 1 1/2-hours of lecture per week. Prerequisite: course 145 or consent of instructor. Practice in the analysis of diachronic data. Mr. Malikel (F)

211A-211B. Linguistic Field Methods. (4-2) Two 2-hour section meetings per week. Sequence beginning in fall, continuing in spring. Prerequisite: course 115 or 120. Credit and grade will be awarded on completion of sequence. Mr. Matloff (F, W); Mr. Malikel (Sp)

214A-214B. Workshop in Biolinguistics. (5-5) Four hours of lecture per week. Permission of instructor. Selected topics on biological basis of language will be examined in depth. Students are encouraged to do an original research project in the content of the workshop. Topics will vary from year to year. May be repeated for credit. Mr. Wang (F, W)

220. Physiological Phonetics. (4) Two 1 1/2 lecture periods per week. The mechanism of speech production and perception. The role of autonomous and feedback control of the speech production process. Interactions between speech production and phonological questions in physiological phonetics. Mr. Ochiai (F)

222. Acoustic Phonetics. (4) Two 1 1/2 lecture periods per week. Prerequisite: course 110 or its equivalent. Mr. Ochiai (F)

*233. Advanced Phonological Analysis. (4) Two 1 1/2-hour lectures per week. Prerequisite: course 116. Mr. Fillmore (F, W)

244. Advanced Grammatical Analysis. (4) Two 1 1/2-hour lectures per week. Prerequisite: course 120. Mr. Fillmore (F, Mr. Lakof (W)

285. Workshop in Syntax and Semantics. (4) Two 1 1/2-hour meetings per week. Prerequisite: course 121 or its equivalent. Practice in constructing examples and counter-examples to verify or disprove hypotheses in the theory of grammar. Both classical and current hypotheses will be considered.

288. Word Formation. (4) Two 1 1/2-hour lectures per week. Prerequisite: graduate standing and consent of instructor. The broad issues in the study of natural words and the relation of words to grammatical theory. Mr. Fillmore (Sp)

292. Linguistic Implications of Lexicography and Usage. (4) Two 1 1/2-hour lectures per week. The broader issues in studying individual lexical problems in dictionary making, and in inventories, through dictionaries, the whole lexical stock, with illustrations from different languages. Mr. Malikel (Sp)

230. Structure of a Particular Language. (4) Two 1 1/2-hour lectures per week. Prerequisite: at least one of the older Germanic languages. The relation between language and such cognitive phenomena as perception, conceptualization, thought, and memory. Mr. Chafe (W)

233. Germanic Linguistics. (4) Two 1 1/2-hour lectures per week. Prerequisite: course 115 or 154 or consent of instructor. A discussion of current research and background issues, primarily for first-year graduate students. Mr. Lakof (W)

Special Group Study. (5) Two 1 1/2-hour lecture per week. Prerequisite: graduate standing and consent of instructor. The key problems of Romance historical and comparative phonology, with full attention to their methodological applications. Mr. Malikel

236. Romance Historical Inflection. (4) Two 1 1/2-hour lecture per week. Prerequisite: graduate standing and consent of instructor. The key problems of Romance historical and comparative derivation, with full attention to their methodological applications. Mr. Malikel

237. Romance Historical Derivation. (4) Two 1 1/2-hour lecture per week. Prerequisite: graduate standing and consent of instructor. The key problems of Romance historical and comparative derivation, with full attention to their methodological applications. Mr. Malikel

238. Romance Historical Phonology. (4) Two 1 1/2-hour lecture per week. Prerequisite: graduate standing and consent of instructor. The key problems of Romance historical and comparative phonology, with full attention to their methodological applications. Mr. Malikel

243. Comparative Grammar of Latin. (4) Two 1 1/2-hour lecture per week. Prerequisite: at least an elementary knowledge of Latin or permission of instructor.

239. Comparative Grammar of Greek. (4) Two 1 1/2-hour lecture per week. Prerequisite: at least an elementary knowledge of Greek or permission of instructor.

242. Advanced Diachronic Linguistics. (4) Two 1 1/2-hour lectures per week. Mr. Malikel (W)

244. Advanced Indo-European Comparative Linguistics. (4) Two 1 1/2-hour lectures per week. May be repeated for credit. Mr. Malikel (W)

245. Linguistics of Southeast Asia. (4) Two 1 1/2-hour lectures per week. Mr. Matloff (Sp)

246. Tibeto-Burman Linguistics. (4) Two 1 1/2-hour lectures per week. Mr. Malikel (Sp)

247A-247B. Theoretical Topics in Chinese Linguistics. (4) Two 1 1/2-hour lectures per week. Prerequisite: Oriental Languages 125 and 145 or consent of instructor. Credit and grade will be awarded on completion of sequence. Mr. Wang (F, W)

252. Applied Linguistics. (4) Two 1 1/2-hour lectures per week. Mr. Sawyer (Sp)

254. Topics in Language and Cognition. (4) Two 1 1/2-hour lectures per week. Prerequisite: course 154 or consent of instructor. Mr. Malikel (W)

285. History of Linguistics. (4) Two 1 1/2-hour section meetings per week. Mr. Malikel (W)

285. Major Schools of Structural Linguistics. (4) Two 1 1/2-hour lectures per week. The linguistic theories of Saussure, the Prague School, Glottosystems, and American Structuralism.

286. History of Generative Grammar. (4) Two 1 1/2-hour lectures per week. Prerequisite: course 120. The development of generative grammar from 1956 to the present. Topics: early and classical transformational grammar, abstract syntax, lexicalism, generative semantics.

290. Current Topics in Linguistic Research. (2) One 3-hour lecture per week. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

295. Proseminar in Syntax and Semantics. (4) Two 1 1/2-hour meetings per week. Prerequisite: consent of instructor. A discussion of current research and background issues, primarily for first-year graduate students. Mr. Lakof (W)

298. Special Group Study. (2-8) Prerequisite: one full year of graduate work at Berkeley or consent of graduate advisor. The Staff (F, W, Sp)

299. Special Individual Study. (2-8) The Staff (F, W, Sp)

001. 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)

002. Individual Study for Doctoral Students. (1-8) Prerequisite: one full year of graduate work at Berkeley or consent of graduate advisor. 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 for candidacy 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)

Note: For key to symbols, see page 36.

Logic and the Methodology of Science

Graduate Study

Group Major Office, 731 Evans Hall

Graduate Adviser: Mr. Sluga

Group Major Office offers an interdisciplinary program of study and research leading to the Ph.D. degree. Although the Department of Mathematics and the Department of Philosophy each offers a Ph.D. degree toward which a student may write a dissertation in logic, the interdisciplinary program is designed for those with a broad interest in logic and the methodology of science who wish to explore the subject in both its mathematical and philosophical aspects. "Methodology of science" is here understood to mean "metascience," the study of the methods of the sciences by logical and mathematical means. The program is administered by an interdepartmental group which cooperates closely with both the Department of Mathematics and the Department of Philosophy.

Preparation. For admission to the graduate program, students shall have completed an undergraduate major in philosophy, in mathematics, or a joint major in both, including at least one full-year upper division course in logic. In addition, they shall have completed (a) at least one upper division course in some science, and (b) at least one full-year upper division course in mathematics (other than logic) if the undergraduate major was philosophy, or in philosophy (other than logic) if the undergraduate major was mathematics.

For key to symbols, see page 36.
Undergraduate Programs

The Department offers the undergraduate student a choice of three programs leading to the A.B. degree. The basic major program in mathematics gives the student the opportunity to obtain a strong, well-rounded mathematical background. The faculty of the Department is strongly oriented toward research, and courses required for the major are oriented toward research. For prospective school teachers of mathematics there is a small, selective major program in mathematics for teachers.

General Major Requirements. Each of the three major programs requires a minimum of 36 upper division units in the major in addition to a lower division base of 1A–1B–1C, 51A–51B–51C. Courses 111, 190A, 190B, 190C, and 190D are not acceptable for the upper division major requirements. Additional requirements for these programs are as follows.

Major in Mathematics. 113A–113B, 104A, 104B or 185; 130 or 140 or 142 or 153; three additional upper division mathematics courses. Only one of courses 120A and 185 can be offered as part of the major.

The attention of students interested in logic is directed to Philosophy 109. 120B, and Mathematics 125A–125B.

Courses in Computer Science, Physics and Statistics. 100A–109B–109C are of interest to mathematics majors.

With the approval of the major adviser, students may count not more than two mathematically theoretical courses in computer science, statistics, astronomy, physics, mathematical economics, or other sciences toward their requirements for the major in mathematics.

Major in Applied Mathematics. Either 120A–120B–120C or three courses from 104A, 104B, 185, 105; both 113A and 112A; at least one course from 120A, 120B, 120C; three additional upper division courses of which at least two must be in an applied area (all subject to the approval of the major adviser). All or none of these three electives may be in the Mathematics Department.

Major in Mathematics for Teachers. Philosophy 12A; Statistics 20; Mathematics 113A–113B, 115A, 130, 123, 134, and 180; two additional upper division mathematics courses.

The major adviser must certify in writing that the student has the ability to write simple programs in BASIC, ALGOL, or FORTRAN. This certification will be given automatically if the student has passed a course which requires programming as part of the course, or which carries at least two units of credit. Current examples of such courses are Mathematics 128A–128B, Computer Science 1 or 101. With the approval of the major adviser, students may count not more than two mathematically theoretical courses in computer science, statistics, astronomy, physics, mathematical economics, or other sciences toward their requirements for the major in mathematics for teachers.

Honors Program. In addition to completing the requirements for the major in mathematics or major in applied mathematics, students in the honors program must (a) earn a grade-point average of at least 3.3 in upper division and graduate courses in mathematics and in all courses taken in the University; (b) pass a graduate mathematics course with a grade of at least A; (c) complete the course H196 in which they will write a senior thesis, or pass a second graduate course with a grade of at least A; (d) receive the recommendation of the major adviser. Students interested in the honors program should consult with their major adviser at least two quarters before graduation.

Preparation for Graduate Study

Students preparing for graduate work in mathematics are strongly advised to acquire a reading knowledge of two foreign languages from among French, German, and Russian. This proficiency is required for most Ph.D. programs. Students who have not had much time for language study. There is usually no language requirement for an M.A. degree.

Course 117, designed to challenge the student's ability to do creative thinking, is useful for students preparing for graduate work. It is also desirable for students in the graduate courses continuing particular interest in the applications of mathematics, a special major program in applied mathematics is available. For prospective school teachers of mathematics there is a small, selective major program in mathematics for teachers.

Graduate Programs

The Department offers the M.A. degree in mathematics and the Ph.D. degree in mathematics and applied mathematics. Detailed information concerning admission, teaching assistantships and fellowships, and degree requirements is given in the Graduate Announcement of the Department of Mathematics, which is available upon request from the Graduate Secretary, Department of Mathematics.

Courses and Seminars

Courses and seminars are listed below. Statements of instructors commenting on their methods of teaching, examples of the contents and characteristics of their courses are posted at the Department Office, 970 Evans, at the beginning of each quarter. Detailed descriptions of seminars and names of instructors offering them are also available.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSES

P. Algebra and Trigonometry. (2) Units recorded as credit, but recognized as four units of work load in computing study list. Four hours of lecture per week. Intended for students who wish to take 1A, or 1A and 1B, but lack the prerequisites. A screening test will be given during the pre-enrollment period. After receiving credit for 1A, 5A, 6B, 16A or the equivalent, students will not receive credit for course P. Review of algebra, graphs, functions, polynomials, exponential and logarithmic functions, inverse functions, trigonometric functions and their properties. Mr. Fary (F, W, Sp)

PS. Self-Paced Study in Algebra and Trigonometry. (2) Units recognized as four units of work load in computing study list. Covers the same subject matter as course P. Students will start the course at the starting-point of course P. Students who complete the course for one unit may re-enroll for a second unit. Grades are based on mastery of the material completed, not quantity, as long as quantity is sufficient to assign at least one unit. Students will not receive credit for PS after receiving credit for any of the following or its equivalent: P, 1A, 5A, 6B, 16A. Students will preenroll and attend the first class meeting as usual for courses with the letter P. Mr. Schoen (F, W, Sp)

1A–1B–1C, Calculus. (4–4–4) Four hours of lecture per week. Prerequisite: at least three and one-half years of high school mathematics including algebra, geometry, trigonometric and other elementary functions, and some coordinate geometry; students lacking the above prerequisites may enroll only after passing course P or 6A–6B. A placement test will be given during the pre-enrollment period. This is the usual sequence for students planning graduate work in mathematics. Students who have received credit for 1A or 19A will receive one unit of credit for 1A; students who have received credit for 1B or 19B will receive two units of credit for 1B. Introduction to differential and integral calculus of functions of one variable with applications, transcendental functions, techniques of integration, introduction to differential equations and infinite series, vectors, introduction to differential and integral calculus of several variables. Mr. Hirota, Mr. Helson, Mr. Hair, Mr. Helson, Mr. Moore, Mr. Stallings (each part offered each quarter)

18. Self-Paced Study in Introductory Calculus. (1–12) Three to twelve hours of discussion per week.
Prerequisite: 3 1/2 years of high school mathematics, including algebra, geometry, trigonometry, and other elementary functions, and some coordinate geometry.

Self-paced instruction covering the material of course 1A–1B–1C for credit up to a maximum of 12 units. Reduced credit for students who have taken part(s) of course 1A–1B–1C, unit credit and grades assigned. Honors exam corresponding to 1A, 1B, 1C, for able students with strong mathematical inclination and motivation. Emphasis on theory, rigor, and hard problems. Recitation preparation of the major, particularly for honors candidates. Mr. Addison (sequence beginning Fall).

**5A. Finite Mathematics. (4) Four hours of lecture per week. Prerequisite: course 5A or a course in linear algebra or discrete structures. Sets, functions, logic, probability, vectors and matrices, with applications.**

**5B. Calculus of Vector Functions. (4) Four hours of lecture per week. Prerequisite: course 5A. Review of elementary calculus, linear and differential and integral calculus, including theorems of Green and Stokes. Implicit function theorem if time permits.**

51A. Introduction to Linear Algebra. (4) Four hours of lecture per week. Prerequisite: course 5A. Students may not receive credit for both 51A and 111. Matrix algebra, simultaneous linear equations, determinants, linear transformations, determinants. Mr. Gil, Mr. Miller, Mr. Kirby, Mr. Grunbaum, Mr. Arveson (F, W, Sp).

51B. Calculus of Vector Functions. (4) Four hours of lecture per week. Prerequisite: course 5A. Review of elementary calculus, linear and differential and integral calculus, including theorems of Green and Stokes. Implicit function theorem if time permits. Mr. Miller, Mr. Sarason, Mr. Grunbaum, Mr. Arveson, Mr. Bowen, Mr. Bremermann (F, W, Sp).

51C. Differential Equations and Related Topics. (4) Four hours of lecture per week. Prerequisite: courses 5A–1B–1C. Ordinary differential equations of first and second order, series solutions and higher order ordinary equations. An introduction to Fourier series and the separation of variables in simple partial differential equations. Mr. Miller, Mr. Sarason, Mr. Kahan, Mr. Kirby, Mr. Miller (F, W, Sp).

51D. Linear Algebra. (5) Five hours of lecture per week. Prerequisite: courses 5IB, 51C, and consent of instructor. Honors sequence corresponding to 104A-104B for exceptional students with strong mathematical inclination and motivation. Emphasis is on rigor, depth, and hard problems. Recommended preparation for the major, particularly for honors candidates. Mr. Klass, Mr. Chernoff (sequence beginning Fall).

**RELATED COURSES IN OTHER DEPARTMENTS**


UPPER DIVISION COURSES

104A—104B. Introductory and Intermediate Analysis. (4—4) Three hours of lecture per week. Prerequisite: courses 5B and 51C or consent of instructor. Determinants, linear equations, n-dimensional Euclidean space, matrices, linear transformations, Gauss-Jordan transformations, review of partial differentiation, application of partial differentiation to maximum and minimum problems, multivariable integrals and applications, surface and line integrals, Green’s theorem, divergence theorem, Stokes’ theorem. Mr. Garavaglia, Mr. Shreve, Mr. Pugh (F, W, Sp).

111A—111B—**111C. Introduction to Abstract Algebra. (4—4—4) Three hours of lecture per week. Prerequisite: course 5A and consent of instructor. Not open to students who have taken 113A—113B—113C. Dual vector spaces, determinants, characteristic values, similarity, canonical forms, unitary spaces, unitary similarity, quadratic forms. Mr. Henkin (Sp).

113A—113B. Introduction to Abstract Algebra. (4—4) Three hours of lecture per week. Prerequisite: course 5A and consent of instructor. Not open to students who have taken 111A—111B—111C. Dual vector spaces, determinants, characteristic values, similarity, canonical forms, unitary spaces, unitary similarity, quadratic forms. Mr. Henkin (Sp).

113A—113B—**113C. Introduction to Abstract Algebra and Abstract Linear Algebra. (4—4—4) Three hours of lecture per week. Prerequisite: course 5A and consent of instructor. Not open to students who have taken 111A—111B—111C. Honors sequence corresponding to 104A-104B for exceptional students with strong mathematical inclination and motivation. Emphasis is on rigor, depth, and hard problems. Recommended preparation for the major, particularly for honors candidates. Mr. Klass, Mr. Chernoff (sequence beginning Fall).

115A. Introduction to Number Theory. (4) Three hours of lecture per week. Prerequisite: course 5A. Divisibility, congruences, numerical functions, theory of primes. Mr. Thomas (F, W, Sp).

115B. Topics In Number Theory. (4) Three hours of lecture per week. Prerequisite: course 115A. Topics selected from: analytical methods in number theory, quadratic forms, partitions, quadratic distributions, additive problems. Mr. Robinson (Sp).

115C. Laboratory in Number Theory. (2) Two hours of lecture per week. Prerequisite: course 115A. Exploration of number theory through interactive computation. Continued from course 115A, algorithmic number theory, Legendre and Jacobi symbols, Diophantine equations of second degree. Mr. De Vogelaere (F).

**115M. Laboratory Course for Topics In Number Theory. (2) Two hours of lecture per week. Prerequisite: course 115A. Exploration of number theory through interactive computation. Continued from course 115A, algorithmic number theory, Legendre and Jacobi symbols, Diophantine equations of second degree. Mr. De Vogelaere (F).**

**117M. Mathematical Problems Seminar. (3) Three hours of lecture per week. Prerequisite: consent of the instructor. Recommended for exceptional students with strong mathematical background and interest. Problems taken from original sources and various mathematical approaches. May include advanced topics developed through problems and open research problems.**

120A—120B—120C. Analysis for Applied Mathematics. (4—4—4) Three hours of lecture per week. Prerequisite: courses 51A and 51B. Primarily for students in the physical sciences who are likely to pursue more advanced work. No credit for 120A following 185.


120B. Holomorphic functions, singularities. Contour integration, analytic continuation and Riemann surfaces. Mr. DeVegalear, Mr. Pinney, Mr. Kato (W, Sp).

121A–121B. Mathematical Tools for the Physical Sciences. (4–4) Three hours of lecture per week. Prerequisite: courses 51B and 51C. Sufficiently advanced students in the physical sciences who have not had courses 112 or 113C and either 104A or 185 or 120A–120B–120C rather than 121A–121B.

121A. Functions of a complex variable. Fourier series, finite-dimensional linear systems, introduction to infinite-dimensional systems. Mr. Ziller, Mr. Taub (F, W)

121B. Infinite-dimensional linear systems, orthogonal expansions, special functions, partial differential equations arising in mathematical physics. Mr. Ziller (Sp, F)

Mr. Taub (W, Sp)

123. Ordinary Differential Equations. (4) Three hours of lecture per week. Prerequisite: course 104A. Some background in linear algebra is required. Existence and uniqueness of solutions, linear systems. Other topics selected from: boundary value problems, analytic systems, autonomous systems, Liouville theory. Mr. Hansen (Sp)

125A–125B. Mathematical Logic. (4–4) Three hours of lecture per week. Prerequisite: course 113A or consent of instructor. Sentential and quantificational logic. Formal grammar, semantic interpretation, formal deduction, and their interrelation. Applications to formalized mathematics. Selection of model theory or proof theory. Mr. Silver, Mr. Vaught (125A: F; 125B: Sp)

128A. Numerical Analysis, I. (6) Three hours of lecture and one 4-hour laboratory per week. Prerequisite: courses 51B and 51C. Programming for numerical calculations, round-off and truncation errors, interpolation, numerical quadrature, and solution of ordinary differential equations. Practice on the computer. Mr. Chorin, Mr. Lehman, Mr. Grunbaum, Mr. Sarason, Mr. Miller (F, W, Sp)

128B. Numerical Analysis, II. (6) Three hours of lecture and four hours of laboratory per week. Prerequisite: course 128A. Additional topics in the following list: polynomials, interpolation, least-squares approximation, numerical integration, partial differential equations, boundary value problems, difference equations. Practice on the computer. Mr. Chorin, Mr. Lehman (W, Sp)

130. The Classical Geometries. (4) Three hours of lecture per week. Prerequisite: course 104A. Classification of hyperquadrics, the projective group and its subgroups, non-Euclidean geometry, inversive geometry, symmetrical projective geometry. Mr. Pugh, Mr. Thomas, Mr. Lehman (F, W, Sp)

130A. Analytic Geometry, Differential and Integral Calculus. (4–4–4–4) Three hours of lecture per week. Prerequisite: courses 51B and 51C. Analytic geometry, differential and integral calculus from ancient times through the seventeenth century and selected topics from more recent mathematics. Applications to physics. Mr. Sarason, Mr. Bowen (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, descriptive geometry, symmetric geometry, algebraic geometry, convexity, and elementary topology. Mr. Schoen (W)

134. Number Systems. (3) Three hours of lecture per week. Prerequisite: course 1C. Especially recommended for prospective teachers. Systems of natural numbers, integers, rational numbers, the real number system, and the complex numbers. Development both axiomatically and through set-theoretic and analytic construction. Proof by induction and definition by recursion. Mr. Gravariva (F)

135. Introduction to the Theory of Sets. (3) Three hours of lecture per week. Prerequisite: courses 113A and 104A. Sets, relations, orders, and well-order. Proof by transfinite induction and definitions by transfinite recursion. Properties of cardinal and ordinal numbers and their arithmetic. Construction of the real numbers. Axiom of choice and its consequences. Mr. Ratner, Mr. Markley, Mr. Potthoff, Mr. Gravariva (F, W, Sp)

141H. Introduction to the Theory of Sets. (3) Three hours of lecture per week. Prerequisite: courses 113A and 104A. Honors section corresponding to 135 for exceptionally strong students with mathematical inclination and motivation. Emphasis is on rigor, depth, and hard problems. Mr. Shelah (Sp)

140. Metric Differential Geometry. (4) Three hours of lecture per week. Prerequisite: courses 113A or 113B and 104A. Functions of a complex variable, Fourier series, finite-dimensional linear systems, introduction to infinite-dimensional systems. Mr. Ziller, Mr. Taub (F, W)

142. Elementary Algebraic Topology. (4) Three hours of lecture per week. Prerequisite: courses 104A and 104B. Elementary topological spaces: manifolds and triangulation, classification of surfaces, Euler characteristic, fundamental groups, plus further topics at the discretion of the instructor. Mr. Gaile (F)

145. Boolean Algebras. (4) Three hours of lecture per week. Prerequisite: course 125A. Postulates, lattices as rings or lattices; relation to semigroups and boolean algebras and classes of infinite, complete, order lattices, ideals, direct products; representation theorem. Mr. Gaile (W)

146. History of Mathematics. (4) Three hours of lecture per week. Prerequisite: courses 51B, 51C, and 113A. Historical development of mathematics, analytic geometry, calculus and mathematics from ancient times through the seventeenth century and selected topics from more recent mathematics. Applications to physics. Mr. Pugh, Mr. Thomas, Mr. Lehman (F, W, Sp)

163. Tutorial in Upper Division Mathematics. (4) Four hours per week. Prerequisite: consent of instructor. Emphasis is placed on the individual's experience in the field of mathematics. Examples of subjects which may be covered include graph theory, category theory, differential topology, mathematical logic, measure and probability, real analysis, theory of ordinary differential equations, and classical linear groups. Content varies; may be repeated for credit with consent of instructor. Mr. Weinstein (W)

165. Introduction to the Theory of Functions of a Complex Variable. (4) Three hours of lecture per week. Prerequisite: course 104A. No credit for 185 following S1A or 111. Course is offered. May be repeated for credit with consent of instructor. Mr. Taub (W, Sp)

190A–190B–190C–190D. Survey of Algebra and Analysis. (4–4–4–4) Three hours of lecture per week. Prerequisite: courses 105 and 185 or 120B. Designed primarily for students specializing outside mathematics and physical sciences, Hahn-Banach theorem, closed graph theorem, principles of uniform boundedness, linear functionals and operators, weak convergence, spectral theory. Mr. Chernoff, Mr. Ziller (F, W, Sp)

190D. Infinite series, differential and difference equations, multiple integration, Kuhn-Tucker theorem. Mr. Niles (W)

191. Experimental Courses in Mathematics. The topics to be covered and the method of instruction to be used will be announced at the beginning of each quarter that such courses are offered. See departmental bulletins.

195. Special Topics in Mathematics. (4–4–4) Three hours of lecture per week. Prerequisite: written permission of instructor. Lectures on special topics, which will be announced at the beginning of each quarter that the course may be offered. May be repeated for credit with consent of instructor. Mr. Horgan (F, W, Sp)

196. Honors Thesis. (6) Three hours of lecture per week. Prerequisite: written permission of instructor. May be repeated for credit. Topics for theses are arranged. Mr. Wiles (F, W)

199. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations listed on page 36. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

RELATED COURSES IN OTHER DEPARTMENTS


GRADUATE COURSES

202A–202B–202C. Introduction to Topology and Analysis. (4–4–4) Three hours of lecture per week. Prerequisite: course 125A; also linear algebra for 202B and 105 for 202B and 202C.

202A. General topology; theory of Tychonoff, Uniform, Tietze, Arzelà-Ascoli, Baire, Stone-Weierstrass theorem. Mr. Bade, Mr. Klass (F, W, Sp)


202C. Measure and Integration. The Fourier transform. Mr. Sarason, Mr. Bowen (F, W, Sp)


205. Theory of Functions of a Complex Variable. (4) Formerly 205A–205B. Three hours of lecture per week. Prerequisite: 122A or consent of instructor. Complex functions and their properties, the Riemann mapping theorem, Picard's and related theorems, and additional topics chosen by the instructor from classical complex variable theory. Mr. Fuglede (W)

206A. Linear Spaces. (3) Three hours of lecture per week. Prerequisite: courses 105 and 202A, or course 204B. Linear spaces, linear transformations, bilinear and quadratic forms, systems of linear equations, theorems of Hilbert and Banach spaces, Hahn-Banach theorem, closed graph theorem, principle of uniform boundedness, linear functionals and operators, weak convergence, and distributions. Mr. Chernoff, Mr. Ziller (F, W, Sp)

206B. Linear Operators. (3) Three hours of lecture per week. Prerequisite: course 206A. Spectrum and resolvent, Fredholm theory, spectral theorem for bounded self-adjoint operators, commutative Banach algebras. Mr. Chernoff (W)

207. Differential Operators. (3) Three hours of lecture per week. Prerequisite: course 206B. Differential operators, unbounded symmetric operators, per-
224A-224B-**224C. Mathematical Methods for the Physical Sciences. (4—4—4) Three hours of lecture per week. Prerequisites: courses 115C, and 104A and 185, or 121A—B, or 120A—B.


224C. Special topics selected by instructor.

Mr. Harsen (Sequence beginning Fall)


228A. Functions and Abstract Machines. (4) Three hours of lecture per week. Prerequisite: courses 115B and 155 or consent of instructor. Functions computed by finite state devices, algebraic characterizations, regular sets. Turing machines, recursive functions, decision problems.

228B. Power Series and Languages. (4) Three hours of lecture per week. Prerequisite: course 228A. Power series in non-commuting variables, rational and algebraic analytic structures. Power series over linear topological spaces, distributions, further applications.

228C. Semigroups and Machines. (4) Three hours of lecture per week. Prerequisite: courses 226A and 225B. Algebraic structure design, prime decomposition theorem, application to finite state machines, algebraic theory of complexity.


Mr. Hefter, Mr. Moishezon, Mr. Wol (W, Sp)

225A—225B—225C. General Theory of Algebraic Structures. (4—4—4) Three hours of lecture per week. Prerequisite: courses 113C and 155. General theory of algebraic structures; isomorphism; homomorphisms and congruence relations; direct products, reduced products, and ultraproducts; free algebras. Applications to notions of groups, rings, fields, lattices, Boolean algebras, etc.

230A. Groups, Rings, and Modules. (4) Three hours of lecture per week. Prerequisite: courses 113A, 113B, and 113C or their equivalent. Unique factorization and ideals; principal ideal domains. Modules over rings: maximum and minimum conditions, free modules, duality, tensor product and homomorphism modules.

Mr. Seidenberg, Mr. Moore (W, Sp)

229A—229B. Theory of Models. (4—4) Three hours of lecture per week. Prerequisite: course 250B. Topics such as: Noetherian rings, with descending chain condition, theory of the radical, homological methods.

Mr. Seidenberg, Mr. Moore (W, Sp)


Mr. Seidenberg (Sp)

251. Ring Theory. (4) Three hours of lecture per week. Prerequisite: course 250B. Topics such as: Noetherian rings, with descending chain condition, theory of the radical, homological methods.

Mr. Lam (F)

252. Representation Theory. (4) Three hours of lecture per week. Prerequisite: course 250B. Structure of finite dimensional algebras, representations of finite groups, the classical linear groups.

Mr. Goldberg (Sp)

253. Homological Algebra. (4) Three hours of lecture per week. Prerequisite: course 250B. Modules over a ring, homomorphisms and tensor products of modules, projective and derived functors, homological dimension of rings and modules.

Mr. Goldsmith (F, W)

254A—254B. Number Theory. (4—4) Three hours of lecture per week. Prerequisite: course 250B. Valuation theory, algebraic number fields and their ideals and completions, algebraic number fields, quadratic and cyclotomic fields, topics from class field theory, zeta-functions and L-series, distribution of prime numbers, modular forms, modular functions, diophantine equations, p-adic analysis, and transcendental numbers.

Mr. Hochschild (F, W)

256A—256B—256C. Algebraic Geometry. (4—4—4) Three hours of lecture per week. Prerequisite: course 256A. Algebraic varieties, dimension, con-138

255A, Classical Harmonic Analysis. (4) Three hours of lecture per week. Prerequisite: course 206A or a basic knowledge of real, complex, and linear analysis. Basic properties of Fourier transforms, summability, conjugate functions, Hardy spaces, boundary behavior of analytic and harmonic functions, additional topics at the discretion of the instructor.

255B. Transformation Groups. (4) Three hours of lecture per week. Prerequisite: courses 215A and 214. Topological groups, Haar measure, general theory of topological transformation groups, Lie groups, Lie algebras, convolution algebras, group representations. Mr. Moore (W)

260A. Topological Groups. (4) Three hours of lecture per week. Prerequisite: courses 202A and 250A. General topological groups, Haar measure, compact groups. Mr. Moore (F)

260B. Abstract Harmonic Analysis. (4) Three hours of lecture per week. Prerequisite: courses 206A and 250A. Banach algebras, convolution algebras, group representations. Mr. Moore (W)

261A—261B—261C. Lie Groups. (4—4—4) Three hours of lecture per week. Prerequisite: course 214. Lie groups and Lie algebras, general structure theory: compact, solvable, semi-simple, and semi-simple groups; classification of simple groups; representation theory; further topics such as the theory of symmetric spaces. Mr. Hsiang (Sequence beginning F)

262. Differential Topology. (4) Three hours of lectures per week. Prerequisite: course 214. Vector bundles, tubular neighborhoods, approximation theorems, Morse theory, handlebodies, surgery and cobordism. Mr. Spanier (Spring)

271. Topics in Foundations. (4) Three hours of lecture per week. Prerequisite: background in logic and set theory. Topics of current interest in set theory and logic. Mr. Nash-135

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. Wagoner (F)

273. Advanced Numerical Analysis. (4) Three hours of lectures 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. Wagoner (F)

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. Hartshorne (F); Mr. Lam (W); Mr. Bass (Sp)

275. Topics in Applied Mathematics. (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. Weinstein, Mr. Marcus, Mr. Taub (W); Mr. Grunbaum (Sp)

276. Topics in 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. Hirsch (W)

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. Lichnerowicz (W); Mr. Chernoff (Sp)

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.

280A—280B—280C. Mathematical Theory of Relativity. (4—4—4) Three hours of lecture per week. Prerequisite: course 140 or consent of instructor. Special topics chosen by the instructor. The content of this course changes, as in the case of seminars. Hence it may be repeated for credit.

290. Seminars. (2—8) Two-hour lecture per week. Credit and grade will be awarded at the discretion of the Instructor. Topics of special interest in mathematics, theory of numbers, numerical calculations, analysis, geometry, topology, algebra, and their applications, by means of lectures given in small classes or based largely on original memoirs. Mr. Singer, Mr. Rosier (F); Mr. Hartshorne, Mr. Helson, Mr. Kirby (W); Mr. Weinstein, Mr. Silver, Mr. Shelah, Mr. Bowen, Mr. Proctor (Sp)

295. Individual Research. (2—6) By appointment. Investigation of special problems under the direction of a member of the Department. Mr. Alpern, Mr. Solovay, Mr. Shelah (W)

299. Reading Course for Graduate Students. (2-8) By appointment. Not open to freshmen. Allows graduate students to pursue independent study of special topics within the parameters of the Department. All courses must be approved by the Department. Mr. Alpern, Mr. Solovay, Mr. Shelah

6. Group Major in Biophysics

The group major is designed to serve as (1) an introduction to the natural sciences for students with a background in the physical sciences; and (2) to provide biomedically oriented students an introduction to some of the quantitative physical sciences and their applications in biology and medicine. Courses 10, 11, 20, and 21 are designed to provide background and perspective in their specified fields.

Group Major in Biophysics

Major Advisers: Mr. Alpen, Mr. Bearden, Mr. Glaeser, Mr. Mortimer, Mr. Nichols, Mr. Tobis. The group major in biophysics is designed to serve as preparation for graduate study in biophysics 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 biological subjects, which include: molecular physics and biological structure, biological energetics and kinetics, radiation and tracer biophysics, and radiation biology. The group major in biophysics includes a medical physics option to provide 'biomedically oriented students with a background in physics, chemistry, mathematics, and biology as well as an introduction to some of the quantitative physical problems and approaches in biology and medicine.'
Chemistry 1A–1B, 8A–8B, Mathematics 1A–1B–1C, 5A–5B–5C, Biology 1A–1B.

Upper Division. Chemistry 109A–109B, Biochemistry 102; two courses from the following: Physics 110A–110B, 112, 124, 137A–137B, 140; one course from the following: Botany 130, Physiology 101, Zoology 104; three courses from the following: Medical Physics 101A–101B, 120, 121; recommended: Medical Physics 111, one upper division course in genetics; additional upper division courses in physical science, biological science, biophysical science, 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 101 or Statistics 130A–130B or related course, Biochemistry 102, Medical Physics 101A–101B; one course from the following: Genetics 100, Molecular Biology 110B; one course from the following: Zoology 104, Physiology 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's attaining senior standing with a grade-point average of 3.5 or better on all University work and a 3.5 grade-point average or better in courses in the major. In addition to completing the normal requirements of the major, the honors student is required to participate in the Honors Undergraduate Club for at least one quarter and to write a thesis on research performed in Medical Physics 119SA–119SB. 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 bioredoiology. These degrees are administered under the Graduate Group in Biophysics and Biomedicine. A complete description of degree requirements 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. (4) Three hours of lecture and one hour of discussion per week. Basic concepts of atomic radiation in biological and physical 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 are presented within the context of health and disease. Topics include: marijuana, tobacco, alcohol, hallucinogens, narcotics, psychoactive medications, habituation, dependency, sensory deprivation, rehabilitation.

20. Topics in Biomedical Science. (2) One hour of lecture and at least one hour of discussion per week. Prerequisite: sophomore standing or consent of instructor. Students interested in the health sciences with selected topics in the biomedical area. The course will focus on a specific topic and will consist of lectures, readings and discussion. May be repeated for credit with consent of instructor.

11A. Radiation and Treacher Biophysics. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: Physics 6C or 5E, Chemistry 1B, Biology 1B, or equivalent with consent of instructor. An introductory course in calculus is recommended. Basic concepts are treatment of interactions and reaction with matter; radiation detection, radioactive isotopes and their role in evaluation of transport, distribution and turnover of metabolites; introduction to the field of trace kinetics.

11B. Radiation Biology. (4) Three hours of lecture and four hours of laboratory per week. Prerequisite: Physics 6C or 5E, Chemistry 1B, Biology 1B, or equivalent with consent of instructor. An introductory course in calculus is recommended. Molecular, cellular, and mammalian responses to ultraviolet and ionizing radiation; genetic changes and repair processes, tumor treatment, and effects on human populations.

101A. Radiation and Treacher Biophysics. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: Physics 6C or 5E, Chemistry 1B, Biology 1B, or equivalent with consent of instructor. An introductory course in calculus is recommended. Basic concepts are treatment of interactions and reaction with matter; radiation detection, radioactive isotopes and their role in evaluation of transport, distribution and turnover of metabolites; introduction to the field of trace kinetics.

103. Human Biology. (4) Three hours of lecture and one and one-half hours of discussion per week. Prerequisite: Biology 1A–1B or Biology 11A–11B, or consent of instructor. A presentation of scientific concepts explaining structure, function and development of the body, the nature and origin of disease, aging, conditioning, demographic and dynamic aspects of human populations.

111. Biophysical Laboratory. (2) Six hours of laboratory per week. Prerequisite: Junior or senior standing in biophysics or biophysics: medical physics option, or consent of instructor. Advanced laboratory in biophysics emphasizing the applications of physics and physical methods to problems in quantitative biology. Experimental results are drawn from a wide range of biological phenomena.

120. Biological Energy. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: Biology 1B, Physics 5E, Chemistry 109A, Mathematics 51C, or equivalent with consent of instructor. Thermodynamics of closed and open systems; physical and biological transport processes; gravity and biology; coupled and uncoupled chemical, electrical, mechanical, and osmotic phenomena, and biological work.

121. Molecular Physics and Biological Structure. (5) Five hours of lecture per week. Prerequisite: Biology 1B, Physics 5E, Chemistry 109A–109B and Mathematics 51C, or the equivalent with consent of instructor. Experimental and theoretical principles of contemporary 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, diffraction methods and spectroscopic methods of structure determination.

122. Mechanisms of Energy Flow and Transformation. (4) Three hours of lecture and one hour of discussion per week. Prerequisites: Biology 1B, Physics 5E, Chemistry 109A, Mathematics 51C or the equivalent with the consent of the instructor. Molar mechanisms of biochemical energy conversion; photosynthesis, oxidative phosphorylation, muscle contraction, active transport, the utilization of chemical energy in biophysiologic processes and the conversion of other forms of energy to biochemical energy in cells.

140. Electron Microscopy; Physical Principles for Biologists. (3) Three hours of lecture per week. Prerequisite: Physics 6A–6B–6C, Zoology 104, or equivalent. Use of the electron microscope for high resolution studies with biological specimens is discussed from the point of view of the physical and optical principles involved. Topics include image formation, image analysis, radiation damage, and related topics from electron optics.

142. Molecular Basis of Life. (4) Four and one-half hours of laboratory per week. Prerequisite: Biology 6A–6B or equivalent with consent of instructor. A seminar course designed for honors students in the field of molecular science. Emphasizes the applications of physics and physical methods to problems in quantitative biology.

155. Seminar in Biophysics. (3-3) 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. Participation in Honors Journal Club (1 1/2 hour discussion per week) is required for at least one quarter. Credit and grade will be awarded on completion of the full sequence.

199. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations listed on page 36. Additional limitation: overall grade-point average of at least 2.5. Must be taken on a pass or not passed basis.

GRADUATE COURSES

Cellular Biophysics

201. Membrane and Lipid Protein Structure. (3) Three hours of lecture per week. Prerequisite: 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 lipid protein macromolecules by physical techniques. Emphasis is placed on the theoretical foundations for each of the physical methods. Topics include nerve myelin, plasma membrane, membrane junctions and fusion, energy transducing membranes, and serum lipoproteins.

202. Electrical and Transport Properties of Membrane. (3) Two 1 1/2-hour lectures per week. Analysis of membrane properties and function; capacitance and conductance; electro-diffusion and ion movement; propagation of nerve impulses; models and theories.
204A–204B–204C. Advanced Laboratory in Biophysical Inorganic Chemistry. Two hours of lecture and six hours of laboratory per week. Physical properties of biological systems 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 radiation on cells and viruses in relation to their effects on molecules of biological interest, radiomimetic chemicals, intracellular repair of radiation damage, and visible radiation on mammalian cells and mammalian organ systems. Cell life cycles; normal and abnormal cell kinetics; recovery phenomena; advanced theory and techniques of repair mechanisms; environmental and public health aspects. Mr. Alpen (W)

212. Mutagenesis and Radiation Genetics. (3) Two 1 1/2-hour lectures per week. Genetic effects of radiation and chemical mutagens. Mutagenic mechanisms, induced genetic and chromosomal changes, radiation and rearrangement. Mr. Mortimer, Mr. Wolff (Sp)

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 radiation on mammalian cells and mammalian organ systems. Cell life cycles; normal and abnormal cell kinetics; recovery phenomena; advanced theory and techniques of repair mechanisms; environmental and public health aspects. Mr. Tobias (Sp)

214. Radiological Physics. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 101A and Physics 124. Interaction of electromagnetic and particulate radiation with matter, dosimetry, health physics, shielding, measurement of environmental radiation. Mr. Tobis (Sp)

Theoretical Biophysics

221. Mathematical Models and Methods in Biophysics. (4) Three hours of lecture per week. Prerequisite: Mathematics 104A or 121A or 129A or equivalent: Biology 1A–1B or consent of instructor. The representation of complex biological systems by differential equations and automate models. Dynamical systems. Chemical dynamics. Epidemiological and ecological models. Optimal control. Model fitting and optimization. Medical applications. Survey of mathematical methods. Mr. Bremermann (F)

222. Bioncumbernic Systems, Nervous Ncere, Artificial Intelligence. (4) Three hours of lecture per week. Prerequisite: Mathematics 104A or 121A or 129A or equivalent: Biology 1A–1B or consent of instructor. Organisms as cybernetic systems. Optimal strategies of behavior. Pattern recognition. Optimization and control. Mathematical, biological, and genetic complexity. Natural and machine intelligence. Mr. Bremermann (W)

223. Bioenergetics and Non-Equilibrium Thermal Physics. (3) Three hours of lecture per week. Prerequisite: physical chemistry or consent of instructor. Thermal physics applied to biology on the scale of equilibrium thermodynamics, and ecological processes, (Sp)

Medical Physics

*231A–231B. Nuclear Medicine. (5–5) Three hours of lecture and three hours of laboratory per week. Prerequisite: course 101A, courses in differential and integral calculus, and techniques of nuclear medicine, application of radioactive isotopes to the study of disease processes. (F, W)

232A–232B. Medical Physics of Pathologic Processes. (2–2) Two hours of lecture per week.

233A. Carcinogenesis. Evaluation of current status of evidence concerning the processes of carcinogenesis and an attempt to integrate such evidence into a consistent picture. Leading concepts concerning development of malignancy will be considered in detail. Mr. Alpen (F)

233B. Atherogenesis. Examination of factors and processes associated with increased atherogenesis in arterial systems of man: characterization of atherogenic aspects of abnormal metabolic states at molecular, cellular and tissue levels; review of risk factors in human atherosclerosis; with emphasis on blood lipids and liproproteins. Mr. Nichols (Sp)

235A–235B–235C. Biophysics Group B, 205A. (1–1–1) One hour per week. Current topics in the biological sciences. Must be taken on a satisfactory/unsatisfactory basis. Faculty of the Graduate Group in Biophysics and Medical Physics. May be repeated for credit. Must be taken on a satisfactory/unsatisfactory basis. Faculty of the Graduate Group in Biophysics and Medical Physics (F, W, Sp)

280L. Biophysics Group Proseminar Laboratory. (3) Eight hours of laboratory per week. Introduction to research programs that are actively in progress in laboratories of Faculty of the Graduate Group in Biophysics and Medical Physics. May be repeated for credit. Must be taken on a satisfactory/unsatisfactory basis. Faculty of the Graduate Group in Biophysics and Medical Physics (F, W, Sp)

290. Seminar. (1–1–1) One and one-half hours of seminar per week. Graduate student seminars in biophysical areas including cellular, radiation, medical and theoretical biophysics. Seminars will offer several sections covering different topics; topics will be announced by department chairman. Enrollment in more than one section is permitted. The Staff (F, W, Sp)

295. Special Topics in Biophysics and Medical Physics. (1–3) One to three hours of lecture per week. Prerequisite: same as for other Medical Physics graduate courses. Lecture courses at advanced level will be offered as result of current interests of faculty & graduate students. Recent topics have included: electron spin resonance, biomolecular spectroscopy, medical applications of radiation therapy, biological energy conversion processes, scanning electron microscope in biology, chemotaxis, three dimensional image reconstruction, and brain images of cancer. The Staff (F, W, Sp)

601. Individual Study for Master's Students. (0–0–0) May be taken for one to three unit hours and 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. (0–0–0) Individual study in consultation with the major field advisor. Intended to provide an opportunity for qualified students to prepare for the comprehensive examinations required of candidates for the Ph.D. May not be used for unit or residency requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

Medical Studies

Program Office, 4321 Dwinelle Hall

Distinguished Visiting Professor (Bi 1978): Albert B. Lord, Ph.D. (Harvard)

Chairman and Graduate Adviser: Jerry R. Craddock

Medieval studies are currently undertaken in a joint-degree program designed to preserve the established standards of training in a major subject, while broadening the student's experience in other aspects of the field. The degree granted in recognition of this extra study.

Medical students are currently undertaken in a joint-degree program designed to preserve the established standards of training in a major subject, while broadening the student's experience in other aspects of the field. The degree granted in recognition of this extra achievement is the Ph.D. with a joint designation, for example, "Ph.D. in English and Medieval Studies". Each student is expected to fulfill the Ph.D. requirements of the major department of study, which administers the program of study. In addition, each student pursues seminar work in two outside departments, one of which is History (unless that is the department of the major). The program includes a special examination in Latin, consisting of representative passages from medieval authors. Interested students should apply for admission to the Ph.D. department in which they would do their major work.

There is no undergraduate major. Students whose interests lie in the medieval period should consider the possibility of setting up an individual major (for requirements see the Announcement of the College of Letters and Science).

In addition to the courses offered by the Distinguished Visiting Professor, listed below, the student is also urged to consult the medieval offerings in the departments of: Art and History of Art, Classics, Comparative Literature, Dramatic Art, English, French, German, History, Italian, School of Library and Information Studies, Linguistics, Music, Near Eastern Studies, Philosophy, Rhetoric, Roman Philology, Scandinavian, Slavic, South and Southeast Asian Studies, Modern and Portuguese, and the Graduate Theological Union. An updated list of such offerings is issued each fall by the Chairperson of the Committee.
proteins; chemical events in mutation and recombinat- tion; control mechanisms in the growth of viruses, bacteria, and animal cells; and biological ultrastructure, development of neural connections, nucleocytoplasmic interactions in development.

In addition to the basic preparatory courses (listed above), the student is expected to take Molecular Biology 200A and 200B. Other courses are chosen in consultation with the major field adviser during the first two quarters of residence and thereafter with the student's research adviser.

Each student serves as a teaching assistant for two quarters as a requirement for the Ph.D. degree. Demonstration of a reading knowledge of one foreign language, 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.

Letters 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 section per week. Prerequisite: Chemistry 1A and 1B. Recommended: Biology 1A and 1B, and Chemistry 8 or 12. For students intending to major in the biological sciences, an introduction to 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 (SP)

10. Introduction to Molecular Biology. (3) Three 1-hour lectures per week. Open without prerequisite for all undergraduates for the first 12 weeks for those not enrolled in the Science or Science/Technology major. The molecular basis of life. Contemporary description of genetics, mutation, evolution, growth, and reproduction, with emphasis on viruses and simple organisms. Extension to higher organisms and medical and social implications. Mr. Rubin (F)

Mr. Fraenkel-Conrat (W)

UPPER DIVISION COURSES

*201. Molecular Biology Laboratory. (4) Two hours of lecture and 6 hours of laboratory per week. Prerequisite: Molecular Biology 110A. The experimental techniques on molecular biology, with particular emphasis on the informational macromolecules of viruses, bacteria and cells of higher organisms. Mr. Duesberg (SP)

110A. Molecular Biology of Heredity. (6) Three 1-hour lectures and two discussion sections per week. Prerequisite: Chemistry 8A–8B; Biology 1A–1B; Molecular Biology 1 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. Calendar (W)

110B. Molecular Biology of Heredity. (6) Three 1-hour lectures and two 1-hour discussion sections per week. Prerequisite: 200B; Biology 1A–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 with examples drawn from recent studies of genetic disease, cytoplasmic inheritance, the nervous system, behavior and evolution. Mr. Clark (SP)

120. Introduction to Molecular Virology. (4) Four 1-hour lectures per week. Prerequisite: organic chemistry, one course in biology. Consideration of viruses as infectious particles having chemical, physical, and hereditary characteristics. To be offered every other quarter in pass/fail pass basis.

196. Current Topics in Molecular Biology. (1) One 1-hour meeting per week. Prerequisite: consent of instructor. Group studies of selected topics. Mr. Echols (SP)

198. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations listed on page 38. Additional limitation: overall grade average of at least 3.0. Must be taken on a passed/not passed basis. The Staff (F, SP)

GRADUATE COURSES

200A–200B. Introduction to Molecular Biology. (5–5–5) Three 1 1/2-hour lectures and one discussion section per week. Prerequisite: Biology 1A–1B or equivalent, or Bacteriology 100A: Biochemistry 100A or 102, and a course in physical chemistry (these courses may be taken concurrently). Three-quarter sequence beginning in the fall.

200A. Genetic and functional characteristics of prokaryotic cells and of viruses; biosynthesis of nucleic acids and proteins, metabolic regulation.

Mr. Echols (F)

200B. Cell structure and gene expression in eukaryotes; cellular differentiation, macromolecular synthesis, chromosomal organization. Ms. Daniell (W)


*210. Molecular Biology Laboratory. (5) One hour of lecture and eight hours of laboratory per week. Prerequisite: consent of instructor. Experimental techniques used in research on the genetics of eukaryotic organisms and their viruses. Mr. Duesberg (SP)

211. Introduction to Research in Molecular Biology. (4–8) Closely supervised experimental work under the direction of individual staff members; an introduction to experimental methods and research approaches in particular areas of molecular biology. Limited to students in this department.

The Staff (F, SP)

220A–220B. Molecular Biology of Viruses. (3–3–5) Three hours of lecture per week. Prerequisite: Biology 1A–1B or equivalent, or Bacteriology 100A: Biochemistry 100A or 102 (may be taken on a passed/not passed basis); one year of college mathematics. Structure, reproduction, mutation, and host-cell interactions of viruses.

*220A. Plant and bacterial viruses. Mr. Fraenkel-Conrat (W)

220B. Animal cytoplasmic and tumor viruses. Mr. Duesberg (SP)

*230. Microbial Genetics. (3) Three hours of lecture per week. Prerequisite: course 200A or 200B, or consent of instructor. Course on current topics in molecular genetics. Emphasis will be on recent advances in the genetics of bacteria, eukaryotic microbes, and microorganisms. Mr. Clark (F)

*231. Microbial Genetics Laboratory. (5) Two hours of lecture and nine hours of laboratory per week. Prerequisite: course 230 or consent of instructor. Experimental techniques used in research on the genetics of bacteria. Mr. Clark (W)

*241. Techniques in Animal Cell Culture. (4) One hour of lecture and seven hours of laboratory per week. Prerequisite: 200B or consent of instructor. Techniques used in research on the growth and function of animal cells in culture.

270. Research Seminar. (1) Prerequisite: 211 or 220 taken concurrently, or instructor's consent. Critical presentation and evaluation of results in area of student's individual research interests.

The Staff (F, Sp)

280. Research. (1–12) Individual research under the supervision of a staff member. The Staff (F, Sp)

290. Seminar. (1) Recent topics in molecular biology. Topics will be announced in advance of each quarter. Enrollment in more than one section is permitted.

The Staff (F, Sp)

299. Special Study for Graduate Students. (1–5) Meetings to be arranged. Reading and conferences under the direction of a staff member.

The Staff (F, Sp)

302. Individual Study for Doctoral Students. (1–5) Individual study in consultation with the major field adviser. Individual opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (F, Sp)

NOTE: For key to symbols, see page 36.

Music

Department Office, 104 Morrison Hall

Professors:

Richard C. Kunai, Ph.D. (Chairman)

Michael Schubert, A.B.

Olaf Wilson, Ph.D.

David L. Boyden, M.A.

Charles E. Haney, M.A. (Emeritus)

Alan Curtis, Ph.D.

Joseph Litman, A.B.

Michael Cushing, M.A. (Emeritus)

W. Wilbur Corning, A.B.

Michael J. Sucher, M.D.

James E. Cunningham, M.M.

Edwin Dugger, M.F.A.

Steve Dineh, Ph.D.

Assistant Professor:

Waiter Wilson, Ph.D.

Senior Lecturers:

Elizabeth Davidson, M.A.

John M. Swackhamer, A.B.

Lecturers:

Bernhard Abernichtsich, Ph.D.

John Burke, M.M. (Organ)

Janet Mosele, B.Mus. (Flute)

Robert Mendenhall, A. B.

Jacek Kobylianski, A.B. (Clarinets)

M. A. (Violins)

Dana C. Gangopadhyay, B.Mus.

D. A. (Vocals)

Laurette Goldberg, B.Mus.

P. A. (Trumpet)

Harpsichord (Piano)

Felix Khuner

Maria Dean (Piano)

C. K. Lazaroff

Daniel Livesay, A.B.

Margaret Lucchetti, M.A.

A. M. (Percussion)

Margaret A. Rowell, A.B.

Frederick Laborde (Violin)

Xerxes S. Smith, S.I.

Charles C. Cushing, M.A.

Philip N. Watson (Trumpet)

H. W. Swadling, A.B.

Conostra Swall, M.A.

Martha Wasley, A.B. (Piano)

Departmental Major Advisers: Mr. Denny, Ms. Wade, Mr. Winlow.

Graduate Advisers: Composition, Mr. Feliciano (M.A. and Ph.D.); History and Literature, Mr. Dukles (M.A.), Mr. Newcomb (Ph.D.).

The Department of Music fosters the cultivation of music on campus through undergraduate and graduate programs of study, and also public concerts and lectures in the Hertz Memorial Hall, Morrison Music Building, and elsewhere. For undergraduates the Department offers a major in music, as well as numerous non-major courses for the student with little or no previous experience in music. For graduate students the Department offers programs leading to the M.A. and Ph.D. degrees in musical composition and in research. The Theory courses provide an introduction to the materials of musical composition through ear training, harmony, counterpoint, and analysis. The History and Literature courses present a comprehensive survey of the evolution of music and detailed study of the chief periods of its development. Courses in Ethnomusicology provide study of specific areas of world music, both in survey and in depth, and also provide an introduction to the principles and methods of research. Courses in Performance (including orchestra, chorus, concert band, and various ensembles) offer the opportunity to perform standard repertory as well as new or little-known works, and are open by audition to all students and to auditors.

All students, including transfer students as well as new undergraduates, who wish to major in music or to take any of the courses for majors listed under Group II, must take the Department's qualifying examination in musicianship and basic keyboard skill. This examination is given at the beginning of every quarter, during the first two weeks of the quarter, the Circular for New Undergraduates. Results of this examination determine admission to the major and assignment to sections of the courses in musicianship. Students wishing to fulfill the requirement for advanced placement in harmony can take the Department's special harmony examination; consult the Department Office.

All students who wish either to audit or to enroll in performance courses are requested to make ap-
pointments for auditions during the advance enrollment period.

The Major

First Year. Courses A–B–C; 1A–1B–1C.


Honors Program. Adviser: Mr. Heatzy. Sufficiently 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 Counseling. Consult major advisers.

Higher Degrees

The M.A. and Ph.D. degrees are offered in musical composition or 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. Please see Index for further information on Medieval Studies.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

Group I

Courses open to all students in the University.

LOWER DIVISION COURSES

Theory

10A–10B. Basic Musicianship. (2–2) Three 1-hour meetings per week. Fundamentals of music, including notation, sight singing, ear training, and beginning linear analysis. For general students.

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

History and Literature

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. Crocker (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 1 1/2-hour lectures per week. Prerequisite: course 27 or consent of instructor. A study of operas selected from the repertory of the San Francisco Opera Association.

Mr. Heatzy (F)

128B. The Symphonies of Beethoven. (4) Three 1-hour lectures per week. Prerequisite: course 27.

Mr. Dugger (F)

128C. Contemporary Music. (4) Three 1-hour lectures per week. Prerequisite: course 27.

Mr. Dugger (F)

128D. J. S. Bach. (4) Three 1-hour lectures per week. Prerequisite: course 27.

Mr. Heatzy (W)

128F. Music of Johannes Brahms. (4) Three 1-hour lectures per week. Prerequisite: course 27 or consent of instructor.

Mr. Crocker (F)

128H. G. F. Handel. (4) Three hours of lecture per week. Prerequisite: course 27.

Mr. Wilson (W)

133A. Music of the South Asia Tradition. (4) Three hours of lecture per week. Prerequisite: course 10A or consent of instructor. Musical concepts and techniques in the cultural and historical context of South Asian music, with emphasis on India, Indonesia, Thailand, Cambodia, and Laos.

Ms. Wade (F, W)

133B. Music of India. (4) Three hours of lecture per week. Prerequisite: course 133A or consent of instructor. Concentration on the classical music of India.

Ms. Wade (W)

134A. Music of the East Asia Tradition. (4) Three hours of lecture per week. Prerequisite: lower division introductory course in music, or consent of the instructor. Classical music of China, Korea, Vietnam, and Japan; with focus on instruments and concepts current throughout East Asia. Readings in the history of these cultures; analysis of music dealing with recent recordings.

Ms. Wade (F)

134B. Music of Japan. (4) Three hours of lecture per week. Prerequisite: course 134A or consent of instructor. An introduction to the study of Japanese traditional music, the courtly music of the Heian period, and contemporary compositions.

Ms. Wade (F)

Performance

Admission to all performance courses is determined by audition during the period of advance enrollment. All courses in this group may be repeated for credit.

140. Javanese Gamelan. (2) Formerly 411. Two 2-hour rehearsals and one discussion section per week. The study of Javanese Gamelan as a musical form, with focus on the gamelan instruments and their use in traditional Javanese music.

Ms. Wade in charge (F, W, Sp)

141. University Symphony Orchestra. (2) Two 1 3/4-hour rehearsals and discussions per week. The course should be taken in a three-quarter sequence.

Mr. Senturia (F, W, Sp)

142. University Chamber Band. (1) One 2-hour rehearsal per week.

Mr. Senturia (F, W, Sp)

143. University Concert Band. (2) Two 1 1/2-hour rehearsals and discussions per week. This course should be taken in a two-quarter sequence.

Mr. Denny (F, W, Sp)

144. University Chorus. (2) Two 1 1/2-hour rehearsals and one discussion section per week. The course should be taken in a two-quarter sequence.

Miss Davidson (F, W, Sp)

114S. Repertory Chorus. (2) Two 2-hour rehearsals per week. A mixed chamber choir that meets at a fixed time to rehearse works chosen from the choral repertoire. Ms. Wade (F, W, Sp)

146. Chamber Music Ensemble. (2) Four 1-hour rehearsals per week. Chamber Music for strings, winds, piano, percussion, and voice.

The Staff (F, W, Sp)

UPPER DIVISION COURSES

Theory

100A. Advanced Musicianship. (3) Three class hours per week. Prerequisite: courses F, 2C, and consent of instructor.

Mr. Denny (F)

100B. Keyboard Harmony. (3) Three class hours per week. Prerequisite: course 2C and consent of instructor.

Mr. Swackhamer (W)

100C. Score Reading. (3) Three class hours per week. Prerequisite: course 2C and consent of instructor.

Mr. Swackhamer (Sp)

101A–101B–101C. Tonal Counterpoint. (4–6) Three 1-hour class hours per week. Prerequisite: course 2C.

Sequence beginning (F)

Mr. Denny (F)

104A–105B–106C. Composition. (4–6) Three class hours per week. Prerequisite: course 2C and consent of instructor.

Sequence beginning (W)

Mr. Denny (F)

107A–107B. Studies in Musical Analysis. (4–6) Two 1 1/2-hour class hours per week. Prerequisite: course 2C.

Sequence beginning (W)

Mr. Denny (F)

109A–1109B. Orchestration. (4–6) Three 1-hour class hours per week. Prerequisite: courses 2C and 101A. Mr. Denny (F)

111A. Instrumental Conducting. (4–6) Formerly 112A. Two 1-hour class hours per week. Prerequisite: course 2C; 100A–100B–100C and 107A–107B–107C are recommended. Open to students who have received credit for Music 112B or 112C prior to Fall 1977, with consent of instructor.

Mr. Senturia (Sp)
111B. Advanced Instrumental Conducting. (4) Formerly 112C. Two hours per class week. Prerequisite: course 111A. Open to students who have received credit for Music 112B or 112C prior to Fall 1977, with consent of instructor. Continuation of 111A, which is prerequisite.

Mr. Senturia (Sp)

112A. Choral Conducting. (4) Two hours per class week. Prerequisite: courses 2008 or 100C, and consent of instructor. Mr. Cunningham (F)

**112B. Advanced Choral Conducting. (4) Two hours per class week. Prerequisite: course 112A. Open to students who have received credit for Music 112B or 112C prior to Fall 1977, with consent of instructor. Continuation of 112A, which is prerequisite.

History and Literature

**114. Music in the Fourteenth Century. (4) Three hours of lecture per week. Prerequisite: course 20C and 21C, or consent of instructor. A study of sacred and secular polyphony from the motets of Philippe de Vitry through the songs of Guillaume de Machaut, his contemporaries and successors, up to 1400.

Mr. Crocker

**115. 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. Mr. Curtis (W)

116F. The Organ Music of J. S. Bach. (4) Three hours of class per week. Prerequisite: courses 20C and 21C, or consent of instructor. Mr. Roe (F)

116G. J. S. Bach. (4) Three hours of lecture per week. Prerequisite: course 20C and 21C or consent of instructor. Mr. Curtis (F)

116H. Purell. (4) Four hours of lecture per week. Prerequisite: course 20C and 21C or consent of instructor. Emphasis will be upon the dramatic music, contemporaries and successors, up to 1400. Mr. Wilson (Sp)

117A. The Symphonies of Mozart. (4) Three class hours per week. Prerequisite: courses 20C and 21C, or consent of instructor. Mr. Website (Sp)

**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: courses 20C and 21C or consent of instructor. Mr. Denny

**117E. Music on the Grand Tour. (4) Three hours of lecture per week. Prerequisite: course 20C and 21C or consent of instructor. Emphasis will be upon the dramatic music, contemporaries and successors, up to 1400. Mr. Burney (F)

118A. The Symphonies: 1825-1910. (4) Three class hours per week. Mr. Newcomb

118B. Piano Music of the Romantic Period. (4) Three class hours per week.

118C. Art Song of the Nineteenth Century. (4) Three class hours per week. Prerequisite: courses 20C and 21C or consent of instructor. Mr. Newcomb (Sp)

118D. Wagner’s Ring of the Nibelung. (4) Three hours of lecture per week. Mr. Newcomb (W)

118E. Verdi. (4) Three class hours per week. Prerequisite: course 20C and 21C or consent of instructor. Mr. Kerman (F)

118F. Opera. (4) Three hours of lecture and one hour of listening/discussion per week. Prerequisite: courses 20C and 21C or consent of instructor. A studio of operas selected from the repertory of the San Francisco Opera Association.

Mr. Kerman (F)

118A. Debussy and Mahler. (4) Three hours of lecture per week. Prerequisite: courses 20C and 21C, or consent of instructor. A comparison of selected orchestral works of Debussy and Mahler. Class performance, using four-hand piano editions.

Mr. Senturia (F)

**119D. Chamber Music of the Twentieth Century. (4) Mr. Imbrie

119E. Contemporary Music. (4) Three class hours per week. Mr. Imbrie (Sp)

**119F. Studies in Afro-American Music. (4) Three hours of lecture per week. Prerequisite: course 20C, 130, or consent of instructor. Detailed analysis of specific musical forms and study of the historical development. Unique aspects of the musical organization, improvisational techniques, and value system will be explored.

Mr. Wilson (Sp)

120. The History of the Organ. (4) Three hours of lecture per week. The history of the organ with emphasis on the development of national styles. The unique instruments in the Music Department's collection. Mr. Byerly

121. Baroque Music. (4) Formerly 117D. Three hours of class per week. Prerequisite: consent of instructor. Mr. Curtis (F)

122. The History of the Organ. (4) Three hours of lecture per week. The history of the organ with emphasis on the development of national styles. The unique instruments in the Music Department's collection. Mr. Byerly

123. The Harpsichord. (4) Three hours of lecture per week. Prerequisite: courses 20C and 21C, or consent of instructor. History, construction, and literature of the harpsichord. Mr. Curtis (F)

180. Instrumental and Vocal Instruction. (1) One half-hour of laboratory per week. Open only to majors in music. Advanced private instruction in keyboard, stringed, percussion, and voice. May be repeated for credit if an average grade of B is maintained.

Mr. Wilson (Sp)

180A-180B. Organ in Music History and Criticism. (4-4) Three hours of lecture per week. Prerequisite: courses 20C and 21C, or consent of instructor. Emphasis will be upon the dramatic music, contemporaries and successors, up to 1400. A limited number of selected topics will be studied by means of lectures, discussions, and reports.

Mr. Website (F)

Honors and Special Courses

198. Honors Seminar. (4) Two 1/2-hour meetings per week. Prerequisite: consent of instructor and approval of the student's adviser. Restricted to seniors and graduate students. A seminar in late 19th century music and history. Mr. Heartz (W)

198A-198B. Seminar: Studies in Classic and Romantic Music. (4-4) Three hours of meeting per week. The topic will be announced. Mr. Website (W)

200A-200B. Advanced Undergraduate Special Study. (2 or 4) Metropolitan Museum of Art, Institute of Archaeology, Administration of Affairs, or Historical Society. Mr. Crocker (W)

205. Studies in the History of Theory. (4) Three class hours per week. Prerequisite: consent of instructor.

Mr. Website (W)

205A. Theory and Methodology of Ethnomusicology. (4) Three class hours per week. Prerequisite: consent of instructor. An introduction to the ideas, methods, theories, themes, and work of anthropologists, sociologists, folklorists, linguists, and other social scientists in the field of ethnomusicology. (May be taken with undergraduates with permission of instructor.)

Mr. Website (W)

208. Group Special Study. (2-8) Meetings as arranged. Mr. Website (W)

209. 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. Brett in charge) (F, W, Sp)

212A-212B. Seminar: Medieval Studies. (4-4) One 3-hour meeting per week. A final grade will be assigned upon completion of both quarters. Mr. Website (Sp)

213A-213B. Seminar: Studies in the Sixteenth Century. (4-4) One 3-hour meeting per week. Mr. Heartz (F)

214A-214B. 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. Website (W)

216. Seminar: Studies in Baroque Music. (4) Three hours of class per week. The topic will be announced. Mr. Website (F)

220A-220B. Seminar: Problems in Criticism. (4-4) One 3-hour meeting per week. Prerequisite: consent of instructor. Mr. Website (W)

230. Topics in Asian Music. (4) One 3-hour meeting per week. Prerequisite: consent of instructor.

Mr. Website (W)

235A. Theory and Methodology of Ethnomusicology. (4) Three class hours per week. Prerequisite: consent of instructor. An introduction to the ideas, methods, theories, themes, and work of anthropologists, sociologists, folklorists, linguists, and other social scientists in the field of ethnomusicology. (May be taken with undergraduates with permission of instructor.)

Mr. Website (W)

235B. Theory and Methodology of Ethnomusicology II. (4) Three class hours per week. Prerequisite: consent of instructor. An introduction to the ideas, methods, theories, themes, and work of anthropologists, sociologists, folklorists, linguists, and other social scientists in the field of ethnomusicology. (May be taken with undergraduates with permission of instructor.)

Mr. Website (W)

235C. Topics in Ethnomusicology. (4) Three hours of lecture per week. Prerequisite: consent of instructor. The topic for 1977 is the work of the scholar and philosopher of music, Charles Ives, and for 1978, for the scholar and philosopher of music, Charles Ives. Mr. Website (W)

240. Group Special Studies. (2-8) Meetings as arranged. The Staff (Mr. Brett in charge) (F, W, Sp)

249. 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. Website in charge) (F, W, Sp)

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. Brett in charge) (F, W, Sp)

259. Group Special Studies. (2-8) Meetings as arranged. The Staff (Mr. Website in charge) (F, W, Sp)

260. 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. Website in charge) (F, W, Sp)

261. Individual Study for Master's Students. (1–8) Prerequisite for the student to have obtained 400 level language requirements in consultation with the field adviser. May not be used for unit or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis.

NOTE: For key to symbols, see page 35.
satisfactory basis. The Staff (Mr. Newcomb in charge) (F, W, Sp)

602. Individual Study for Doctoral Students. (1-6)

Tended 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. May be taken on a satisfactory/unsatisfactory basis. The Staff (Mr. Duckles in charge) (F, W, Sp)

Professional Courses

403A-405B-405C. 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)

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)

429A. Stringed Instruments. (4) See Interdepartmental Studies for the complete description.

Interdepartmental Studies


*IDS 117. Music and the Philosophers. (4) See Interdepartmental Studies for the complete description of this course. Music: Mr. Heurtz; French: Mr. Rex (F)


Near Eastern Studies

Department Office, 1229 Dwinelle Hall

Professors:

Robert B. Alter, Ph.D.
Arif A. Bloch, Ph.D.
William M. Brbin, Ph.D.
George F. Deles, Jr., Ph.D.
Mounah A. Khouri, Ph.D.
James T. Moore, Ph.D.
Joseph Stelstenn, Dottore in Lettere

Associate Professors:

Harold Aigner, Ph.D.
Guzy Azarpay, Ph.D.
Wolfgang J. Heimpel, Ph.D.

(Chairman)

Assistant Professors:

Barnabas M. Gatt, Ph.D.
William C. Kickman, Ph.D.
Kent R. Weeks, Ph.D.

Professors:

Victor R. Gold, Ph.D. (Visiting)

Michael D. Guinan, Ph.D. (Visiting)

Assistant Professor:

William J. Fulco, Ph.D. (Visiting)

Lecturers:

Charlotte Grosman

Departmental Major Adviser: Mr. James T. Monroe

Graduate Adviser: Mr. Kent R. Weeks

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, Egyptology, Hittitology, Iran 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 Near Eastern Languages and Civilizations, and with the School of Education in an MAT program in Near Eastern Studies. In addition, the Department is cosponsoring with the School of Library and Information Studies a concurrent degree 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 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. For further information consult the departmental 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 Palestinion archaeology, Biblical studies, Semitic epigraphy and philology.

The Majors

A. The Major in Near Eastern Studies

1. In Arabic, Hebrew, Persian and Turkish: Prerequisite: the elementary course in that language, or its equivalent. 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 complete 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.

2. 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.

B. The Major in Ancient Near Eastern History and Archaeology

The major requires at least 68 quarter units. The required courses for the major shall include:

1. NES 20A-20B-20C, Anthropology 2, NES 15 or NES 16, for a total of 23 or 24 units. (Students who choose the Art History emphasis may substitute either History of Art 40 or NES 16 for Anthropology 2.)

2. At least 12 upper division units in one of the Near Eastern languages and at least 32 upper division units to be selected from the lecture course and seminars offered by the Department in the fields of history, archeology, art and culture. The following courses are required:


Honors Program

With the consent of the major adviser, 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 completed in the major may apply for admission to the honors program. The honors program consists of completion of the honors course H198, in which the student will prepare an honors thesis in the senior year.

Graduate Study

Graduate programs leading to the M.A. and Ph.D. degrees are offered in the following languages and literatures: Arabic, Hebrew, Persian, and Turkish; and in the following special fields of the Near East: archaeology, art history, Near Eastern Studies; Assyriology; Biblical and Judaic studies; Old Iranian studies, comparative Semitics, Egyptology, Hittitology, and Islamic studies.

Degrees. Applicants for graduate study should have fulfilled the equivalent of the departmental requirements for the A.B. or be prepared to satisfy these requirements before advancement to candidacy. Both M.A. and Ph.D. degrees require the study of one major and at least one minor language offered in the Department. If deemed relevant to the major, the minor language may be taken outside the Department with the consent of the graduate adviser.

The M.A. degree is obtained according to Plan II (see Graduate Division). In addition to the plan’s requirements, students must pass a reading examination in French or German or another language deemed pertinent by the graduate adviser. A written final examination is required of students to test (a) their working knowledge of the pertinent languages—one major language and at least one minor language in the department—according to the field of concentration; (b) general knowledge of the relevant history and civilization of the area; and (c) knowledge of other subjects specified in the program. Scholarly papers written independently or in connection with course work will also be required. Students must satisfactorily complete the requirements for the M.A. before proceeding to the Ph.D.

Admission to candidacy in the Ph.D. program depends on successful completion of the following requirements:

1) a reading examination in one of the two above-mentioned languages that was not taken for the M.A. degree, or in any other European language (i.e., Italian, Spanish, etc.) germane to the student’s main field of interest; (2) both the written and oral sections of the qualifying examination; and (3) submission of research or seminar reports written in the course of graduate work.

After admission to candidacy, the student completes the dissertation according to Plan A (see Graduate Division).

The Concurrent 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 (independent 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. and, in most cases, to study under the major adviser. First process 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. Application must be made to 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 Adviser in 1229 Dwinelle Hall.

Letters and Science List: for regulations governing
1454-1456C. The Archaeology of Palestine. (3-3) Formerly 195B. Three hours of lecture per week. The basic concepts of field archaeology (site selection, preparation for excavation, excavation methods) are treated. Mrs. Milgrom, Mr. Gold (F, W)

1515A-1515B. Medieval Jewish Civilization. (4-4) Three hours of lecture per week. The social and intellectual history of the Jews in Europe from the Near East of the thirteenth to the fourteenth century. Mr. Bokser (W, Sp)

1525B. Art and Architecture. (4-4-4) Three hours of lecture per week. A survey of the art and architecture of Ancient Iran and neighboring regions; study of sites and the ways in which it reflects Israel's historical predicament. Mr. Winston (F)

1531B. Hebrew Literature in Translation. (4-4) Four hours of lecture per week. A survey of Hebrew literature in translation from the Middle Ages to the present. Mr. Knapp (F, W, Sp)

1541A-1541B-1541C. The Archaeology of Palestine. (3-3-3) Three hours of lecture per week. Study of the major varieties of Hasidic Mysticism from its sixteenth-century origin through the modern period. Mr. Dan (W)

1545A-1545B. Introduction to Islamic Art. (4) Formerly course 155A. Three hours of lecture per week. The art and architecture of Islamic lands from the seventh to the seventeenth century. Ms. Azarpay (W)

1571A-1571B. Jewish History. (4-4) Three hours of lecture per week. The political, legal, and social development of the Jewish people from its origins until the formation of Israel. Mr. Schwartz (F, W, Sp)

1605A-1605B. History and Culture of Ancient Iran. (4-4) Three hours of lecture per week. The political, legal, and social development of the Jewish people from its origins until the formation of Israel. Mr. Schwartz (F, W, Sp)

1616A-1616B. Civilization of Ancient Iran. (4-4) Three hours of lecture per week. The civilization of the Iranian nations from the beginning of the rise of Islam until the end of the medieval period to the contemporary period. Mr. Schwartz (F, W)

1640A-1640B. Civilization of Ancient Iran. (4-4) Three hours of lecture per week. The civilization of the Iranian nations from the beginning of the rise of Islam until the end of the medieval period to the contemporary period. Mr. Schwartz (F, W)

1640A-1640B. Civilization of Ancient Iran. (4-4) Three hours of lecture per week. The civilization of the Iranian nations from the beginning of the rise of Islam until the end of the medieval period to the contemporary period. Mr. Schwartz (F, W)

1648A-1648B. Civilization of Ancient Iran. (4-4) Three hours of lecture per week. The civilization of the Iranian nations from the beginning of the rise of Islam until the end of the medieval period to the contemporary period. Mr. Schwartz (F, W)

NOTE: For key to symbols, see page 36.
Arabic

LOWER DIVISION COURSES

1A- 1B-1C. Elementary Arabic. (6-5-5) Five 1-hour recitation sessions and one 1-hour laboratory per week. Sequence beginning (F).

Mr. Zeitlin in charge (F, W, Sp)

200A-200B-200C. Intermediate Arabic. (4-4-4) Five 1-hour recitation sessions and two 1-hour drill sessions per week. Prerequisite: course 1A-1B-1C or equivalent. Sequence beginning (F).

Mr. Brinner in charge (F, W, Sp)

19A. Supervised Independent Study and Research. (1-5) Enrollment is restricted by regulations on page 36. Must be taken on a passed/not passed basis.

The Staff (F, W, Sp)

UPPER DIVISION COURSES

201. Arabic Dialectology. (4) Formerly 210A-210B-210C. Three 1-hour lectures per week. Prerequisite: at least two years of Arabic and one year of another Semitic language or equivalent. A comparative approach to the Arabic dialects, their relationship to literary Arabic and other Semitic languages.

Mr. Bloch (F, W, Sp)

202. Advanced Spoken Arabic. (4) Formerly 202A-202B-202C. Three hours of lecture per week. Prerequisite: course 101A-101B-101C or consent of instructor. Intensive study of a particular dialect. May be repeated for credit when applied to a different dialect.

Mr. Bloch (W)

204A-204B-204C. Classical Arabic Poetry and Prose. (4-4-4) Formerly 204A-204B-204C. Three hours of lecture per week. Prerequisite: 104A-104B-104C or equivalent. Intensive study of major works from the pre-Islamic to the end of the 11th century. Readings in Selected Cuneiform texts. May be repeated for additional credit when subject matter differs.

Mr. Brinner (W)

206A-206B-206C. Contemporary Arabic Literature. (4-4-4) Three 1-hour lectures per week. Prerequisite: 105A-105B-105C or equivalent. May be repeated for additional credit.

Mr. Khouri (F, W, Sp)

208A-208B-208C. Judeo-Arabic. (4-4) Three hours of lecture per week. Prerequisite: 101A-101B-101C or consent of instructor. A survey of the various examinations required for 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)

225. Supervised Field Research in Near Eastern Archaeology. (10-15) Full time participation in an archaeological excavation or exploratory survey. Students will participate in all aspects of the operation and be responsible for preparing a written report on some specific part of the work. Geographical areas and sites to be determined each year.

Mr. Weeks (F, W, Sp)

226. Seminar in Near Eastern Art. (4-4) Three hours of class per week. Prerequisite: open to graduate students and Ancient Near East majors. Admission by consent of instructor. Graduate seminar on specific aspects of the arts of Western and Central Asia. Topics will vary according to student interest. May be repeated for credit. Students who take the course in succession will be assigned credit at the end of the sequence.

Ms. Azarpay (F, W, Sp)

GRADUATE COURSES

200. Advanced Grammar and Syntax. (Formerly 200A-200B-200C. Three hours of lecture per week. Prerequisite: course 103A-103B-103C.

Mr. Bloch (F)

201. Arabic Dialectology. (Formerly 201A-201B-201C. Three hours of lecture per week. Prerequisite: at least two years of Arabic and one year of another Semitic language or equivalent. A comparative approach to the Arabic dialects, their relationship to literary Arabic and other Semitic languages.

Mr. Bloch (F, W, Sp)

209A-209B-209C. Primary Sources in Arabic Studies. (4-4-4) Three hours of lecture per week. Prerequisite: course 103B-103C or equivalent. Readings in primary materials, all problems in Arabic or equivalent. May be repeated for additional credit when subject matter differs.

Mr. Brinner (W)

288. Seminar. (2-8) Students may receive credit for more than one seminar in the same quarter. May be repeated for credit when topics change and with consent of instructor. Topics will vary from year to year. For precise schedule of offerings, see department catalog.

Mr. Stefanini (F, W, Sp)

Cuneiform

UPPER DIVISION COURSES

100A-100B-100C. Elementary Akkadian. (4-4-4) Three 1-hour meetings per week. Introduction to Akkadian grammar. Reading of selected cuneiform texts. Sequence beginning (F). Ms. Kimer (F, W, Sp)

101A-101B-101C. Intermediate Akkadian. (4-4-4) Three 1-hour meetings per week. Prerequisite: course 100A-100B-100C or consent of instructor. Introduction to Cuneiform texts. May be repeated for additional credit. Sequence beginning (F, W). Mr. Heimpel (F, W, Sp)

106A-106B-106C. Elementary Hittite. (4-4-4) Three 1-hour meetings per week. Introduction to Cuneiform Hittite language and grammar with reading of selected historical and religious texts.

Sequence beginning (F, W, Sp)

198. Directed Group Study for Upper Division Students. (1-4) The Staff (F, W, Sp)

H198. Senior Honors. (2) Prerequisite: limited to senior honors candidates. Directed study centering upon preparation of an honors thesis. The Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1-5) Enrollment is restricted by regulations on page 36. Must be taken on a passed/not passed basis.

The Staff (F, W, Sp)

GRADUATE COURSES

**200A-200B-200C. Advanced Akkadian. (4-4-4) Three hours of lecture per week. Prerequisite: course 104A-104B-104C or consent of instructor. May be repeated for additional credit.

Major composition.

Mr. Heimpel (F, W, Sp)

206A-206B-206C. Advanced Hittite. (4-4-4) Three 1-hour meetings per week. Prerequisite: course 104A-104B-104C or consent of instructor. May be repeated for additional credit.

Mr. Heimpel (W, Sp)

210A-210B-210C. Advanced Sumerian. (4-4-4) Three 1-hour meetings per week. Prerequisite: course 103B-103C or consent of instructor. Selected readings in Sumerian. May be repeated for additional credit.

The Staff (F, W, Sp)

288. Seminar. (2-8) Students may receive credit for more than one seminar in the same quarter. May be repeated for credit when topics change and with consent of instructor. Topics will vary from year to year. For precise schedule of offerings, see department catalog.

Mr. Stefanini (F, W, Sp)
**H198. Senior Honors.** (2) Prerequisite: limited to senior honors candidates. Directed study centering upon preparation of an honors thesis. The Staff (F, W, Sp)

198. Supervised Independent Study and Research. (1–5) Enrolment is restricted by regulations shown on page 36. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

**GRADUATE COURSES**

**200A–200B–200C. Advanced Biblical Hebrew Texts.** (4–4–4) Three hours of lecture per week. Prerequisite: course 10A–10B–10C and 105A–105B–105C or equivalent. May be repeated for additional credit with consent of instructor. The Staff (F, W, Sp)

201A–201B–201C. Later Stages of Egyptian. (4–4–4) Three 1-hour meetings per week. Prerequisite: course 101A–101B–101C and 202A–202B–202C 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: concurrent or previous enrollment in course 101A–101B–101C or consent of instructor. May be repeated for additional credit. The Staff (F, W, Sp)

203. Intensive 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 temple of Amon at Karnak. (W), Mr. Alter (Sp)

204. Elementary Hebrew. (5–5–5) Five 1-hour meetings per week. Prerequisite: course W5A–10SB–10SC and one of the following: Hebrew 101A–101B–101C, or equivalent. Study of texts or themes based on texts, e.g., magic, messianic, poetic, apocalyptic, sectarian, historical, exegetical, or legal texts. May be repeated for additional credit with consent of instructor. (Sp)

104A–104B–104C. Modern Hebrew Texts. (4–4–4) Three hours of lecture per week. Prerequisite: course 101A–101B–101C or equivalent. May be repeated for credit with consent of instructor when reading material varies. (Sp)


106. Introduction to Bibliography of Jewish Studies. (2) Two hours of lecture per week. An introduction to the history, methods, and scope of bibliographical work in Jewish studies: descriptive bibliography, indexes and reference tools for students of Jewish literature. Sample problems in bibliographical research. (F, W), Mr. Bokser (in charge) (F)

198. Directed Group Study for Upper Division Students. (1–4) The Staff (F, W, Sp)

H198. Senior Honors. (2) Prerequisite: limited to senior honors candidates. Directed study centering upon preparation of an honors thesis. The Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1–5) Enrolment is restricted by regulations shown on page 36. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

**GRADUATE COURSES**

201A–201B–201C. Advanced Biblical Hebrew Texts. (4–4–4) Three hours of lecture per week. Prerequisite: course 10A–10B–10C and 105A–105B–105C or equivalent. May be repeated for credit with consent of instructor and when reading material differs. Grades and units will be assigned at completion of entire sequence. (Sp)

202A–202B–202C. Advanced Rabbinic Hebrew Texts. (4–4–4) Three hours of lecture per week. Prerequisite: course 201A–201B–201C and 105A–105B–105C or equivalent. May be repeated for credit with consent of instructor and when reading material differs. (Sp)

203A–203B–203C. Advanced Talmudic Hebrew Texts. (4–4–4) Three hours of lecture per week. Prerequisite: course 202A–202B–202C and 105A–105B–105C or equivalent. May be repeated for credit with consent of instructor and when reading material differs. Mr. Alter, Mr. Dan (W, Sp)

204A–204B–204C. Advanced Modern Hebrew Texts. (4–4–4) Three hours of lecture per week. Prerequisite: course 105A–105B–105C and one of the following: 101A–101B–101C, 102A–102B–102C or 103A–103B–103C, or equivalent. Course may be repeated for additional credit when subject matter varies. (Sp)

205. Studies in Hebrew Linguistics. (4) Three 1-hour meetings per week. Prerequisite: consent of instructor. (Sp)

206. Ancient and Modern Hebrew Literary Texts. (4–4–4) Three hours of lecture per week. Prerequisite: course 201A–201B–201C or consent of instructor. Focus on biblical texts seen from a literary point of view, attempting to establish connections with later Hebrew literature. Mr. Alter (W)

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)

**301. Pre-Islamic Iranian Studies.** (4–4–4) Three 1-hour meetings per week. Prerequisite: course 201A–201B–201C or consent of instructor. May be repeated for additional credit. Manichean Middle Persian texts, with an introduction to Pahlavi. Mr. Schwartz (W, Sp)

111A–111B–111C. Old Iranian. (4–4–4) Three 1-hour meetings per week. Prerequisite: consent of the instructor. May be repeated for additional credit. Texts from the Vendicd and the Yashts; Achaemenid inscriptions. Mr. Schwartz (W, Sp)

201A–201B–201C. Iranian Philology. (4–4–4) Three 1-hour meetings per week. Prerequisite: course 111A–111B–111C or 110A–110B–110C or consent of instructor. May be repeated for additional credit. Readings of texts in Avestic, Western Middle Iranian, and Sogdian taken from Zoroastrian, Manichean and Buddhist texts. Mr. Schwartz (Sp)

**Semitics**

**UPPER DIVISION COURSES**

100A–100B–100C. Aramaic. (4–4–4) Three 1-hour lecture sessions per week. Three hours of class per week. Prerequisite: course 100A–100B–100C or equivalent. May be repeated for additional credit with consent of instructor. (Sp)

102A–102B–102C. Readings in Classical Persian Prose. (4–4–4) Three 1-hour meetings per week. Prerequisite: course 101A–101B–101C or consent of instructor. (F, W, Sp)

103A–103B–103C. Classical Persian Poetry. (4–4–4) Three 1-hour meetings per week. Prerequisite: course 101A–101B–101C or consent of instructor. (F, W, Sp)

104. Contemporary Persian Literature. (4) Three hours of class per week. Prerequisite: course 101A–101B–101C or consent of instructor. Selected readings from the modern poetry of contemporary Iran, with particular attention to the socio-political context of the works in question. (Sp)

198. Directed Group Study for Upper Division Students. (1–4) The Staff (F, W, Sp)

H198. Senior Honors. (2) Prerequisite: limited to senior honors candidates. Directed study centering upon preparation of an honors thesis. The Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1–5) Enrolment is restricted by regulations shown on page 36. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

**NOTE:** For key to symbols, see page 36.
**Neurobiology**

**Group Major Office, 301 Campbell Hall**

**Major Advisers:** Mr. C.H.F. Rowell (A-H), Mr. Robert Zucker (S-Z)

**Group Major in Neurobiology**

The group major program is administered through the Division of Neurobiology. Requests for admission are referred to this office for all administrative matters, and this is where major students will file their study lists.

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, students must 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, molecular biology, and zoology. 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 subjects. It may lead to graduate study in neurobiology, and might also be appropriate for those entering the health sciences who are already strongly biased towards later specialization in neurology, neuropathology, psychiatry, pharmacology, or mental health. It must be presented to a group adviser no later than the beginning of the senior year. Students must be approved for additional credit with the consent of an instructor. The honors program consists of the preparation of a written thesis on a topic in neurobiology. This thesis must be presented to a group adviser no later than the fourth week of the quarter in which the student expects to gradute. The student may enroll in a 195 course in a cognate department for supervised independent study for the purpose of preparation of the thesis, but units for such courses will not count toward the 45 units of upper division courses required in the major. The undergraduate advisers, acting as a committee, will approve the thesis and if the student has satisfied the prerequisite grade-point stipulation, the student will be recommended to the Dean for a degree with honors.

**Graduate Program**

The M.A. and Ph.D. degree programs in neurobiology are administered by the Graduate Group in Neurobiology. Information concerning admission and degree requirements may be obtained from the Chairman of the Group, Mr. F. W. Sproul, Department of Electrical Engineering and Computer Science.

**GRADUATE COURSES**

**Anatomy 203. Functional Neuroanatomy.** (4) See Physiology-Anatomy for a complete description of this course.

**Anatomy 206. Seminar in Advanced Neuroanatomy Topics.** (2) See Physiology-Anatomy for a complete description of this course.

**EECS 286. Neurophysiology of the Visual System.** (3) See Electrical Engineering and Computer Sciences for a complete description of this course.

**Entomological Sciences 219. Physiological Mechanisms in Insect Behavior.** (3) See Entomological Sciences for a complete description of this course.

**Entomological Sciences 219L. Laboratory in Physiological Mechanisms in Insect Behavior.** (1) See Entomological Sciences for a complete description of this course.

**IDS 200. Comparative Neurophysiology.** (4) See Interdepartmental Studies for a complete description of this course.

**IDS 200L. Advanced Laboratory in Neurophysiology.** (6) See Interdepartmental Studies for a complete description of this course.

**IDS 210L. Laboratory: Cellular Mechanisms Underlying Nervous Activity.** (5) See Interdepartmental Studies for a complete description of this course.

**IDS 202. Neural Integration and Coordination.** (4) See Interdepartmental Studies for a complete description of this course.
Oriental Languages

Department Office, 104 Durant Hall

Professors:
Haruo Aoki, Ph.D.
Edward H. Schafer, Ph.D. (Agassiz Professor)
Mr. Miyoshi (Emeritus)
Mr. Bosson (Emeritus)

Departmental Major Advisers: Mr. Chang (F), Mr. Miyoshi (Sp)
Mr. Bosson (Emeritus)

Graduate Advisers: Mr. Miyoshi (Sp)

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, Japan, Korea, and Tibet, is located on the Berkeley campus. A student selects one area of emphasis in the under-graduate major program: Chinese, Japanese, or Altaiic languages and literatures. In addition to initial acquisition of a facility in the spoken language to a reading knowledge of both modern and classical forms, individual upper division courses stress the philo-

dology, linguistics, and literary study of Oriental Lan-
tures, and students are encouraged to select courses that will provide them an insight into each of these disciplines. The Department also emphasizes the study of a particular aspect in the cultural background.

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 (5-4-4); 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), Modern Chinese (130A-130B-130C), Modern Chinese (150A-150B-150C), Modern Chinese (160A-160B-160C); Japanese (100A-100B-100C, 160A-160B-160C); Japanese (129A) or Japanese 129B (4) or Japanese 1290 (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 36 upper division units.

Emphasis on Altaiic Languages

Lower Division: Oriental Languages—Korean 1A-1B-1C (5-5-5) or Near Eastern Studies—Turkish 1A-1B-1C (4-4-5); Linguistics 20 (5).

Upper Division: Oriental Languages—Altaiic 144A (4)-144B (4)-144C (4-4-4) and other relevant courses as designated by the adviser (e.g., Oriental Languages 143 (4), Altaiic 177A-177B (4-4), Near Eastern Studies—Turkish 100A-100B-100C (5-4-4) and 168A-168B (4-4)) to make a total of 36 upper division units.

Honor Program. An undergraduate student who has completed 12 units of 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 Honor Program. If accepted, the student will enroll in H195 for three consecutive quarters. A minimum cumulative grade-point average of 3.3 in all upper-graduate work in the University.

Graduate Programs

M.A. and Ph.D. programs are offered in Chinese Language and Literature, in Classical Chinese, and in Japanese Language and Literature. The M.A. degree is offered in Altaiic 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 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 at 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

36. Great Books of Eastern Asia. (4) Three hours of lecture per week. Prerequisite: no knowledge of an Oriental language required. Lectures and readings in the great literary classics of China, Japan, Korea, and Tibet, in English translation. Mr. Lancaster (Sp)

UPPER DIVISION COURSES

1152A-1152B. Chinese Literature in Translation. (4-4) Three hours of lecture and discussion per week. Prerequisite: junior standing; sophomores admitted with consent of instructor. Lectures on principal Chinese writers, authors, and individual works of Chinese literature from the beginning to the present day, with section discussions (to follow each lecture) based on lectures and on students’ reading of selected works in English translation. Mr. Bosch (Sp)

132. History of Japanese Literature. (4) Three 1-hour meetings per week. From the beginning to modern times, with emphasis on Chinese, Buddhist, and Western influences. Mr. Motofuji (W)

141-143. Civilizations of Eastern Asia. (4) Three hours of lecture per week.

141. Japan. Major themes in the development of traditional Japanese civilization. Mr. McCullough (W)

142. Korea. The development of Korean civilization, with emphasis on Chinese influence. Mr. Rogers (F)

143. Mongolia. A survey of the historical, cultural, and linguistic development of the Mongols. Mr. Bosch (F)

151. The Modern Japanese Novel in English Translation. (4) Two 1-hour meetings per week. Intensive formal analysis of six modern Japanese novels and three English and American novels. Mr. Miyoshi (Sp)

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. Mr. Motofuji (Sp)

171A—171B. Development of Buddhism In the Far East. (4-4) Three 1-hour lectures per week. An introduction to the history and development 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 begins (F). May be repeated for credit with consent of instructor.

Mr. Lancaster (W)

NOTE: For key to symbols, see page 36.
Chinese

LOWER DIVISION COURSES

1A-1B-1C. Elementary Chinese. (5-5-5) Five 1-hour meetings plus two additional hours in the language laboratory any week. Prerequisite: students with previous knowledge of the language admitted only by consent of instructor. Final 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. (4-4-4) Formerly 11A-11B-11C. Two 1-hour meetings per week. Prerequisite: two 1-hour meetings per week. Prerequisite: course 1A or 11B is prerequisite to 1B; 28-20: three 1-hour meetings per week. Pre-requisite: 2A is prerequisite to 2B; 2B or equivalent is prerequisite to 2C. 2A: Characters, radicals, grammar; easy readings in pre-han literature; 2B: dictionaries; easy readings in Han and Six-dynasties literature; 2C: easy readings in T'ang literature. Mr. Chang (F)

10A-10B-10C. Intermediate Chinese. (5-5-5) Five 1-hour meetings and one additional hour in the language laboratory per week. Prerequisite: course 10A. Students who have attended a Chinese school admitted only by consent of instructor.

Sequence beginning (F). The Staff (F, W, Sp)

UPPER DIVISION COURSES

100A-100B-100C. Advanced Chinese. (5-5-5) Five 1-hour meetings per week. Prerequisite: Chinese 10C, or consent of instructor. Students are not prerequisite to 100B; 100B is not prerequisite to 100C. Reading and discussion, in Chinese, of modern Chinese texts, literary, practical. In a variety of themes. Assignments to develop oral and writing skills. Students who have attended a Chinese school admitted only by consent of instructor.

Mr. Birch (100A-100B); Mr. Cheung (100C) (F, W, Sp)

1012A-1013B. Readings in Modern Chinese Scholarship. (4-4) Formerly 102. Course 102B open to students who have received credit for 102.) Two 1 1/2-hour meetings per week. Prerequisite: course 100A. A course designed to develop the student's reading knowledge of writings in pinyin on Chinese literature. Mr. Cheung (W)

103. Classical Chinese: Medieval Texts (Cultural). (4-4) Three 1-hour meetings per week. Prerequisite: course 10C. Open to students who have received credit for 113, with consent of instructor. Historical and other narrative texts from the T'ang period.

Mr. Schaler (F)

104A-104B. Studies in Ancient Chinese Literature: Philological Analysis of Texts. (4-4) Three 1-hour meetings per week. Prerequisite: courses 103 or 113 and 8 additional units of upper division Chinese or Japanese. Topics and texts will vary from year to year, normally in sequence: Prose (F), Poetry (W), Writings (Sp)

UPPER DIVISION COURSES

100A-100B-100C. Readings in Chinese Buddhist Texts. (4-4-4) Two 1 1/2-hour meetings per week. Prerequisite: one upper division course in Classical Chinese. 10C, 113A or 113B is prerequisite to 100B; 110A and 110B are not prerequisite to 110C. Mr. Chang (F)

111B. Documents on the Chinese World Order. (4-4) Two 1 1/2-hour meetings per week. Prerequisite: three quarters of Classical Chinese, including course 133. Philosophical analysis of documents pertaining to the Chinese tributary system, c. B.C. 1000- A.D. 1280. Mr. Chang (Sp)

111B. Documents on the Chinese World Order. (4-4) Two 1 1/2-hour meetings per week. Prerequisite: three quarters of Classical Chinese, including course 133. Philosophical analysis of documents pertaining to the Chinese tributary system, c. B.C. 1000- A.D. 1280. Mr. Chang (Sp)

111B. Documents on the Chinese World Order. (4-4) Two 1 1/2-hour meetings per week. Prerequisite: three quarters of Classical Chinese, including course 133. Philosophical analysis of documents pertaining to the Chinese tributary system, c. B.C. 1000- A.D. 1280. Mr. Chang (Sp)

112A. Classical Chinese: Medieval Poetry. (4-4) Three hours of lecture per week. Prerequisite: courses 111B or 111C. Mr. Schaler (F)

112B. Classical Chinese: Medieval Poetry. (4-4) Three hours of lecture per week. Prerequisite: courses 111B or 111C. Mr. Schaler (F)

133. Chinese Bibliography. (4) Three 1-hour meetings per week. Prerequisite: two upper division courses in classical Chinese. Open to seniors or by consent of instructor.

Mr. Jamieson (W)

Japanese

LOWER DIVISION COURSES

1A-1B-1C. Elementary Japanese. (5-5-5) Formerly 1J-2J-3J. Five 1-hour meetings per week. Registration for two additional hours per week in the language laboratory is required. Prerequisite: students with previous knowledge of the language admitted only by consent of instructor. Sequence beginning (F).

The Staff (F, W, Sp)

10A-10B-10C. Intermediate Japanese. (5-5-5) Formerly 4J-5J-6J. Five 1-hour meetings and one 1-hour laboratory per week. Prerequisite: course 10A, 10B, or 10C. 10A is prerequisite to 10B; 10B is prerequisite to 10C. Students who have attended a Japanese school administered by consent of instructor.

The Staff (F, W, Sp)

12. Introduction to Literary Japanese. (3) Three 1-hour meetings per week. Prerequisite: course 10C or equivalent.

Mrs. McCullough (F)

UPPER DIVISION COURSES

100A-100B-100C. Advanced Japanese. (5-5-5) Five 1-hour meetings per week. Prerequisite: courses 100A, 100B or 100C. Students who have attended a Japanese school administered by consent of instructor. Final examinations for 100A-100B-100C prior to Fall 1975. A linguistic analysis of the phonological system of Japanese. An introduction to some of the principal types of modern Japanese historical texts. Mr. McCullough (F)

Korean

LOWER DIVISION COURSES

1A-1B-1C. Elementary Korean. (5-5-5) Formerly 1K-2K-3K. 1A. Five 1-hour meetings per week. 1B-1C. Two 1-hour laboratories per week. Prerequisite: 1A. Five 1-hour meetings per week. Prerequisite: course 10A or equivalent. Mrs. McCullough (F)

134A-134B-134C. Readings in Classical Korean Literature. (4-4) Three 1-hour meetings per week. Prerequisite: course 134A. Students who have attended a Korean school administered only by consent of instructor.

Mr. Chang (W)

189. Japanese Documents. (4) Three 1-hour meetings per week. Prerequisite: courses 129A or 129B or equivalent. An introduction to some of the principal types of premodern Japanese historical texts. Mr. McCullough (F)

Altaic

144A-144B-144C. Introduction to Mongolian. (5-5-5) Four 1-hour meetings per week. An introduction to the official language of the Mongolian People's Republic (Khalkha). Graded readings in literary and expository texts.

Mr. Miyoshi (F, W)

159A-159B-159C. Intermediate Mongolian. (4-4-4) Three 1 1/2-hour meetings per week. Continued reading and exercises in Khalkha, together with an exploration into the orthography and grammar of literary Mongolian in vertical script. Selected prose texts from the 17th century to the present in both Cyrillic and vertical script. Mr. Bosson (F, W, Sp)

177A-177B. Manchu. (4-4) Three 1 1/2-hour meetings per week. Prerequisite: junior standing; consent of instructor. An introduction to literary Manchu; reading of selected prose texts. Mr. Bosson (Sp)

178A-177B. Survey of Mongolian Languages. (4-4) Three 1-hour meetings per week. Prerequisite: courses 144A, 144B, 144C. The linguistic classification of the mongol languages will be discussed in connection with a detailed study and comparison of their phonological and morphological peculiarities.

Mr. Bosson (F, W, Sp)

178B. Burzat. (4) Three 1-hour meetings per week. Prerequisite: courses 177A, 177B. An introduction to the standard modern Burzat literary language; reading of selected prose texts. Mr. Bosson (Sp)

Tibetan

164A-164B-164C. Elementary Tibetan. (4-4-4) 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. 164A. One 2-hour meeting per week. Prerequisite: courses 164A-164B. Mr. Bosson (F, W, Sp)

174A-174B-174C. Intermediate Tibetan. (3-3-3) Three 1-hour meetings per week. Prerequisite: course 164C. Emphasis on doctrinal Buddhist texts. Mr. Lancaster (F, W, Sp)
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 (Sp)

SPECIAL UPPER DIVISION COURSES

H198. 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, Sp)

198. Preceptorial and Reading Course. (1-4) Hours to be arranged. Prerequisite: junior standing. The Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1-6) Enrollment is restricted by regulations listed on page 30. Additional limitations: restricted to senior honor students in Oriental Languages. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

GRADUATE COURSES

*201. Japanese Bibliography. (3) Three 1-hour meetings per week. Prerequisite: Japanese 100A-100B-100C. Japanese reference works for literature and culture. Mr. McCulloch (F)

*202. Korean Bibliography and Research Method. (4) Two 1 1/2-hour meetings per week. Prerequisite: Korean 1C; Chinese 103, 113, or consent of instructor. Survey and analysis of major source works from the Three Kingdoms period through the Yi Dynasty. Mr. Jamieson (F)

*206. Seminar in Early Chinese Fiction. (4) One 2-hour seminar per week. Studies in the historical development of Chinese fiction and a critical analysis of some early fictional writings. May be repeated for credit with consent of instructor. Mr. Cheung (Sp)

206. Chinese Vernacular Literature. (4) One 2-hour seminar per week. Detailed study of a text with its literary and historical background. May be repeated once for credit with consent of instructor. Mr. Birch (W)

210. Seminar in Buddhism and Buddhist Texts. (4) One 2-hour seminar per week. May be repeated for credit with consent of instructor. Mr. Lancaster (Sp)

*212. Seminar in Chinese Literary History. (4) One 2-hour seminar per week. Textual and aesthetic criticism. Mr. Schuler (F)

213A–213B. Seminar in Philological Analysis of Ancient Chinese Texts. (4–4) One 2-hour seminar per week. Prerequisite:-course 104A or 104B with consent of instructor. A seminar on the philological approach to the texts of the late Chou period; the particular text chosen for study will vary from year to year. Credit and grade will be awarded upon completion of the sequence. (W, Sp)

216A–216B. Texts on the Civilization of Medieval China. (4-4) One 2-hour seminar per week. Studies in the history of Chinese students who have received course credit for 216B, with consent of instructor. 216A will be devoted to the background readings in secondary sources; 216B will be devoted to the study of primary sources. Credit and grade will be awarded upon completion of the sequence. Mr. Schuler (F, W)

*216C. Seminar in Philological Analysis of Koryo and Yi Dynasty Sources. (4) One 2-hour seminar per week. May be repeated for credit with consent of instructor. Mr. Rogers (W)

*216D. Seminar on the Sources for the Traditional Chinese World Order. (4) One 2-hour seminar per week. Prerequisite: advanced knowledge of literary Chinese. Cultural, strategic, and economic factors in the operation of the tributary system of the Chinese empire. Historiographical effects of the tension between orthodox ideology and political reality. Emphasis on textual analysis of primary sources. Mr. Rogers (Sp)

224. Reading in Altaic Texts. (4) One 2-hour seminar per week. May be repeated for credit with consent of instructor. Mr. Bosson (Sp)

229A–229B. Seminar in Classical Japanese Texts: Helen Prose. (4-4) One 2-hour meeting per week. Prerequisite: one semester of Japanese. Open to students whose first language is an Altaic language. In the first quarter, individual meetings are arranged with the instructor to prepare students for the seminar. In the second quarter, one hour seminar meeting is held each week. A final grade is assigned upon completion of both quarters. May be repeated for credit. Mr. McCulloch (W, Sp)

236. Seminar in Chinese Linguistics. (4) One 2-hour seminar per week. Prerequisite: one or more of the following: 125, 135, 154, 165, 166, 185. Mr. Chang (Sp)

239. Seminar in Japanese Linguistics. (4) One 2-hour seminar per week. Prerequisite: 125. May be repeated for credit. Mr. Aoki (F)

*240. Seminar in Alttco Compartive Phonology. (4) One 2-hour session per week. A laboratory in comparative phonology of the Altaic languages. Each student will concentrate on one specific aspect of the problem. Mr. Bosson (W, Sp)

*249A–249B. Seminar in Modern Japanese Literature. (4–4) One 2-hour meeting per week. Prerequisite: Japanese 159. O.L. 249A is prerequisite to 249B, May be repeated for credit with consent of instructor. A final grade is assigned upon completion of 249A or 249B.

260. Seminar on Classical Japanese Drama. (4) One 2-hour seminar per week. Prerequisite: 129A or 129B or 129C or 160. Analysis and discussion of major plays from the Noh and Joruri theater. Selections from the works of Zeami and Chikamatsu will be made in alternate years. Mr. Motofuji (Sp)

*269A–269B. Seminar in Classical Japanese Poetry. (4-4) One 2-hour meeting per week. Prerequisite: courses 129A or 129B or 129C or 160. Seminar sequence intended to provide an opportunity for advanced study in the area of the title. Content may be changed from year to year, and the course may be repeated for credit. A final grade is assigned upon completion of both quarters. Mr. McCulloch (F, W)

275. Historical Documents. (4) One 2-hour seminar per week. Prerequisite: advanced level of competence in literary Chinese or consent of instructor. Mr. Jamieson (Sp)

276. Old Turkish: Uighur. (4) Two 1 1/2-hour meetings per week. Prerequisite: Near Eastern Studies 20A–20B. Mr. Bosson (Sp)

289. Thesis Preparation and Related Research. (1–8) Hours to be arranged. Prerequisite: consent of thesis supervisor and graduate adviser. Grading is on a satisfactory/unsatisfactory basis in all sections. The Staff (F, W, Sp)

Graduate Adviser: Mr. Berry.

The Department offers instruction in invertebrate paleontology, micropaleontology, palynology, 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 fossil organisms or the geological aspects of their occurrence may be stressed at the undergraduate level, but advanced study requires competence in both geology and geology 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–6C (12). Additional courses in mathematics (1C, 5A), statistics (Statistics 20), computer science, organic chemistry, and Anthropology 1 are recommended. Study of a modern foreign language is strongly recommended.

Geology 150 and 160–169 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

NOTE: For key to symbols, see page 30.

Paleontology

Department Office, 3 Earth Sciences Building

Professors:
William B. N. Berry, Ph.D. (Chairman)
J. Wyatt Durham, Ph.D. (Emeritus)
William A. Clemens, Jr., Ph.D.
Robert M. Kleinpell, Ph.D.
Joseph T. Gregory, Ph.D.
Donald J. Savage, Ph.D.
Zach M. Arnold, Ph.D. (Emeritus)

Associate Professor:
Wayne L. Fry, Ph.D.

Departmental Major Adviser: Mr. Fry.

Graduate Adviser: Mr. Berry.

The Department offers instruction in invertebrate paleontology, micropaleontology, palynology, 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 fossil organisms or the geological aspects of their occurrence may be stressed at the undergraduate level, but advanced study requires competence in both geology and paleontology 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–6C (12). Additional courses in mathematics (1C, 5A), statistics (20), computer science, organic chemistry, and Anthropology 1 are recommended. Study of a modern foreign language is strongly recommended.

Geology 150 and 160–169 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

NOTE: For key to symbols, see page 30.
units of biological science from the list of recommended courses below. Paleobiological emphasis requires Genetics 100 and 9 additional units of upper division biology or paleontology from the list of recommended courses below.


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 apply for admission to the honors program no later than the beginning of the senior year. Students accepted for this program may substitute the research and Honors Thesis course for up to six units of the major requirements, and must complete a thesis (course H195).

Students who wish to arrange an individual major should confer with the departmental adviser.

The Museum of 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 offered. Candidates are 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 are required to pass reading examinations in at least one of the 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 contact the graduate adviser for the Department.

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**LOWER DIVISION COURSES**

1. Fossils and the History of Life. (5) Three 1-hour lectures, two 2-hour laboratories per week. Origin and development of the major groups of plants and animals, their changing relationships through time; lineages of significant groups of organisms, including man, and an overview of earth history and evolution from the point of view of the fossil record. 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 (may be taken concurrently). Field, museum, and laboratory investigations of diverse problems in paleontology under direct faculty guidance. Supervised field trips, readings, and discussions. The Staff (F, W, Sp)

15. Ecologies of the Past. (4) Two 1-hour lectures and one discussion/demonstration section per week. Prerequisite: not open to students who have taken course 1. Changes in animal and plant associations and interrelationships are traced in the context of environmental changes that took place throughout geologic time. Mr. Berry (W)

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**UPPER DIVISION COURSES**

101. Phylogeny and Evolution. (4) Two 1-hour lectures and one 2-hour demonstration section per week; one or more field trips. Prerequisite: a course in paleontology or in a related science. Paleontology 101 is designed for science-oriented majors in paleontology. Examination and discussion of selected examples from the fossil record of plant and animal groups. Mr. Clemens (Sp)

111. Invertebrate Paleontology. (4) Four 1-hour lectures and two 3-hour laboratories per week. Prerequisite: course 1 or 15 and Biology 1A–1B, 11A–11B, or Biology 5. Paleobiology, morphology, and stratigraphy of the invertebrates. Mr. Berry (F)

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. An introduction to geology and evolution of backboned animals. Mr. Gregory (Sp)

128. Vertebrate Paleontology. (4) Three hours of lecture and one 3-hour laboratory per week. Prerequisite: course 1 or Anthropology 1, and Biology 1A–1B. An introduction to geology and evolution of backboned animals. Mr. Gregory (Sp)

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. Mr. Gregory (W)

195. Honors Thesis. (3) Restricted to candidates for honors with the bachelor's degree. Preparation of a satisfactory report on original research. In evaluating the report emphasis will be placed on composition and style as well as scientific content. The Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1–6) Enrollment is restricted by regulations listed on page 58. Must be taken on a pass/not pass basis. The Staff (F, W, Sp)

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**GRADUATE COURSES**

*210. Principles of Phylogeny and Systematics. (4) Four hours of lecture per week. Mr. Berry (Sp)

*220. Advanced Paleobotany. (4) Two hours lecture and two 3-hour laboratories per week. Prerequisite: advanced training in plant anatomy and systematics. Advanced study of plants represented in the fossil record. Prerequisites: courses 122 and 126 or Zoology 105 and equivalent. To be offered in alternate years. Mr. Gregory (W)

*224. Paleontology and Evolution of Fish. (4) Two 3-hour laboratory sessions per week. Prerequisite: courses 125 and 126 or Zoology 105 and equivalent. To be offered in alternate years. Mr. Gregory (W)

*225. Paleontology and Evolution of Amphibians and Reptiles. (4) Two hours of lecture and two 3-hour laboratory sessions per week. Prerequisite: courses 125 and 126 or Zoology 105 or equivalent. Mr. Gregory (W)

226A–226B. Evolution and Systematics of Mammals. (6–6) Two 1-hour lectures, one 2-hour discussion, and two 3-hour laboratory sessions per week. Prerequisite: courses 125 and 126 or comparative anatomy of vertebrates. Study of fossil record of Mammalia and comparative research on modern animals, contributing to determination of mammalian phylogenetic relationships. One weekend field trip will provide experience with collecting techniques. To be offered alternate years. Mr. Clemens (W, Sp)

227. History and Paleocology of Higher Vertebrates. (4) Two-hour lectures and two 3-hour laboratories per week. Prerequisite: course 124. Mr. Savage (Sp)

**229. Field Studies in Vertebrate Paleontology. (1–4)** Prerequisite: course 224, 225, or 227. Demonstrations of fossils and written reports on problems in occurrence, taphonomy, stratigraphic relationships, and correlation of vertebrate-bearing deposits. Mr. Savage, Mr. Clemens, Mr. Gregory (F, Sp)

**250. Seminars in Paleontology.** (2) Advanced study and current literature in various fields of paleontology. Topics vary from year to year. 250A. Mr. Berry (F) 250B. Mr. Berry (Sp) 250C. Mr. Clemens (F) 250D. Mr. Fry (W) 250G. Mr. Gregory (F) 250S. Mr. Savage (Sp)

**299. Research in Paleontology. (1–9)** The Staff (F, W, Sp)

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**COURSES IN OTHER DEPARTMENTS**

IDS 150. Man's Earliest Ancestors. (3) See Interdepartmental Studies for the complete description of this course.

IDS 215A–215B. Faunal Analysis in Archaeology. (4–4) See Interdepartmental Studies for the complete description of this course.

IDS 216. Pollen Analysis. (4) See Interdepartmental Studies for the complete description of this course.

IDS 228. Human Evolution, Prehistory and Palaeo-environments. (2) See Interdepartmental Studies for the complete description of this course.

**Biology 190A–190B. Marine Geology. (4–4)** See Biology for the complete description of this course.

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**Philosophy**

Department Office, 314 Moses Hall

Professors: Ernest W. Adams, Ph.D. Karl Aschenbrenner, Ph.D. Charles S. Gilhara, Ph.D. David Rynin, Ph.D. Emeritus)

Hubert L. Davies, Ph.D. Paul K. Feyerabend, Ph.D. L.H.D.

H. Paul Gloe, M.A. L.D. (Matis Professor, Emeritus)

Benson Mattes, Ph.D. Wallace I. Matson, Ph.D. Michael Schen, D.P.H.

Alan Code, Ph.D. John R. Searle, D.Phil.

Benson Mattes, Ph.D. Emeritus)

Fred Daniel, Ph.D. Emeritus)

Bruce J. Vermazen, Ph.D. (Emeritus)

Hilda Q. Foy

Associate Professors: Thompson Clarke, Ph.D. Emeritus) James R. Topp, Ph.D. Emeritus)

Assistant Professor: Alan Code, Ph.D.

Linda C. Hoy

Samuel Scheffer

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**Visiting Matis Professor:**

Gregory Vlastos, Ph.D.

The Major

Lower Division. 12A–12B or 14A–14B; 25A–25C–25D.

Upper Division. 100; 104; 134A.

A total of 60 units is required in the major program. Twenty-four units are required in the upper division in
addition to the three required upper division courses: 100, 104, and 134A. The student must take two courses from the 160-179 series and four additional upper division restricted courses (courses numbered 191-199 may not be counted among the four unless the major so declares). Philosophies 12A-12B or 14A-14B should be passed before the end of the junior year. Philosophy 100 should be taken as soon as possible after declaring a major. One of the four additional upper division courses may be taken in another department, provided that the course selected is deemed by the major advisor to be relevant to the major.

Honors Program. With the consent of the major advisor, a student with an overall 3.3 grade-point average 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. This program requires completion of either (1) Philosophy H186, Senior Colloquium, or (2) a graduate seminar, admission to such seminar being contingent upon approval of the instructor in charge. It also requires that the candidate write an acceptable honors thesis, for which 5 units of credit will be given under Philosophy H185.

Higher Degrees

Attention is called to the requirement of a reading knowledge of Latin or Greek or German and one other modern language for the Ph.D. in philosophy. Students who contemplate advanced study in philosophy should prepare themselves for the requirement in their undergraduate years.

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 per week. The nature and the manner of philosophical enquiry. The role of philosophy in relation to problems of everyday life and to 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 (F)

3. Introduction to Philosophy: Theory of Knowledge. (4) Three 1-hour lectures per week and one weekly section meeting for discussion and written work. Mr. Scheffer (W), Mr. Searle (Sp)

11. Practical Reasoning. (4) Two 1-1/2 hours lectures per week. Intensive training in the analysis and theory of everyday arguments and functional prose (advertising, propaganda, instructions), without use of formal logic. Emphasis on current and controversial issues, and on clarity of commentary; other topics include definition and use of the concepts of decision-making and decision-strategies.

12A-12B. Introduction to Logic. (6-8) 3 hours of lecture and 2 hours of discussion per week. Course 12A in itself should not be regarded as a terminal course in logic.


14A. Rudiments of Logic and the Philosophy of Logic. (4) Formerly 91B. Three hours of lecture and two hours of discussion per week. A first course in which a sequence in which approximately equal time will be given to the development of propositional and predicate logic, and to an elementary examination of philosophical questions directly raised thereby.

14B. Rudiments of Logic and the Philosophy of Logic. (4) 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 the subject-matter of formal languages, metatheorems, the relationship between formal systems and natural languages, between logical studies and empirical investigations of languages.

26A. Ancient Philosophy. (5) Three 1-hour lectures per week and one weekly section meeting.

26B. Medieval and Early Modern Philosophy. (5) Three 1-hour lectures per week and one weekly section meeting.

25C–25D. Modern Philosophy to Kant. (5–8) Three hours of lecture and one section meeting per week.

UPPER DIVISION COURSES

General prerequisites.—Students enrolling in an upper division course must have completed 8 units in courses 1, 2, 4, 25A, 25B, 25C, or 25D, or have completed, 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. Fundamental problems and methods of inquiry in the general field of philosophical theory. Careful reading and discussion of selected texts of Plato, Hume, Kant, and recent authors. Course 101 is one of two courses which 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.

104. Ethical Theories. (4) Three hours of lectures and one 1-hour discussion section per week. A course in the nature of normative ethics, involving a study of contemporary examples of personal and social problems.

106. Philosophy in Literature. (4) Three hours of lectures and discussions as expressed in poetry, drama, and the novel. At the discretion of the instructor, the general prerequisite may be waived for major students in literature or in the fine arts.

107A. Existentialism in the Novel and Drama. (4) Formerly 107. Three hours of lecture and one hour of discussion per week. Prerequisite: 106. The course is designed to acquaint students with the techniques of philosophical analysis. Emphasis on the literary and the 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.

107B. Existentialism in Drama and Film. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: 106. In the structure and in the form of the novel or play, the general prerequisite may be waived for students in literature. Dostoevsky’s The Brothers Karamazov, Melville’s Moby Dick, Kafka’s The Castle and Milne’s A.A. Milne’s explanation of existential attitudes.

108. Social Philosophy. (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.

110A–110B. Marxism. (4) Formerly 182A–182B. Three hours of lecture per week. A critical appraisal of the philosophical foundations and implications of Marx’s view of 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.

126A–126B. Aesthetics. (4) Three hours of lecture per week. Course 126A is not prerequisite to 126B. At the discretion of the instructor, the general prerequisite for upper division courses in philosophy may be waived for major students of literature or the arts. Form, expression, representation, style; interpretation and evaluation.

126A. The Visual Arts.

112B. Literature and Music.


128. Political Philosophy. (4) Three hours of lecture per week. Analysis of political obligation and related problems.

129. Aesthetic Theories. (4) Three hours of lecture per week. A study of aesthetic theories based on historical and recent materials.

Mr. Aschmenn (F)

130. 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 rational choice? What is the role of free will? What is the structure of practical arguments? What is the structure of explanations of actions? Mr. Vermazen (W)

131. Metaphysics. (4) Three hours of lecture per week. Mr. Myro (F)

132. Philosophy of Mind. (4) Three hours of lecture per week. Mind and matter; other minds; the concept “person.” Ms. Foy (W)

133A–133B. Philosophy of Language. (4–4) Three hours of lecture per week.

Mr. Poole (W), Foy (W)

133B: Mr. Searle (Sp)

134A–134B. Theory of Knowledge. (4–4) Three hours of lecture per week.

Mr. Adams (F)

*135. 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.

136. Perception. (4) Three hours of lecture per week. The course will be devoted to studying major conflicting accounts of the nature of the simplest kinds of perceptual experience, and their roles in the acquisition of knowledge with special emphasis on divergent philosophical principles and orientations.

137. Special Topics in the Philosophy of Science. (4) Three hours of lecture per week. A discussion of some of one or a few special issues in, or approaches to, the philosophy of science. Details of current topics are available in the departmental HOGP, for each quarter in which the course is given.

139. Philosophy of Science. (4) Three hours of lecture per week. A survey of main topics in the logic of science—the nature of laws, explanations, probability, reduction, etc.—and of other issues coming under the general heading of philosophy of science—overviews of science and its direction, etc.

140. Philosophy of the Natural Sciences. (4) Three hours of lecture per week. Philosophical issues arising from physics, biology, etc. Mr. Feyereaband (Sp)

*141. Philosophy of the Social Sciences. (4) Three hours of lecture per week. Different approaches to the foundations of probability; inductive confirmation of scientific hypotheses. Mr. Adams (F)

143A–143B. Logic. (4–4) Three hours of lecture per week. Prerequisite: course 12A–12B or equivalent.

Mr. Craig (F, W)


Mr. Chihara (W)

NOTE: For key to symbols, see page 36.
Search. (1-6) Enrollment is restricted by regulations on various topics. Prerequisite: consent of instructor. The Staff listed on page 36. Must be taken on a passed/not passed basis. The Staff

*150. Anglo-American Philosophy, 1900–1945. (4) Three hours of lecture per week.


152A–152B. Phenomenology and Existentialism. (6–8) 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 both parts. 152A. Background in phenomenology and existentialism: Kierkegaard, Nietzsche, and Husserl. 152B. Contemporary existential phenomenology: Heidegger, Sartre, and Merleau-Ponty.

*153. The Later Heidegger. (5) Formerly course 191G. Three hours of lecture per week. Prerequisite: Philosophy 105A or 105B. Of Being and Time, and related later 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. 160A: Mr. Code (F) 160B: Mr. Code (W)

161. Aristotelian. (4) Three hours of lecture per week.

*168. Medieval Philosophy. (4) Three hours of lecture per week.

*170. Descartes. (4) Three hours of lecture per week. (W)


*172. Spinoza. (4) Three hours of lecture per week. Mr. Sluga (F)

*174. Locke. (4) Three hours of lecture per week.

175. Berkeley. (4) Three hours of lecture per week. Mr. Adamo (Sp)

176. Hume. (4) Three hours of lecture per week. Mr. Sluga (F)

176A–176B. Kant. (4–4) Three hours of lecture per week. 176A: Mr. Aschenbrenner (F) 176B: Mr. Aschenbrenner (W)

*180. Philosophy of the 19th Century. (4) Three hours of lecture per week.

*184. Nietzsche. (4) Three hours of lecture per week.

190. The Later Wittgenstein. (4) Three hours of lecture per week. Mr. Sluga (W)

*191J. Kierkegaard. (5) Three hours of lecture and one hour of discussion per week. Prerequisite: one philosophy course. A study of Kierkegaard as theologian, psychologist, and thinker, with emphasis on those aspects of his thought which have provided the basis of existential phenomenology. Readings of The Present Age, Either/Or, Philosophical Fragments, Concluding Unscientific Postscript, Sickness unto Death. Mr. Dreyfus (F)

*191K. Moral Psychology. (4) Three hours of lecture per week. A study of notions and problems that deal with the individualism-emphasis on weakness of will; self-regard and self-deception; moral motives, emotions, and virtue; moral education. Mr. Ross (Sp)

H185. Philosophy Tutorial. (5) Meetings once a week. Prerequisite: restricted to students in the Honors Program. The department will designate a tutor, under whose guidance the student will seek to satisfy the requirement of the Honors Program. The Staff

H190E. Senior Colloquium. (5) Formerly H197. A seminar course for senior philosophy majors in a topic to be announced. Emphasis on the writing of papers and discussion of them in the seminar.

198. Group Study. (1–5) Directed study on special topics. Prerequisite: consent of instructor. The Staff

199. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations listed on page 36. Must be taken on a passed/not passed basis. The Staff

GRADUATE COURSES

200. First Year Graduate Seminar. (5) Two hours of lecture and two hours of tutorial per week. A combination seminar and tutorial, required of and limited to first year graduate students in philosophy. Mr. Clarke, Ms. Foy (W) Mr. Grice (Sp)

*204. Recent Work in Ethics. (5) Prerequisite: course 104 or equivalent. Open to advanced undergraduates. Mr. Vermazen (W)

*213. Metaphysics. (5) Three hours of lecture per week. A survey of the concept of "metaphysics" (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. Mr. Clarke (F)

237. Philosophical Problems, (5) Two to four hours per week. Restricted to graduate students who have not yet passed the Qualifying Examination. Mr. Grice (W)

*240. Philosophy of Science. (5) Two to four hours per week. Survey course for graduate students with extensive philosophical background and substantial specialization in philosophy. Emphasis on discussing the major logical problems in philosophy of science including induction, prediction, productivity, evaluation, and explanation.

250. Special Studies. (1–9) Enrollment is ordinarily restricted to students who have been admitted to candidacy for the doctor's degree. The Staff

290. Seminar. (6) Advanced study in various fields of philosophy. Topics will vary from year to year. The Staff (F, W, Sp)

601. Individual Study for Master's Students. (6) Individual study for comprehensive or language examinations in philosophy. Units may not be used to fulfill the one or two units or residence requirements for a master's degree. Must be taken on a satisfactory/unsatisfactory basis.

602. Individual Study for Doctoral Students. (6) Prerequisite: one full year of graduate work at Berkeley or consent of graduate adviser. 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 doctor's degree. Must be taken on a satisfactory/unsatisfactory basis.

Physical Education

Department Office, 103 Harmon Gymnasium

Professors: Helen M. Eckert, Ph.D. Mary Lou Norton, Ph.D. (Chairperson) G. Lawrence Ricketts, Ph.D. (Acting Chairman, F.M.) Donald B. Van Dellen, Ph.D. Anna S. Embachache, Ph.D. (Emerita)

Associate Professors: George A. Brooks, Ph.D. Franklin M. Henry, Ph.D. (Emeritus) Pauline Hodgeson, Ph.D. (Emerita) Carl L. Norby, Ph.D. (Emeritus)


Activities Instructions

The Department of Physical Education offers 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 gymnasium, swimming pools, towells, showers, lockers, lamps, and equipment. The athletic facilities also to the use of clothing for certain physical education activities, including swimming.

A few special activity classes such as bowling and sailling require payment of extra fees.

Pines. Fines are imposed for each formal transacton necessitated by failure of the student to comply with the regulations of the Department: (a) failure to return equipment or clothing on or before the date posted for such return at the end of each quarter, or at the end of
2. Physical Education Activities at Hearst Gymnasium. (1/2) Sections meet two hours per week. Student selects section by activity, 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.

The Staff (Mr. Rarick in charge F, W), (Miss Nice in charge Sp)

30. Theory and Practice of Staged Combat. (3) Two 1-hour lectures and one 3-hour laboratory per week. Prerequisite: elementary or theatrical fencing, or consent of instructor. The mechanics of movement in staged combat, and practice of related skills in dramatic scenes; choreography of physical conflict.

Mr. Rarick (F, W)


Miss Nortie (Sp)

105A. Physiological Hygiene. (3) Three 1-hour lectures and one 3-hour laboratory per week. Prerequisite: Physical Education 105A. Discussion of the physiological basis of long-term and short-term exercise and its effects on drug performance, blood doping, sex differences and performance. (W)

105B. Physiological Hygiene. (3) Three 1-hour lectures and one 3-hour laboratory per week. Prerequisite: Physical Education 105A. Discussion of the physiological basis of long-term and short-term exercise and its effects on drug performance, blood doping, sex differences and performance. (F, Sp)

106. Energy Sources for Human Movement. (3) Two hours of lecture and one 1-hour discussion per week. Prerequisite: 105B or permission of instructor. Lectures on the transduction of potential, organic energy sources to work in the human. Emphasis will be placed on direct and indirect methods of caloriometry, digestion, pathways of intermediary metabolism, the role of exercise limiting, reactions, and the selection used at rest, during various forms of physical exercise, and in starvation. Mr. Brooks (Sp)

110. Neuromuscular Fatigue. (3) Three hours of lecture and one 2-hour laboratory per week. Prerequisite: 106, elementary statistics (Psychology 5 recommended). Percepion, motivation, learning, and emotion as factors in physical activity; reaction time and coordination; the psychology of competition. (F, Miss Nortie (W), (Sp)

111. Motor Development. (4) Three 1-hour lectures and one 1-hour laboratory per week. Prerequisite: Psychology 1 and in elementary statistics. Motor development of the handi capped as a function of age, sex, and type of disability. Influence of factors on motor development of the type of handi capped condition. Mr. Rarick (W)

120. Sports in American Society. (3) Three 1-hour lectures per week. Prerequisite: Sociology 1 or equivalent. Interrelationships of sports and physical recreation with other aspects of American culture. Emphasis on the twentieth century. (F, W, Sp)

121. Social-Cultural Bases of Human Movement. (4) Three hours of lecture and one 1-hour discussion per week. Prerequisite: one lower division sociology course, Following Sociology 105B and one course in social and cultural analysis and structure, variety, and extent of sport in modern societies. Social factors such as institutions, processes, and systems are examined in relation to sport and sport groups as subcultures.

Miss Park (F, W)

130. History and Theories of Physical Education. (4) Three 1-hour lectures per week and one section meeting each quarter. Prerequisite: Sociology 1. History and theories of the development of sports and physical education in historical, social and contemporary cultures. Political and social influences on theories and practices.

Mr. Rarick (F, W)

131. Curriculum Development and Administration. (3) Three 1-hour lectures and two 1-hour laboratory sessions per quarter. Prerequisite: one lower division course in kinesiology. Development and evaluation in school programs of physical education including the instructional program, intramural sports and intercollegiate activities. Majors and minor objectives. (W)

Miss Nortie (Sp)

135A-135B. Measurement and Evaluation in Physical Education. (3) Three hours of lecture and three hours of laboratory per quarter. Prerequisite: course 101. Measurement of physical abilities and specialized motor skills. Standard and advanced courses. Upon successful completion of course 135A a certificate is awarded. Offered on a passed/not passed basis only.

Miss Scott (F, Sp)

135A. Three hours of lecture and two hours of laboratory per quarter. Prerequisite: a course in elementary statistics. (F)

135B. Three hours of lecture and three hours of laboratory per quarter. Prerequisite: course 135A. Statistical methods and evaluation techniques pertaining to staff, facilities, equipment, budget and program. (W)

136. Theory of Dance. (4) Formerly 160A-B. Two 1-hour lectures and six hours of laboratory per week. Prerequisite: course 130. Historical analyses of sports and dance in selected historical and contemporary cultures. 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.

Mr. Van Dalen (W, 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, health, and dietary 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 Nortie in charge Sp), (Mr. Rarick F, W)

H196. Honors Thesis. (3) Individual conferences to be arranged. Special study and/or research in the field of the major.

The Staff (Miss Nortie in charge Sp), (Mr. Rarick F, W)

PROFESSIONAL COURSE

200. Problems and Methods in Teaching Physical Education. (3) Three hours of lecture per week. Prerequisite: admission to major examinations in physical education activities; course 101 or 105; 110 or 135A. Analysis of modern, practical and theoretical problems in educational development and instructional practices in secondary school. Study of methods and outcomes and the desirable progression and sequences of skills, especially as applied to developmental skills and individual, dual, and team sports.

Mr. Flanagan (Sp)

GRADUATE COURSE

200. Seminar in Physical Education. (3) One 3-hour meeting each week. Prerequisite: course 101 or 105. Theoretical and practical problems in teaching physical education activities; course 101 or 105; 110 or 135A. Analysis of modern, practical and theoretical problems in educational development and instructional practices in secondary school. Study of methods and outcomes and the desirable progression and sequences of skills, especially as applied to developmental skills and individual, dual, and team sports.

Mr. Van Dalen (Sp)

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 (Sp)

210. Seminar in Psychological Bases of Physical Education. (3) One 3-hour meeting each week. Prerequisite: course 110. Kinesthetic perception, motor coordination and learning, motivation, tension, subjective psychological factors, and related aspects.

Miss Nortie (Sp)

211. Seminar in Motor Development. (3) One 3-hour meeting per week. Prerequisite: course 111. Contemporary theories of development. Changing motor abilities and behavior from childhood through youth and age.

Mr. Rarick (F, Miss Eckert (W)

212. Seminar in Motor Development of the Handi capped. (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, motivational level, sex, and environmental factors.

Mr. Rarick (Sp)

221. Seminar in Sociocultural Bases of Human Movement. (3) One 3-hour meeting per week. Prerequisite: course 121. Contemporary theories of development. Changing motor abilities and behavior from childhood through youth and age.

Mr. Van Dalen (W, Sp)

230. Seminar in the Historical Foundations of Physical Education. (3) One 3-hour meeting per week. Prerequisite: course 130. Historical analysis of sport, games, exercise, and dance in primitive and modern societies.

Mr. Van Dalen (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. Historical analysis of sport, games, exercise, and dance in primitive and modern societies.

Mr. Van Dalen (Sp)

NOTE: For key to symbols, see page 36.
Physical Science

Advisor: Mr. Walter D. Knight, 341 Birch Hall

Field Major In Physical Sciences

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 of chemistry students. 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.

Plan 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 105B, 132; Chemistry 105A, 105B; Statistics 130A, 130B. Electives in computer science, mathematics, statistics, and physical science with the approval of the advisor to complete a total of 45 upper division units in the major. Up to 12 upper division units in engineering science will be accepted with the approval of the advisor.

Plan B

(Option of departmental concentration)

Lower Division Courses. Mathematics 1A, 1B, 1C, 5A, 5C; Physics 5A, 5B, 5C, 5D, 5E; Chemistry 1A, 1B, 1C or 4A, 4B, 4C; 14. Strongly Recommended: Mathematics 51B.

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 104A. Electives in computer science, mathemat-
The M.A. degree is offered under Plan II of the Graduate
Division.

Letters and Science List: for regulations governing this
list, see the Announcement of the College of Let-
ters and Science.

LOWER DIVISION COURSES

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 Chem-
istry or Engineering. Those proceeding with the second
year mathematics sequence should take courses in the
order 51C–51A–51B concurrently with Physics 5C–
5D–5E respectively. Physics 6A–6B–6C is designed
for premedical students, students in architecture, and
students in the biological sciences. Physics 10 is rec-
commended for the non-science major student who de-
sires to gain some understanding of basic physical
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 trigono-
metry.

5A. Physics for Scientists and Engineers. (3) Sec-
tion 1: three hours of lecture and one hour of dis-
cussion per week and/or section 2: three 2-hour tutorial
meetings per week. Prerequisite: high school
mathematics, Physics 1A or 1S; Mathematics 1B or 1S
must be taken concurrently if it has not been com-
pletely completed. Newton's laws, conservation of energy, momentum,
and angular momentum, center of mass, motion of rigid
girds, central force fields. The Staff (F, W, Sp)

6A. Introductory Physics. (4) Three hours of lecture
and one hour of discussion per week, and five 3-hour
laboratories per quarter. Prerequisite: course 6A.
Students with credit for Physics 5A or 5B will not receive
credit for Physics 6B. Electricity and magnetism,
opics and wave motion. Mr. Knight, Mr. Fretter,
Mr. Tripp, Mr. Watson (F, W, Sp)

6B. Introductory Physics. (4) Three hours of lecture
and one hour of discussion per week, and five 3-hour
laboratories per quarter. Prerequisite: course 6B.
Students with credit for Physics 5C or 5D will not receive
credit for Physics 6C. Quantum and statistical modern
physics; atoms, elementary particles, con-
demned matter. Mr. Tripp, Mr. Fretter,
Mr. Knight (F, W, Sp)

6A–I. Introductory Physics. (4) Formerly 6A–I. One
hour of lecture and three hours of individual tutoring
per week, plus 19-20 hours of lab per quarter. Pre-
requiste: Physics 5A–I or 5B–I or 5C–I. Course equiv-
alent to courses 6A–B–C, 5A–B–C, or 5D–I. Students
must be taken concurrently if it has not been com-
pletely completed. Harmonic oscillators, fluids, kinetic
gases, first and second laws of thermodynamics, sta-
tistical considerations. The Staff (F, W, Sp)

5C. Physics for Scientists and Engineers. (4) Sec-
tion 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 5A. Mathе-
matics 1B or 1S; Mathematics 1C or 1S must be taken
concurrently or have been completed. Harmonic
oscillators, fluids, kinetic gases, first and second laws of
thermodynamics, statistical considerations. The Staff (F, W, Sp)

6C. Introductory Physics. (4) Formerly 6C–I. Three
hours of lecture and three hours of individual tutor-
ing per week, plus 15-16 hours of lab per quarter. Pre-
requiste: Physics 5A–I or 5B–I or 5C–I. Course equiv-
alent to courses 6A–B–C, 5A–B–C, or 5D–I. Students
must be taken concurrently if it has not been com-
pletely completed. Harmonic oscillators, fluids, kinetic
gases, first and second laws of thermodynamics, sta-
tistical considerations. The Staff (F, W, Sp)

10. Descriptive Introduction to Physics. (4) Four
hours of lecture and one hour of discussion per week.
Prerequisite: Physics 5A–I or 5B–I or 5C–I. Course equiv-
alent to Physics 60 but designed for individual, flexibly-paced study. Topics of
biological interest are included. Mr. Helmholtz (W)

121. Physics of Music. (4) Three hours of lecture and
one hour of discussion per week. Prerequisite: no pre-
vious courses in physics are assumed, although Phys-
ics 5A–I or 5B–I or 5C–I. Prerequisite: course SC.
Prerequisite: course SC. Time-varying electromagnetic waves, refraction, diffraction, polarization,
optical instruments. Section 1 to be given 1977-78.
The Staff (F, W, Sp)

6E. Physics for Scientists and Engineers. (4) Sec-
tion 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 5B. Mathе-
matics 51C recommended. Electrostostics, electric
fields and potentials, conductors and currents, mag-
netic fields, induced fields, induction, Faraday's law,
etc. The Staff (F, W, Sp)

5D. Physics for Scientists and Engineers. (4) Sec-
tion 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 5C. Time-vary-
ing electromagnetic waves, refraction, diffraction, polarization,
optical instruments. Section 2 not to be given 1977-78.
The Staff (F, W, Sp)


UPPER DIVISION COURSES

Courses 5A–5E–5D–5C–5B, and differential and inte-
gral calculus are prerequisite to all upper division
courses except 106A–106B, and 132.

Four unit upper division courses may have scheduled
one additional hour to the three hours of lecture. See
Schedule of Classes.

105A–105B. Analytic Mechanics. (4–4) Three
hours of lecture and one hour of discussion per week.
Statics, oscillations, central force problems, motion
of rigid bodies in three dimensions, accelerated coordi-
nate systems, introduction to Lagrange's and Ham-
liton's equations, normal modes of vibration, mechan-
ics of continuous media.

Sequence beginning (F, W, Sp) Mr. Elv, Mr. Price,
Mr. McKee, Mr. Suzuki, Mr. Watson

106A. Geometrical Optics. (4) Three 1-hour lec-
tures and one 3-hour laboratory per week. Prerequisite:
course 106A–106B. Geometrical optics. Geometrical
methods applied to the optics of mirrors, lenses, and prisms; laboratory work to accompany the lecture.
Mr. Chlinowsky (F)

106B. Physical Optics. (4) Three 1-hour lectures and
one 3-hour laboratory per week. Prerequisite: course
6A–6B–6C. Physics 106A is not a prerequisite to 106B. Physics 106A is prerequisite to Physics 106B. Pheno-
mena of diffraction, interference, and polarization of
light, and their application; laboratory work to accom-
mpany the lecture. Mr. Price (W)

110A–110B–110C. Electromagnetism and Optics.
(4–4–3) Three hours of lecture and one hour of dis-
cussion per course. A course emphasizing applications of electromagnetic theory to optics, wave equa-
tions, electromagnetic waves, radar, radar signals, radio
frequency applications. Mr. Crowe, Mr. Tripp, Mr. Steiner,
Mr. Strovink (F, W, Sp)

112. Introduction to Statistical and Thermal Phys-
ics. (4–4–4) Three hours of lecture and one hour of
discussion per week. Basic concepts of statistical me-
chanics, classical statistical mechanics and its applications, statistical methods, approximations, quantum
mechanics, and solid-state physics. Individual work is en-
couraged. Eight units required for physics majors; twelve may be taken for advanced standing. Mr. Crowe,
Mr. Tripp, Mr. Steiner, Mr. Strovink (F, W, Sp)

114. Introductory Nuclear Physics. (4) Three hours
of lecture and one hour of discussion per week. Pre-
requiste: course 101A. Not open for credit to those
with credit for 129A. Tools of nuclear physics, alpha,
beta, and gamma decay, nuclear interactions and
structure, brief introduction to particle physics. Mr.
Steiner (W)

129A–129B. Nuclear and Particle Physics. (4–4)
Three hours of lecture and one hour of discussion per
week. Prerequisite: course 137A and 137B. Recent
developments and applications of nuclear and particle
physics, nuclear reactions, nuclear reactions of high
energy, nuclear astrophysics, applications of nuclear
physics to various fields. Mr. Goldhaber (Sp)

137A–137B–137C. Quantum Mechanics and Its
Applications to Atomic Physics. (4–4–3) Three
hours of lecture and four hours of laboratory per week. Prerequisite: course 137A and 137B. Properties and
classification of the elementary particles, their in-
teractions; strong and weak interactions, quark models, and mesons, analyzed by quantum me-
chanical methods. Sequence beginning (F, W, Sp)

132. Modern Physics. (4) Three hours of lecture and
one hour of discussion per week. Prerequisite: course
6A–6B–6C, or equivalent or consent of instructor. Not
open for credit to students who have completed 137A.
A general descriptive course in modern physics; elec-
trons and atoms, periodic table, X rays, spectra, nu-
clear physics, nuclear energy, solids, fundamental par-
ticles. Mr. Goldhaber (Sp)

137A–137B–137C. Quantum Mechanics and Its
Applications to Atomic Physics. (4–4–3) Three
hours of lecture and four hours of laboratory per week. Prerequisite: course 137A and 137B. Properties and
classification of the elementary particles, their in-
teractions; strong and weak interactions, quark models, and mesons, analyzed by quantum me-
chanical methods. Sequence beginning (F, W, Sp)

139. Special Theory of Relativity. (3) Three
hours of lecture and one hour of discussion per week.
Prerequisite: courses 105A–105B, 110A–110B. Einstein's
treatment of the special theory of relativity, with
applications to the atomic and subatomic worlds.
Mr. Tripp (Sp)

141A–141B–141C. Solid-State Physics. (4–4–4)
Three hours of lecture and one hour of discussion per

NOTE: For key to symbols, see page 30.
quantum theory through the correspondence principle. Classically. Limits of classical theory. Transition to advanced perturbation theory, and computational methods. (Sp)

208. Interactions of Light with Matter. (3) Three hours of lecture and one hour of discussion per week. Prerequisite: courses 110A-110B and 110C and 137A. Emission, absorption, and propagation of light treated classically. Limits of classical theory. Transition to quantum theory through the correspondence principle. Mr. Shen (F)

209A-209B. Interaction of Coherent Radiation and Matter. (3-3) Three hours of lecture and one hour of discussion per week. Prerequisite: 208 and 112 or consent of instructor. Introduction to the theory of the laser; spontaneous and stimulated emission and scattering. Nonlinear polarization: its physical origins and its usefulness in controlling the characteristics of coherent material excitations; parametric and self-induced processes. Sequence beginning (W). Mr. Hahn 210A-210B-210C. Theory of Electricity and Magnetism. (3-3-3) Three hours of discussion per week. Prerequisite: course 110A-110B-110C and a working knowledge of differential equations. Applications of quantum mechanics, field, including special relativity and electron theory. Sequence Beginning (F). Mr. Trittig 211. Equilibrium Statistical Mechanics. (3) Formerly 212A. Three hours of lecture and one hour of discussion per week. Prerequisite: 210A-210B or equivalent. Foundations of statistical physics. Ensemble theory. Degenerate systems. Systems of interacting particles.


212A-212B-212C. Quantum Mechanics. (3-3-3) Three hours of lecture and one hour of discussion per week. Prerequisite: course 137A-137B or equivalent. Foundations of quantum mechanics. Schrödinger theory; symmetry and invariance principles; theory of angular momentum; stationary state problem; perturbation theory. 212B. Time dependent perturbation theory; theory of scattering; many particle formalism; creation and annihilation operators. 212C. Rigid bodies; radiation processes; the Dirac equation; applications in atomic physics and beta decay. Sequence beginning (F) Mr. Mandelstam

213. Group Theory and Quantum Mechanics. (3) Three hours of lecture and one hour of discussion per week. Prerequisite: 211A-211B-211C, or consent of instructor. Introduction to group theory of crystallographic point groups; brief survey of quantum mechanics of atoms, molecules and solids, emphasizing applications of group theory to chemical problems. Sequence (Sp).

220A-220B. Mathematical Methods of Physics. (4) Three hours of lectures and one hour of discussion per week. Application of some particular branch of mathematics to physical problems. Topics to be announced by the instructor. Recent developments in methods and to the unifying mathematical ideas. With consent of instructor may be repeated for credit.

223. Group Theory and Quantum Mechanics. (3) Three hours of lecture and one hour of discussion per week. Prerequisite: 221A-221B-221C, or consent of instructor. Introduction to the group theory of crystallographic point groups; brief survey of quantum mechanics of atoms, molecules and solids, emphasizing applications of group theory to chemical problems. Sequence (Sp).

225A-225B. Electromagnetic Theory and Equations. (3-3) Three hours of lecture and one hour of discussion per week. Prerequisite: 210A-210B-210C, or consent of instructor. Analytical solutions of electromagnetic field, including special relativity and electron theory. Sequence Beginning (F). Mr. Trittig 226A-226B-226C. Theoretical Plasma Physics. (3-3-3) Three hours of lecture and one hour of discussion per week. Prerequisites: 210A-210B-210C, 211, 212, 142A-142B, or consent of instructor. Analysis of plasma behavior according to the Vlasov, Fokker-Planck equations, guiding center and hydrodynamic approximations. Structure and motion of plasma. Neutron and nuclear oscillations, transport, and inter-action with radiation. Rigorous kinetic theory. Sequence beginning (F) Not given every year. Mr. Kaufman

228A. Aerodynamics of Flows. (3) Three hours of lecture and one hour of discussion per week. Prerequisite: 210A-210B-210C, 211, 212, 142A-142B, or consent of instructor; some familiarity with plasma physics is recommended. Basic processes in ionized gases, mac- roscopic description of partially ionized plasmas including electronic collisions, radiation and transport phenomena, plasma production and decay. Applications to astrophysics and space problems, high speed gas dynamics and electric discharges. Not given every year.

230. Special Topics In Physics. (2-4) Prerequisite: with consent of instructor, may be repeated for credit. Topics will vary from quarter to quarter. See Department of Physics announcements.

231A-231B. General Relativity. (3-3) Three hours of lecture and one hour of discussion per week. Prerequisite: course 210C or equivalent. An introduction to the relativistic quantum mechanics of fields and particles. General principles of general relativity, Einstein's field equations, and gravitational dynamics. Phenomenological theories of weak and strong interactions. Sequence beginning (F). Mr. Bardakci

242A-242B-242C. Theoretical Plasma Physics. (3-3-3) Three hours of lecture and one hour of discussion per week. Prerequisites: 210A-210B-210C, 211, 212, 142A-142B, or consent of instructor. Analysis of plasma behavior according to the Vlasov, Fokker-Planck equations, guiding center and hydrodynamic approximations. Structure and motion of plasma. Neutron and nuclear oscillations, transport, and interaction with radiation. Rigorous kinetic theory. Sequence beginning (F) Not given every year. Mr. Falcov

243. Physics of Ionized Gases. (3) Three hours of lecture and one hour of discussion per week. Prerequisites: courses 112, 137A, 137B, or consent of instructor; some familiarity with plasma physics is recommended. Basic processes in ionized gases, macroscopic description of partially ionized plasmas including electronic collisions, radiation and transport phenomena, plasma production and decay. Applications to astrophysics and space problems, high speed gas dynamics and electric discharges. Not given every year.

250. Special Topics In Physics. (2-4) Prerequisite: with consent of instructor, may be repeated for credit. Topics will vary from quarter to quarter. See Department of Physics announcements.

251A-251B. Introduction to Graduate Research In Physics. (2-2) One hour lecture and one hour discussion section per week. Prerequisite: Graduate status and approval of instructor. Must be taken on a satisfactory/unsatisfactory basis. A survey of experimental and theoretical programs available in the different areas of research. Selected topics in one or more areas. Open to first year graduate students. One regular meeting each week with supplementary visits to experimental laboratories. Meetings include discussions with research staff. Mr. Tripp, Mr. Ely (F, Sp)

252. Individual Study for Doctoral Students. (1-8) Individual study in consultation with the major field advisor. Topics must be approved by qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. may not be counted towards degree requirements. May be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)
Physiology-Anatomy

Department Office, 2549 Life Sciences Building

Professors: John G. Forte, Ph.D. (Chairman); Marian C. Diamond, Ph.D.; Walter F. Freeman, M.D.; Harlan W. Jones, Ph.D.; Robert I. Macey, Ph.D.; Charles S. Nicoll, Ph.D. (i.e., Chief of one of the laboratories).


Associate Professor: Beth Bums, M.D., Ph.D.

Assistant Professor: Terry E. Machen, Ph.D. (Robert S. Zucker, Ph.D. (Chairman) of the Department of Anatomy and Histology). SeeIndex.

Departmental Major Advisers: Mrs. Diamond, Mr. Nicoll, Mr. Zucker.

Graduate Advisers: Mr. Forte, Mr. Freeman, Mrs. Timiras (Physiology); Mr. Srebnik, (Anatomy).

Physiology-Anatomy

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 processes, of the functions of the various parts of living organisms, and of the integrated physiological responses of the environment 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 (4.5-4.5); Mathematics 1A-1B (4-4) or 1A-1B-1C (4-4-4) recommended or 16A-16B (4-4); 1A-1B (6-6); Chemistry 1A-1B-1C (4-4-4), Chemistry 9A-9B-9C (5-5-5) or equivalent, and (4) submit a satisfactory thesis based upon original research in physiology to be prepared according to Plan B of the Graduate Division.

All candidates for the Ph.D. degree are required to acquire teaching experience equivalent to a minimum of one quarter of full-time teaching as a Teaching Assistant or Associate (e.g., 2 quarters of 1/2-time teaching; 4 quarters of 1/4-time teaching, etc.).

For further details concerning the graduate degrees please consult the graduate adviser in physiology.

Major in Anatomy (Graduate Only)

In addition to meeting the general requirements of the Graduate Division, the student must have had the following courses, or their equivalents, before admission to the graduate degree program in anatomy: Biology 1A-1B (4-4), Math 4A-4B (5.5-5.5) recommended; Biology 1A-1B (4-4) and one 4 1/2-hour laboratory per week. Prerequisite: one year of calculus, Biology 1A-1B and Biochemistry 102 (or concurrent enrollment). Recommended: Physics 5 or 109. Studies of fine structure and function in cells and organelles. Topics will include: membrane structure and transport, metabolism, secretion, bioelectricity, excitation, and cell motility.

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 in physiology. 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.

2. The Ph.D. degree in physiology. Required: Biochemistry 102 (5); Chemistry 109A-109B (3-3); a course in biochemistry or another of the sciences approved by the Department (e.g., French, German, Russian, or Computer Language). Selection of a major professor should also have been made by that time. The student must also pass an oral examination to test his general mastery of physiology and at least two other related subjects which are approved by the major professor and the graduate adviser. A dissertation based upon original research in physiology is to be prepared according to Plan B of the Graduate Division.

For further details concerning the graduate degrees please consult the graduate adviser in physiology.

UPPER DIVISION COURSES

101. Introductory Cell Physiology. (3) One 1 1/2-hour lecture per week. Prerequisite: one year of calculus, Biology 1A-1B and Biochemistry 102 (or concurrent enrollment). Recommended: Physics 6, Chemistry 109. Studies of fine structure and function in cells and organelles. Topics will include: membrane structure and transport, metabolism, secretion, bioelectricity, excitation, and cell motility.

Mr. Macey, Mr. Packer, Mr. Forte (F)

102A-102B. Mammalian Physiology, (5-5) Three 1 1/2-hour lectures and one 1 1/2-hour laboratory per week. Prerequisite: one year of calculus, Biology 1A-1B and Biochemistry 102 (or concurrent enrollment). Recommended: Physics 6, Chemistry 109. Studies of fine structure and function in cells and organelles. Topics will include: membrane structure and transport, metabolism, secretion, bioelectricity, excitation, and cell motility.

Mr. Macey, Mr. Packer, Mr. Forte (F)

103A-103B. Physiology Laboratory, (5-5) One and one-half hours of lecture and four and one-half hours of laboratory per week. Prerequisite: course 101. Recommended: course 102A-102B. Laboratory experiments to teach basic principles and techniques of cellular and organismal physiology. Prerequisite: Biology 1A-1B or equivalent (F).

Mr. Macey, Mr. Packer, Mr. Forte (F)

105. Histology, (5) Two 1 1/2-hour lectures and one 1 1/2-hour laboratory per week. Prerequisite: Physiology 1A-1B. Mammalian organology.

Ms. Burnside (W)

Anatomy 108. General Human Anatomy. (4) See Anatomy for the description of this course.

Anatomy 108L. General Human Anatomy, (3) See Anatomy for the description of this course.

109. Survey of Mammalian Physiology. (4) Three and one-half hours of lecture per week. Prerequisite: Anatomy 108L. Medicine. The life processes of animals by the study of function of cells, tissues, and organ systems. Emphasis will be placed on man.

Mr. Macey, Mr. Packer, Mr. Forte (W)

109L. Introductory Physiology Laboratory, (2) One 1 1/2-hour lecture and one 3-hour laboratory per week. Prerequisite: Anatomy 108, 108L should be taken concurrently. Laboratory experiments demonstrating the functional mechanisms underlying life processes in mammalian systems.

Mr. Makan (W)

110. Introduction to Neurobiology. (3) Three 1 1/2-hour lectures per week. Prerequisite: Biology 1A-1B or consent of instructor. The important contributions of neurological, anatomical, physiological, comparative, and behavioral studies to the understanding of the nervous system, particularly that of man. Properties of neurons and neural systems in terms of structure and function, and their evolution. Not open to students currently enrolled in or who have credit in 102B or Zoology 134.

Mr. Macey, Mr. Packer, Mr. Forte (Sp)

123. Comparative Physiology. (3) Four and one-half hours of lecture per week. Prerequisite: Biology 1A-1B or equivalent; organic chemistry recommended, or consent of instructor. Comparative survey of physiological function among various animal phyla. The function of organs and processes which are peculiar to certain animal groups or species will be emphasized.

Mr. Nicoll (W)

123L. Comparative Physiology Laboratory, (4) Two 1 1/2-hour laboratories per week or arranged work schedule. Prerequisite: course 123 and consent of instructor. The study of the nervous system using whole animals and original research projects. Some of these may be conducted at the Bodega Marine Laboratory.

Mr. Nicoll (Sp)

NOTE: For key to symbols, see page 36.
182. Physiology of Human Development. (4) Three 1-1/2 hour lectures per week. Prerequisite: an introductory course in the biological sciences. Recommended: Anatomy 151. Functional changes in man from prenatal life to maturity. Mrs. Timiras (W)

183. Physiology of the Aging Process. (4) Three 1-1/2 hour lectures per week. Prerequisite: an introductory course in the biological sciences. Recommended: Anatomy 151. Functional changes in man from maturity to old age. Mrs. Timiras, Mr. Packer, Mr. Jones (Sp)

190. Biology of Human Reproduction. (5) Four and one-half hours of lecture per week. Prerequisite: an introductory course in the biological sciences. Recommended: Anatomy 151. Emphasis will be on the functional anatomy, secretory phenomena, neural control of endocrine function, and secretion of drugs at the organismic and cellular levels. Mrs. Timiras (F)

198. Supervised Independent Study and Research. (1-5) Enrollment is restricted by regulations listed on page 38. Individual conferences to be arranged. Prerequisite: completion of two quarters of upper division courses in physiology. Special library or laboratory projects may be assigned. Must be taken on a passed/not passed basis. The Staff (W, Sp)

**204. Neuroendocrinology.** (4) Three 1-1/2 hour lectures per week. Prerequisite: courses 101–103 or equivalent, or consent of instructor. Neuronal effectors of the central nervous system. Emphasis will be upon molecular organization, membrane bioenergetics and current developments in the field including the interactions of natural and artificially reconstituted membranes, high resolution microscopy and spectroscopy. Mr. Packer, Mr. Macey (Sp)

205. Neuroendocrinology. (4) Four and one-half hours of lecture per week. Prerequisite: courses 101–103, 105–107. A course in organic chemistry and in biochemistry. The endocrine glands of mammals and the metabolic reactions mediated by their hormones. Mr. Rosen (F)

221. Seminar in Neuroendocrinology. (2) Two one-hour lectures per week. Prerequisite: consent of instructor. Discussions and readings in current research in endocrinology. Mr. Rosen (F)

226. Seminar in Neuroendocrinology. (2) Two one-hour lectures per week. Prerequisite: consent of instructor. Original research in physiology. Must be taken on a satisfactory/unsatisfactory basis. Mr. Zucker (W)

290. Seminar in Neuroendocrinology. (2) Two one-hour lectures per week. Prerequisite: consent of instructor. Discussions and readings in current research in endocrinology. Mr. Zucker (W, Sp)

292. Seminar. (1) One hour of lecture per week. Recommended: course 108 or equivalent. Prospective students should consult instructor before considering this course. Physiology-Anatomy Mr. Zucker (W)

298. Special Study in Physiology. (1-12) Permission of the instructor required. To be taken on a passed/not passed basis. The Staff (F, W, Sp)

299. Individual Research in Physiology. (1-12) Permission of the instructor required. To be taken on a passed/not passed basis. The Staff (F, W, Sp)

**UPPER DIVISION COURSES**

107. Introductory Mammalian Neuroanatomy. (4) Three 1-1/2 hours of lecture per week. Prerequisite: an introductory course in human anatomy or equivalent. Prospective students should consult instructor before considering this course. Mrs. Diamond (F)

108L. General Human Anatomy. (4) Three 1-1/2 hours of lecture per week. Prerequisite: an introductory course in human anatomy. Prepared human dissections, models, and microscopic slides. Mrs. Srebnik (F)

108L. General Human Anatomy Laboratory. (1) One 3-hour laboratory per week. Prerequisite: course 108L. Human anatomy laboratory. Mrs. Srebnik (F)

151. Developmental Anatomy. (4) Three 1-1/2 hours of lecture per week and one 3-hour laboratory. Prerequisite: Biology 1A–1B and consent of instructor. An study of the major anatomical divisions of the brain and spinal cord examined at the gross and microscopic level. Functional neuroanatomy will be emphasized. Mrs. Diamond (F)

152. General Anatomy. (4) Three 1-1/2 hours of lecture per week. Prerequisite: course 101 or equivalent. Mrs. Sorensen (F, W)

190. Biology of Human Reproduction. (5) Four and one-half hours of lecture per week. Prerequisite: an introductory course in the biological sciences. Recommended: Anatomy 151. Emphasis will be on the functional anatomy, secretory phenomena, neural control of endocrine function, and secretion of drugs at the organismic and cellular levels. Mrs. Timiras (F)

198. Supervised Independent Study and Research. (1-5) Enrollment is restricted by regulations listed on page 38. Individual conferences to be arranged. Prerequisite: completion of two quarters of upper division courses in physiology. Special library or laboratory projects may be assigned. Must be taken on a passed/not passed basis. The Staff (W, Sp)

**199. Supervised Independent Study and Research.** (1–3) Limited to freshmen and sophomores. Consent of the instructor required. To be taken on a passed/not passed basis. The Staff (Mr. Srebnik in charge) (F, W, Sp)

**LOWER DIVISION COURSE**

99. Supervised Independent Study and Research. (1–3) Limited to freshmen and sophomores. Consent of the instructor required. To be taken on a passed/not passed basis. The Staff (Mr. Srebnik in charge) (F, W, Sp)

**PRACTICAL COURSES**

213. Seminar in Cell Physiology. (1) One 1-hour meeting per week. Current research on cell structure and function. Mr. Macey, Mr. Machen, Mr. Forte (W, Sp)

218. Neuropharmacology. (4) Four hours of lecture per week. Prerequisite: courses 102A and 102B. Computer Science Mr. Lewis

219. Neuroanatomy. (4) Three 1-hour lectures per week. Prerequisite: courses 102A and 102B. Physiology-Anatomy Mr. Zucker (W)

220. Laboratory in Cell Physiology. (10) Three 1-hour laboratory meetings per week. Prerequisite: courses 101 or equivalent and Biochemistry 102 or equivalent, or consent of instructor. Techniques of anesthesia and sterile surgical technique. Mrs. Timiras (F)

221. Seminar in Neuroendocrinology. (2) Two one-hour lectures per week. Prerequisite: consent of instructor. Discussions and readings in current research in endocrinology. Mr. Rosen (F)

226. Seminar in Neuroendocrinology. (2) Two one-hour lectures per week. Prerequisite: consent of instructor. Original research in physiology. Must be taken on a satisfactory/unsatisfactory basis. Mr. Zucker (W)

292. Seminar. (1) One hour of lecture per week. Recommended: course 108 or equivalent. Prospective students should consult instructor before considering this course. Physiology-Anatomy Mr. Zucker (W)

298. Special Study in Physiology. (1-12) Permission of the instructor required. To be taken on a passed/not passed basis. The Staff (F, W, Sp)

299. Individual Research in Physiology. (1-12) Permission of the instructor required. To be taken on a passed/not passed basis. The Staff (F, W, Sp)

**UPPER DIVISION COURSES**

107. Introductory Mammalian Neuroanatomy. (4) Three 1-1/2 hours of lecture per week. Prerequisite: an introductory course in human anatomy or equivalent. Prospective students should consult instructor before considering this course. Mrs. Diamond (F)

108L. General Human Anatomy. (4) Three 1-1/2 hours of lecture per week. Prerequisite: an introductory course in human anatomy. Prepared human dissections, models, and microscopic slides. Mrs. Srebnik (F)

151. Developmental Anatomy. (4) Three 1-1/2 hours of lecture per week and one 3-hour laboratory. Prerequisite: Biology 1A–1B and consent of instructor. An study of the major anatomical divisions of the brain and spinal cord examined at the gross and microscopic level. Functional neuroanatomy will be emphasized. Mrs. Diamond (F)
205A-205B. Systematic and Regional Human Anatomy. (9-6) Two 1 1/2-hour lectures and two 4 1/2-hour laboratories per week. Prerequisite: either course 10 or Zootology 105 or other advanced work in mammalian biology; consent of instructor. Dissection, x-ray, and surface anatomy of the body, with 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 205A or consent of instructor. Current research topics in functional neuroanatomy. Mrs. Diamond (Sp)

207. Advanced Topics in Histology. (3) Two one-hour lectures per week. Prerequisite: consent of instructor. Discussion and dissections of experimental boxes for present concepts and a survey of current research and clinical problems. Ms. Burnside (S)

210. Physiological Anatomy of Reproduction. (2) One 1 1/2-hour meeting per week. Prerequisite: graduate standing in a biological science. Formal conferences and demonstrations. Outside reading required. Mr. Srebnik (Sp)

298. Special Study in Anatomy. (1-12) Individual arrangement to be made. Prerequisite: consent of instructor. The Staff (Mr. Srebnik in charge) (F, W, Sp)

299. 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)

602. Individual Study for Doctoral Students. (1-8) Individual 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 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

Group Major Office, 209 Moses Hall

Major Advisers: Mr. Giuseppe Di Palma (Political Science), Co-ordinator; Mr. Edwin M. Epstein (Business Administration); Mr. Gerald D. Feldman (History); Mr. John G. Ruggie (Political Science); Mr. David Vogel (Business Administration); Mr. Benjamin Ward (Economics 1); Mrs. Diamond (Sp); Ms. Bumsde (S)

Group Major in the Political Economy of Industrial Societies

Industrial societies have undergone a series of unexpected developments in recent years, with far reaching and unclear consequences for their internal order and their external economic and political relations. These developments, which have affected industrial democracies as well as developed socialist countries, are the most difficult to understand and explain because of their diversity: they range from a crisis of political institutions to a change in mass cultural values, from stagnation in the productive and service sectors to the expansion of government planning and intervention to the growth of corporate interests of supranational dimensions, from population explosion to the collapse of the International monetary order, from environmental and resource depletion to a new distribution of power between nations controlling and consuming crucial re-

sources. Will these developments usher in a new and more effective way of handling internal conflict, accommodating new values, sustaining delivery of public services, and expanding performance, or will they bring about the progressive decay of social institutions—unable to cope with the expanding and novel nature of demands and problems—and arrest the growth and diversification of society? Will a new world order emerge, or will world-wide instability prevail? Will the search for solutions make industrial countries converge toward a new political format, neither democratic nor socialist, or will significant differences remain? Above all, is it possible or appropriate to make generalized and sweeping predictions, or will changes be more discrete and unpredictable?

Our program intends to offer interested students a chance to study the nature of the emerging problems, but also the opportunities with which industrial societies are confronted. Above all, it intends to offer a better understanding of how the problems may be solved and the opportunities seized, both in view of their root causes and in view of the institutional and cultural resources which industrial societies can put to the task. In pursuit of these objectives, the program assigns first priority to the historical, comparative, and analytical study of what industrial societies have in common and what differentiates them from each other. Western industrial societies have capitalist economies, participant and democratic polities, open equalitarian and achieving cultures, welfare policies, complex and interdependent institutions, and share in a wide supranational network of political and economic transactions. Some of these properties point to principles of economizing, productive expansion, organized complexity, and applied knowledge, which variously inspire the developmental goals of these societies and the instrumentalities for directing development. Other properties point to principles of freedom, diversity, and self-government, which inform the democratic goals of these societies and the means to pursue them, but may be curtailed by growth objectives. Socialist industrial countries also pursue development objectives. But these objectives, which in the West seem to disturb democratic principles, have served to foster social and political diversity by hampering centralized rule. Irrespective of political format, political practitioners in every industrial country are faced with policy dilemmas when trying to accommodate development objectives with the preservation of their political institutions.

In order to achieve a better understanding of these dilemmas, students in the program design their plans of study, in consultation with their advisers, so as to devote special attention to the institutions and values that have shaped and caused the emergence of contemporary issues. They also study the instrumentalities available for planning and problem solving, the way in which institutions and values link with policy choices, and the way in which contemporary issues feed back into institutions, values, and solving processes. Students study the emerging problems of industrial societies not only as problems of resource use and distribution, but also, and above all, as problems of institutional adaptation, value innovation, and changing political equilibria. They have an opportunity to combine problem solving with historical and analytical interests, and to ground them in the study of some of the most salient countries and institutional sites within which features and problems of industrialism emerge.

(For a more detailed description of the program and course offerings, please obtain a brochure from the Group Major Office.)

Lower Division: 23 to 31 units.

Economics 1 (5); Economics 20 (4); Sociology 1A-1B (5-5) or History 5 (5) and 170 (5); Interdepartmental Studies 1 (4); Mathematics 1A-1B (4-4) (required only for students taking Economics 101A-101B).

Upper Division: 45 to 54 units, including no more than three courses offered outside the College of Letters and Science.

Methodology: 10 units.

Economics 100A-100B (5-5) or Economics 101A-101B (5-5).

Introductory Sequence: 10 units.

Political Science 140D (5) and Political Science 187A (5).

Fields of Concentration: 25 to 34 units, including five required courses as specified below and additional courses from any of the four groups to attain the unit total. All courses must be selected in strict consultation with a major adviser. No more than three may be from one department.

I. Models of the Industrial State: three one-quarter courses, two of which deal with a specific geographic area.

Business Administration III (5); Economics 105 (4), 106 (4), 107 (5), 113 (4), 114 (5), 115 (4), 117 (5), 161 (4), 162 (4), 163 (4), 164 (5); History 123 (5), 126 (5); 128A-128B (5-5), 129A-129B (5-5), 174B (5); Political Science 140E, 140I, 141A-141B (5-5),

NOTE: For key to symbols, see page 36.
The major

The major in political science at Berkeley consists of twelve courses. The required lower division courses are Political Science 1, 2, and 3. At the upper division level there are nine subfields of study. Within each subfield certain courses have been designated as "core" courses. The student will be required to take one core course each from three different subfields. In addition, the student must complete at least two two-course sequences; the student must take at least one two-course sequence from each group. The student must then select other upper division courses in political science to total four upper division units. Directly below is the breakdown of the subfields into Groups I and II. The designated core courses are in parentheses.

Group I. International Relations (120A, 120B); Comparative Politics (any course from 140A-140I); Political Theory (118A, 118B); Empirical Theory and Quantitative Methods (131A, 131B).

Group II. American Government and Politics (102, 103, 104, 105, 161); Sub-national Government and Politics (170A, 170B); Public Organization, Administration, and Policy (181); Public Law and Jurisprudence (125, 157A, 157B); Political Behavior (162, 164, 165).

Honors Program. Students accepted into the honors program will enroll in the Political Economy of Industrial Societies 195, Senior Honors Seminar (5 units), the topic of which will be explicitly designated for students in the group major. The topic may change from year to year. Honors students will write a thesis under the supervision of the seminar instructor. To be eligible for admission, a student must have a grade-point average of 3.3 or higher in the major and in all courses completed in the University.

UPPER DIVISION COURSES

100. American Institutions. (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 (F, W, Sp)

102. The American Executive. (Formerly 107) Two 1 1/2-hour lectures and one 1-hour discussion per week. Prerequisite: 101 or equivalent; consent of instructor. An introduction to the American political process. The Staff (W, Sp)

103. Congress. (Formerly 105) Three hours of lecture and one hour of discussion per week. Prerequisite: Not open to students who have received credit for 1A or 1B. A survey of the role of political parties, the electoral process, and the formal and informal structures of both the Congress and the executive branch, policy formation, and the ethical values of social behavior in the political world. Sessions with elected officials and party workers on their vocation. Directed field research. Mr. Woelfling (W)

105. The Politician. (Formerly 106) Three hours of lecture and one hour of discussion per week. The nature of political parties, the role of political organizations, the nature of the electoral process, and the ethical values of social behavior in the political world. Sessions with elected officials and party workers on their vocation. Directed field research. Mr. Woelfling (W)

106. Societal Groups and Political Power. (Formerly 160) Three hours of lecture and one hour of discussion per week. Prerequisite: Not open to students who have received credit for 1A or 1B. A survey of the role of societal groups, the nature of the electoral process, and the ethical values of social behavior in the political world. Sessions with elected officials and party workers on their vocation. Directed field research. Mr. Woelfling (W)

Political Science

Department Office, 210 Barrows Hall

Professors:
Reinhard Bendix, Ph.D. (Emeritus), Ph.D., Ph.D.
Giovanni Orazio, B.A., B.A., B.A., B.A.
A. James Gregor, Ph.D.
Ernst B. Haas, Ph.D.
Norman Jacobson, Ph.D.
Robert M. Price, Ph.D.
J. Merrill Shanks, Ph.D.
Joseph P. Harris, Ph.D.
Thomas C. Blalock, Jr., Ph.D.
John Zysman, Ph.D.
Robert A. Kagan, Ph.D.
Carol G. Rothenberg, Ph.D.
Robert A. Scataphe, Ph.D.
Paul Seabury, Ph.D.
Kenneth N. Wirtz, Ph.D.
Eric L. Davis, M.A.
Richard Lowenthal, D.Phil.
Joe R. Schuster, LL.B., M.A.
Jack H. Schuster, LL.B., M.A.
Martin Landau, Ph.D.
Kanna Pitklin, Ph.D.
Chalmers Johnson, Ph.D.
J.8.D.
Norman Jacobson, Ph.D.
Kanna Pitklin, Ph.D.
Eric L. Davis, M.A.
Richard Lowenthal, D.Phil.
Joe R. Schuster, LL.B., M.A.
Jack H. Schuster, LL.B., M.A.
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J.8.D.
Norman Jacobson, Ph.D.
Kanna Pitklin, Ph.D.
Eric L. Davis, M.A.
Richard Lowenthal, D.Phil.
Joe R. Schuster, LL.B., M.A.
Political Theory

113A-**113B. American Political Theory, (5-5) Two 1 1/2-hour lectures and one 1-hour discussion per week. Prerequisite: 112A and one 1-hour discussion per week. 113B: 113A or consent of instructor. Basic problems of political theory as viewed within the context of American history and institutions. Major political theories from the Greeks to modern period. Ms. Lapidus (Sp)

114. Theorists and His Theory, (5) Three hours of lecture and one hour of discussion per week. Prerequisite: one quarter of 113A or 118, or consent of instructor. Intensive study of one of great political theorists. Topic will vary with instructor. Mr. Thomas (F)

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 sections will be scheduled for graduate and undergraduate 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. Ms. Pitkin (F)

118B. Early modern theories up to the French Revolution, including Machiavelli, Hobbes, Locke, and Rousseau. Mr. Thomas (W)

118C. Modern theories of the nineteenth century including Hegel, Burke, the Utilitarians, and Marx. Mr. Thomas (Sp)

118D. Recent and contemporary political theories. Mr. Gregor (Sp)

119. Community and Intellectual Life, (6) Three hours of lecture and one hour of discussion per week. Intelectuals as a social group in the process of "modernization" and the intellectual influence of "non-European" antecedents, men of letters in the eighteenth century, the Romantic reaction. Intellectuals in the theories of Marx and his followers are the topics. Mr. Bendix (F)

International Relations

120A-**120B-**120C. International Relations, (5-5-5) Two 1 1/2-hour lectures and one 1-hour discussion per week. Prerequisite: 120A or pre-requisites of 120A. Students with credit for 120B prior to Fall 1977 may not take 120A. 120A: Comparative foreign policy. 120B: Theory of International Relations. 120C: Concepts and problems in international relations and foreign policy. 120A: Mr. Haas (F); 120B: Mr. Ruggie (W); 120C: Mr. Seabury (Sp)

121. International Organization, (5) Two 1 1/2-hours of lecture and one 1-hour of discussion per week. Prerequisite: course 120A. An examination of the impact of international interdependence (in security relations, economic and technological, etc.) on the activities of international organizations (regional and global), and upon the structure of the international political system. Prerequisite: may be taken concurrently. Mr. Gregor (F, W)

122A-**122B. International Law, (5-5) Two 1 1/2-hour lectures and one 1-hour conference per week. Nature, sources, function and evolution of international law and alterations from traditional to modern concepts. International legal personality; treaties and executive agreements; jurisdiction over places and persons. Diplomatic and consular intercourses; treaties and executive agreements; pacific settlement; war and neutrality. Mr. Hauck (W, Sp)

**123. Regional Communities, (5) Two 1 1/2-hour lectures and one 1-hour conference per week. Examination of super-national regional communities; the processes of political, cultural, economic and military integration. Mr. Gilquin (F)

124. Politics and Military Strategy, (5) Two 1 1/2-hour lectures and one 1-hour conference per week. The interrelationships among military strategy, technological science, relationships between the military, political, economic, national security concepts, and domestic politics. Mr. Thies (F)

125A-**125B. International Political Economy, (5-5) Two 1 1/2-hour lectures and one 1-hour discussion per week. Bargaining theory, conflict resolution, trade, investment, technology diffusion, imperialism, nationalism, monetary relations, multi-national corporations. Mr. Seabury (W)

127A-**127B. American Foreign Policy, (5-5) Formerly 128A-128B. Two 1 1/2-hour lectures and one 1-hour discussion per week. Prerequisite: 127A. Analysis of competing concepts of the American "national interest" operative since World War I; Wilsonianism, isolationism, the Open Door, the Monroe Doctrine, and the Good Neighbor Policy; containment; the relation of national security, containment, and ideological policies to the character of American democracy. Mr. Thies (F, W)

128A-**128B. The American Role in Asia, (5-5) Formerly 101A-101B; 101C. Three hours of lecture and one 1-hour discussion per week. 128A: The role which the United States has played in the Far East, examining such topics as the history of Western influence on the United States/Far Eastern foreign policy. 128B: A study of the policies of the US in the Far East. Ms. Scalapino (Sp); 128B: Mr. Rose (W)

128C. Modern theories of the nineteenth century in the area of political science. 128B: The evolution of foreign policy from 1917 to the present. Continuity and change in Soviet perceptions and priorities. Current relations with the Third World. 128C: Selected topics, such as the Cold War; détente; relations among the superpowers; the Sino-Soviet dispute; Soviet policy in the West and East Asia; the Third World. 128A: Ms. Lapidus (F); 128B: Mr. Breslauer (W)

Empirical Theory and Quantitative Methods

131A-**131B. Political Inquiry, (5-5) Formerly 101A-101B; 101C. Three hours of lecture and one 1-hour discussion per week. The empirical method and its logical and methodological characteristics. Mr. Thies (F, W)

131A-**131B-**131C. Quantitative Methods for Political Scientists, (5-5) Two 1 1/2-hour lectures and one 1-hour discussion per week. Prerequisite: 131A. 131B: Complex research methods, statistics, and computer usage for social science majors. 131C: Introduction to research methods and computer programs. Mr. Gregor (F, W)

132A-**132B-**132C. Evolution and Revolution in the Middle East. (5-5) Two 1 1/2-hour lectures and one 1-hour discussion per week. Issues of sociological and economic social development with several third world contexts. 132A: Mr. Ayres (F); 132B: Mr. Breslauer (Sp)

140A-**140B. Precepts of Character of Modern Systems, (5-5) Two 1 1/2-hour lectures and one 1-hour discussion per week. Issues of social organization and political change. 140B: The distinction between traditional and modern systems. Mr. Israel (F)

140C-**140D-**140E-**140F. Revolutionary Movements. (5) Formerly 140E; 141E. Two 1 1/2-hour lectures and one 1-hour discussion per week. Prerequisite: may be repeated once with consent of instructor. Marxist or Leninist theories of society, the state, and international politics in Communist bloc nations, the relationship of neo-Maoist thought to other political systems, nationalism, existentialism, and democratic theory. Mr. Lowenthal (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 discussion per week. Major political systems of the Middle East. Mr. Israel (F, W, Sp)

142D. Evolution and Revolution in the Middle East. Foundations of Islamic society and its political history; the consequences of Islamic and Western systems, process of modernization; traditional, constitutional and revolutionary states; parties, political organizations, ideologies, and development policies. Mr. Gregor (F)

Area Studies

141A-**141B. Government and Politics in the Soviet Union, (5-5) Two 1 1/2-hour lectures and one 1-hour discussion per week. Prerequisite: 141A. The Soviet political system. Ms. Moskowitz (F)

141C-**141D. Government and Politics in Eastern Europe, (5-5) Formerly 141C-141D. Two 1 1/2-hour lectures and one 1-hour discussion per week. Prerequisite: 141A or permission of instructor. A more advanced course based on 141A. Selected topics of Soviet internal politics: Marxist-Leninist political culture, national and ethnic development and the distributive process by which societies become modern. Mr. Lowenthal (F, W)

**141F. Comparative Politics (5-5) Two 1 1/2-hour lectures and one 1-hour discussion per week. Theories of rebellion, revolution, and political violence. Mr. Breslauer (F, W)

NOTE: For key to symbols, see page 36.

L&S: Political Science / 179
Government and Politics in Great Britain. (5) Two 1 1/2-hour lectures and one 1-hour discussion per week. The British political tradition; evolution from oligarchy to democracy; elections and parties; the constitution; parliament, cabinet, and administration; functions of the welfare state. 

Mr. Lipson (W, Sp).

145A-145B. Government and Politics in South Asia. (8-8) Two lectures and one 1-hour discussion per week. A comparative analysis of development and current politics in Southern European and South Asian 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-Maoist thought.

145A: Mr. Das Gupta (F).
145B: Mr. Rose (Sp).

145C. Political Theory in Non-Western Societies. (5) Formerly 145E. Two 1 1/2-hour lectures and one 1-hour discussion per week. 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-Maoist thought.

145A: Mr. Ayres (W, Sp).
145B: Mr. Johnson (F, W, Sp).

151. Legal Theory. (5) Three hours of lecture and one hour of discussion per week. An introduction to theories of law from a philosophical, historical, and sociological points of view. Particular attention will be given to modern theories of the function of law.

152. Legal Techniques. (5) Two 1 1/2-hour lectures and one 1-hour discussion per week. Problem-oriented approach to the study of substantive law. Emphasis on techniques of legal analysis and practice, and critical evaluation of specific legal problems.

153. Comparative and Historical Approaches to Legal Systems. (5-5) Three hours of lecture and one 1-hour discussion per week. An introduction to the analysis of legal systems and the international aspects of comparative law. Particular attention will be given to the comparative study of legal systems in Europe.

154. 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 may be repeated once subject to approval by the department. An inquiry into synoptic and incremental decision-making, the concept of rationality—substantive and procedural, and their relationship to democracy, pluralism, and mass politics. The effects of political development on bureaucratic and collegial decision-making will also be explored.

Mr. Landau (W).

155A. Political Behavior. (5) Three hours of lecture and one hour of discussion per week. An in-depth analysis of a problem area, which may be repeated once subject to approval by the department. An inquiry into synoptic and incremental decision-making, the concept of rationality—substantive and procedural, and their relationship to democracy, pluralism, and mass politics. The effects of political development on bureaucratic and collegial decision-making will also be explored.

Mr. Landau (W).

156. Political Ideology and Involvement. (6) Three hours of lecture and one hour of discussion per week. An in-depth analysis of a problem area, which may be repeated once subject to approval by the department. An inquiry into synoptic and incremental decision-making, the concept of rationality—substantive and procedural, and their relationship to democracy, pluralism, and mass politics. The effects of political development on bureaucratic and collegial decision-making will also be explored.

Mr. Landau (W).

157A-157B. Constitutional Law of the United States. (5-5) Three hours of lecture and one 1-hour discussion per week. Fundamental constitutional principles; constitutional law; leading cases; causes and consequences of legal decisions. 157A: The Federal System. 157B: Civil Liberties. 

Mr. Muir (W, Sp).

158. Political Culture. (5) Three hours of lecture and one 1-hour discussion per week. An in-depth analysis of a problem area, which may be repeated once subject to approval by the department. An inquiry into synoptic and incremental decision-making, the concept of rationality—substantive and procedural, and their relationship to democracy, pluralism, and mass politics. The effects of political development on bureaucratic and collegial decision-making will also be explored.

Mr. Landau (W).

159. The Practice of Intergovernmental Relations. (5) Three hours of lecture and one 1-hour conference per week. An in-depth analysis of a problem area, which may be repeated once subject to approval by the department. An inquiry into synoptic and incremental decision-making, the concept of rationality—substantive and procedural, and their relationship to democracy, pluralism, and mass politics. The effects of political development on bureaucratic and collegial decision-making will also be explored.

Mr. Landau (W).

160. Public Organization, Administration, and Policy. (5) Two 1 1/2-hour lectures and one 1-hour discussion per week. The study of methods used to manage the process of the bureaucracy in the American political system. An introduction to theories of organizational behavior. The effects of administrative structure upon decision-making and distribution of public benefits. Mr. Leonard (F).

161. Public Organization and Administration. (5) Two 1 1/2-hour lectures and one 1-hour discussion per week. The study of methods used to manage the process of the bureaucracy in the American political system. An introduction to theories of organizational behavior. The effects of administrative structure upon decision-making and distribution of public benefits. Mr. Leonard (F).

162. Development Policy, Planning, and Administration. (5) Two 1 1/2-hour lectures and one 1-hour discussion per week. Policy analysis in developing countries. Economic, social, and political influences on administrative systems that are and should be considered in the formulation of governmental intervention in the developmental process.

Mr. Hyden (Sp).

163. The Development of the Civil Services. (5) Two 1 1/2-hour lectures and one 1-hour discussion per week. A comparative examination of the origins, evolution, and contemporary character of selected national administrative systems.

164. Policy and Administration of Public Finance. (5) Three hours of lecture and one 1-hour conference per week. Financial administration in the modern state—American, comparative, historical; fiscal implications of governmental activity; the budget process, and the relationship of administrative decision-making devices to secure administrative accountability and political responsibility.

165. Public Policy and Decision Theory. (5) Three hours of lecture and one hour of discussion per week. An in-depth analysis of a problem area, which may be repeated once subject to approval by the department. An inquiry into synoptic and incremental decision-making, the concept of rationality—substantive and procedural, and their relationship to democracy, pluralism, and mass politics. The effects of political development on bureaucratic and collegial decision-making will also be explored.

Mr. Landau (W).

166. Administrative Behavior. (5) Two 1 1/2-hour lectures and one 1-hour discussion per week. The study of methods used to manage the process of the bureaucracy in the American political system. An introduction to theories of organizational behavior. The effects of administrative structure upon decision-making and distribution of public benefits. Mr. Leonard (Sp).

167. Special Studies

H190A-H190B. Senior Honors Seminars. (5-5) Four hours of seminar each week. Prerequisite: senior honors candidates, consent of instructor. Offerings vary from year to year. May be 2 or 3 quarters with thesis written in last quarter. Credit and grade awarded upon completion of sequence, applications and details through the Undergraduate Office.

The Staff (W, Sp).

168. Experimental Course. (1-5) Prerequisite: consent of instructor. Topics, experimental in nature, will vary from year to year.

H195A-H195B. Senior Honors Thesis. (5-6) Four hours of seminar each week. May be 2 or 3 quarters with thesis written in last quarter. Senior honors candidates, completion of suitable seminar as determined by instructor. Directed research and thesis. Satisfaction of requirement for seniors only. One or two quarters, at the instructor’s option; if two quarters, credit and grade to be awarded upon completion of seminar and course details through the Undergraduate Office.

The Staff (W, Sp).

197A-197B. Political Internship Program. (5) Formerly 190C. Two 1/2-hour lectures and 1 1/2 hours of field work per week. Prerequisite: Consent of faculty sponsor and department chairperson. Juniors and seniors only. Supervised experience in field positions with California state and local governments for 15-20 hours per week, and coordinated course
**Graduate Courses**

A statement on admission to graduate work may be obtained from the graduate office in the department. Properly qualified undergraduates may be admitted to graduate work and classes with the approval of the instructor. For updated information on graduate course descriptions and faculty scheduling, consult the departmental graduate office.

**Comparative Analysis**

**Courses**

200. Major Works in Comparative Analysis. (4) Two hours each week. Major works in the field of comparative politics. Lectures will be on (1) the process of social change and (2) the methodology of social analysis. Typically, students will read one book a week and take an examination at the end of the quarter. Prerequisite: consent of instructor. Basic problems of political theory will be examined within the context of American political development. Mr. Jacobson (Sp).

214A. Themes in Western Political Theory. (4) Two hours of lecture per week. Prerequisite: consent of instructor. Themes to be specified each year. In Progress grade to be assigned to students who take 214B. Letter grade to students taking 214A only. Mr. Thomas (F).

216. Marxist Theory. (4) One 2-hour session and one 1-hour conference per week. Prerequisite: consent of instructor. Basic problems of political theory will be examined within the context of Marxist political development. Mr. Heges, Mr. Jacobson (F).

216A-216B. Contemporary Theory and Political Science. (4-4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 214B. Mr. Jacobson (F).

218A-218B. Colloquium in Political Theory. (4-4) Two hours of lecture and one hour of discussion per week. An intensive examination of the nature and aims of various forms of political theory. Mr. Thomas (F).

224A-224B. Comparative Analysis of Developing Political Systems. (4-4) Two 2-hour sessions and one 1-hour conference per week. An analysis of the processes of political modernization and change in developing countries. Major emphasis will be given to comparative analytical theory and methodology. In Progress grade to be assigned to students who take 224B. Letter grade to students taking 224A only. Mr. Zysman (W, Sp).

225A. International Organization. (4) Two 2-hour sessions and one 1-hour conference per week. Specialized theoretical issues in the study of International organization. Mr. Waltz (W).

225B. International Law. (4) One 2-hour session per week. Prerequisite: course 220A. An analysis of the legal and institutional organization of the International system. Mr. Ruggie (W).

228. National Security Policy. (4) Two 2-hour sessions and one 1-hour conference per week. Strategic concepts, theories of national security, and the relationship of conflict-theory to policy-making and national action. Special, but not exclusive, emphasis on United States data and policy problems. Mr. Seabury (Sp).

229B. Future World Orders. (4) Three hours of lecture per week. Prerequisite: course 229A. Mr. Ruggie (Sp).

**International Relations**

**Courses**

220. Theories of International Relations. (4) One 2-hour session per week. Prerequisite: consent of instructor. A systematic introduction to the principal theories and approaches to the study of International relations. Mr. Waltz (F).

222. Nationalism and Imperialism. (4) One 2-hour session per week. Prerequisite: course 220 or 220A. Themes in the theory of nation-building, illustrated with Western and non-Western case studies. Mr. Haas (W).

226A. International Organization. (4) Two hours of lecture per week. Readings and discussion concerning International Relations.
Methods. (4) Two hours of lecture per week. An introduction to the collection, use, and analysis of law data.

257A—257B. Constitutional Law. (4—4) Two hours of lecture per week. Fundamental principles of the American constitutions and amendments affecting the liberties, rights, duties, and procedures of governmental officers and agencies; causes and consequences of judicial decisions. Credit and grade will be awarded upon completion of the sequence.

258A—258B. The Jury System. (4—4) Two hours of lecture and one hour of discussion per week. Development and current functions of juries. Investigations include State and Federal juries and trial juries. Emphasis on jury selection and on the effects of jury membership composition on jury functioning and jury decisions.

Political Behavior

Seminars

261A—261B. Political Behavior. (4—4) Two 1-hour conferences per week. A comparative review of the major topics in political behavior through intensive examination of the theories, findings, and proceedings of the most significant studies in the field. Credit and grade will be awarded upon completion of the full sequence. Mr. McClosky (F, W)

261C. Political Behavior: Personality and Politics. (4) One 2-hour session per week. Mr. McClosky (Sp)

262A—262B. Field Work Seminar on Research Methods. (4—4) Two 2-hour sessions per week. Prerequisite: Seniors accepted with consent of instructor. Survey research methods. Students will collect, code, and analyze data from a research concept to the reporting of the results. Includes questionnaire design, construction of measures, sample selection, interviewing, coding, data analysis, etc. Credit and grade to be awarded upon completion of the full sequence.

265A—265B. Special Topics in Political Behavior. (4—4) One 2-hour session per week. Review of research on special topics in political behavior. Topics may vary from year to year. Mr. Citrin (F, W)

266A—266B. Conflict and Politics. (4—4) Two hours of lecture per week. Analysis of conflicts of various types: intrapersonal, interpersonal, intragroup, intergroup, intranational, international. Examination of the role of political processes (both political and formal) specifying causes, structures, and consequences of conflictive and harmonious relations. Investigation of conflict perspectives in political systems and ideologies. Credit and grade awarded upon completion of the full sequence.

270A. American Government and Politics

Seminars

270A—270B—270C. Voting Behavior and Public Opinion. (4—4—4) Two hours of lecture and one hour of discussion per week. Examination of the basic literature on American political behavior and public opinion, and student research on individually selected topics in this field. Credit and grade to be awarded upon completion of 270A—270B—270C sequence. 270A is optional and will receive letter grade.

271A—271B—271C. American Government and Politics. (4—4—4) Formerly 274A—274B—274C. Two 2-hour sessions per week. 271A: Canadian politics and public opinion; 271B: American political parties. 271C: Social groups and political power.

272A—272B—272C. National Policy Making. (4—4—4) Formerly 267A—267B—267C. Two hours of lecture per week. Prerequisite: students with credit for 267A—267B may take 272C. National policy-making processes, especially the national governmental agencies of the Presidency, sometimes on Interactions among major policy-making institutions. Credit and grade will be awarded upon completion of 272A—272C. Seminar 272C is optional. Mr. Wollinger (F, W, Sp)

273A—273B. Political Recruitment and Candidate Selection. (4—4) Formerly 268A—268B. Two hours of lecture per week. An examination of the elite and mass politics of political recruitment and candidate selection, with special attention to participation, organization, and ideological criteria. Credit and grade will be awarded upon completion of the sequence. Mr. Cavata (F, W)

274A—274B. Sub-national Government and Politics. (4—4) Two 2-hour sessions per week. Research on local political processes, decision-making, and community power structure.
viser, 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. Must be taken on a satisfactory/unsatisfactory basis.

The Staff (F, W, Sp)

**IDS 159. Introduction to Marxism.** (5) See Interdepartmental Studies for the complete description of this course.

**IDS 175. A Nontechnical Introduction to Operant Conditioning.** (4) See Interdepartmental Studies for the complete description of this course.

**IDS 234A-234B. Compliance: Public and Private Law Enforcement.** (3) See Interdepartmental Studies for the complete description of this course.

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**Psychology**

Department Office, 3210 Tolman Hall

**Professors:**
- Frenz A. Beach, Jr., Ph.D.
- Jack Block, Ph.D.
- Susan Ervin-Tripp, Ph.D.
- Stephen S. Glickman, Ph.D.
- Harrison G. Gough, Ph.D.
- James L. DeValois, Ph.D.
- Frank A. Beach, Jr., Ph.D.
- Geoff Keppel, Ph.D.
- Leo J. Postman, Ph.D.
- Walter M. Roderick, Ph.D.
- John Shaughnessy, Ph.D.
- Martin V. Covington, Ph.D.
- Mark R. Rosenzweig, Ph.D.
- Donald A. Riley, Ph.D.
- Etvin R. Hatter, Ph.D.
- G. Bruce Beal, Ph.D.
- John T. Croxall, Ph.D.
- William B. Ritchie, Ph.D.
- Catherine Landreth, Ph.D.
- Christina Maslach, Ph.D.

**Assistant Professors:**
- James C. Coyne, Ph.D.
- Enrioo Jones, Ph.D.
- Mary B. Main, Ph.D.
- Arnold L. Leiman, Ph.D.
- Eleanor H. Roese, Ph.D.
- Sheldon Zedeck, Ph.D.
- Stephen Palmer, Ph.D.
- David Krech, Ph.D.

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- John T. Croxall, Ph.D.
- William B. Ritchie, Ph.D.
- John T. Croxall, Ph.D.
- Sheldon Zedeck, Ph.D.

**Associate Professors:**
- Susan Ervin-Tripp, Ph.D.
- Susan Ervin-Tripp, Ph.D.
- Susan Ervin-Tripp, Ph.D.
- Susan Ervin-Tripp, Ph.D.
- Susan Ervin-Tripp, Ph.D.
- Susan Ervin-Tripp, Ph.D.

**Graduate Study**

Preparation. The Department of Psychology recognizes a broad undergraduate background in the natural, physical, and social sciences as the best preparation for graduate study. A student majoring in psychology and a course in statistical methods are strongly recommended. Provisional acceptance of an applicant seeking to make up undergraduate deficiencies rarely, if ever, occurs. The number of applicants accepted to full graduate status normally exceeds the number admitted. Hence, the prospective applicant who has little or no background in psychology, is well advised to defer application until such time as he or she is prepared to enter as a regular student.

Graduate Training Programs. The graduate program is designed for Felix students interested in pursuing advanced study and conducting original research in psychology. New admissions are restricted to candidates for the Ph.D. Students are accepted for the fall quarter only. Details concerning admission, financial aid, and degree requirements are given in a brochure which is available from the Student Services Office, Department of Psychology, University of California, Berkeley, CA 94720.

Graduate study is organized around seven major areas of study. Formal graduate training, including the selection and evaluation of students and the development and maintenance of the training programs, is the primary responsibility of the faculty members who have charge of the following areas: biological, clinical, cognitive, developmental, personality, quantitative, and social. The core of each training program is a set of prescribed courses. These courses are designated as "core" courses (i.e., 200, 210, 220, etc.) and are offered either yearly or every other year. They are intended to provide the core content necessary for a student to become an effective scholar.

A departmental diagnostic quantitative examination will be administered during the first quarter. 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. The sequence in either alternative must be taken consecutively.
3. Specialization: Three advanced courses in psychology. (Only one 198 or 199 course may be included in this total.) Subject to the provisions of the passed or not passed option, any or all of the lower division courses may be accepted with a passing grade, but no courses to be counted toward the completion of the upper division requirements may be taken on a passed or not passed basis except with the explicit approval of the major advisor.

Honor Programs. The award of departmental honors is contingent upon: (1) maintenance of an overall grade-point average of 3.3; (2) achievement of a grade-point average of 3.3 in upper division Psychology courses; (3) submission of a thesis of high quality, based upon independent study with a member of the Psychology Department faculty, and marked by satisfactory completion of at least 4 units of course 199. Evaluation of the thesis is the responsibility of, first, the faculty supervisor and then of the departmental committee. It is the responsibility of the latter group to decide on the level of honors to be awarded. Additional information concerning the honors program is available in the Student Services Office, Room 3305 Tolman Hall.
and researcher in the area of specialization. Students are expected to affiliate themselves with one of the special programs and to complete the core sequence for that area. Depending upon the area, additional course requirements might consist of (1) courses on methodology, experimental design, and statistical analysis, (2) courses covering particular areas such as the study of brain and behavior, especially reproduction of non-human primates. Process of sexual differentiation of the nervous system, and development of the central nervous system, (3) advanced courses and seminars in the area of specialization, and (4) individual study and research (298 and 299). The program is designed to provide a solid foundation in the area of specialization and to prepare students for further study in graduate school or for careers in research. The program is not designed to prepare students for careers in practice.

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. (5) Three 1-hour lectures and one 1-hour discussion session per week. Introduction to the principal areas, problems, and methods of psychology. (F; W; S) Mr. Covington (W); Mr. Covington in charge (Sp). 46. Freshman Seminars. (1) Two hours of lecture per week. Prerequisite: Open to students in the psychology freshman cluster program. Weekly discussions on the nature, methods, and aims of contemporary psychology. Emphasis on the development of critical thinking. (F; W; S) Mr. Keppel in charge (F).

90. Supervised Independent Study and Research. (1-6) Prerequisites: Psychology 1 and consent of Instructor. A detailed and integrative overview of major areas of interest within psychology. Examination of various aspects of visual perception and its role in the acquisition of visual experience. (F; W; S) Mr. Shaughnessy in charge (Sp).

UPPER DIVISION COURSES

Psychology 1 is prerequisite for all upper division courses. Additional requirements are also stated for certain courses.

General

100A—100B—100C. Advanced General Psychology. (6-5-5) Three 1/2 hours of lecture and one hour of discussion per week. Prerequisites: courses 1 and 2, or equivalent. Completion of the major or consent of the instructor. Intended primarily for majors. Enrollment limited to 300 students. See description of major for further information. A systematic introduction to the core of psychology. Will include guest lectures given by a number of recognized individuals and discussion of the major areas of interest within psychology. Course must be taken in the A, B, C order. Statistics or concurrent enrollment in statistics is recommended. (F; W; S) Mr. Leiman, Mr. Zedeck (F, W, Sp).

105. Environmental Psychology. (6) Formerly 191X. Two 2-hour laboratories per week. Prerequisite: course 101A useful but not necessary. Survey of environmental psychology, including environmental perception and assessment; cognitive representations of the large-scale environment; and concepts of environmental attitudes and dispositions; analysis of behavior settings; human spatial behavior; behavioral effects of density; psychological aspects of environmental planning; and problems of decision-making. (F; W; S) Mr. Craik (F).

110. History of Psychology. (6) Three 1 1/2 hours of lecture per week. Prerequisite: course 1 and at least three upper division psychology courses or consent of instructor. Development of scientific study of human and animal behavior. Consideration of history of psychology as a whole. Comparative developmental, personality, and social psychology—as well as general trends.

Quantitative

101A. The Analysis of Psychological Data. (6) Three 1 1/2 hours of lecture and one 1-hour laboratory per week. Prerequisites: courses 1 and 2, or consent of instructor. The quantitative prerequisites for the major or consent of the instructor. An introduction to the use of statistical and data analytic techniques and research design. Topics to be covered include experimental design, comparison of means, comparison of frequency distributions, tests of correlations and their relation. Mr. Shaughnessy (F); Mr. Arvey (W).

101B. The Analysis of Psychological Data. (5) Three 1-hour lectures and one 3-hour laboratory per week. Prerequisites: completion of 101A with heavy emphasis on application. Students will be expected to collect and analyze their own data. Reliability, validity and level of measurement, factorial designs and their analyses. Mr. Shaughnessy (W); Mr. Arvey (Sp).

110A—110B—110C. Research Design in Psychology. (4-4-5) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisites: courses 101A—102A—102B—102C, or consent of instructor. To be offered in alternate years. An introduction to the methodology of psychological research. Emphasis on the design and analysis of data. (F; W; S) Mr. Arvey (W).

105. Introduction to Multivariate Psychological Experiments. (5) One 3-hour lecture and one 1-hour laboratory per week. Prerequisites: courses 101A—102A—102B—102C, or consent of instructor. To be offered in alternate years. General techniques for analyzing psychological experiments yielding multiple measurement variables. Emphasis on multivariate prediction models, factor and component analysis, discriminant analysis, classification, and analysis of variance. Topics to be selected from the following: Analysis of variance, multivariate analysis of variance, multiple regression, discriminant analysis, analysis of covariance, principal components, factor analysis. Topics will vary somewhat from year to year. (F; W; S) Mr. Meredith (F).

106. Topical Seminars in Quantitative Psychology. (6) Two 2-hour lectures per week. Prerequisites: course 110A, or consent of instructor. Open to students in the psychology major or junior. Credit and grade to be awarded upon completion of sequence. (F; W; S) Mr. Shaughnessy in charge (Sp).

110. Introduction to Biological Psychology. (5) Two 2-hour lectures and one 1-hour discussion per week. Prerequisites: course 1 and biological pre-requisites for the major or consent of instructor. Survey of relations between behavioral and biological processes. Topics include sensorimotor processes, neural maturation, neural bases of motivation, learning. Mr. DeValois (W).

111. Sensory Processes: Vision. (5) Formerly part of 111A. Two 3-hour laboratories per week. Prerequisites: course 101A—100B—100C or 111A or consent of instructor. Examination of various aspects of visual perception and its role in the acquisition of visual experience. (F; W; S) Mr. DeValois (W).

112. Sensory Processes: Hearing. (5) Formerly part of 113A. Two 3-hour laboratories per week. Prerequisites: consent of instructor. Examination of various aspects of auditory perception and its role in the acquisition of auditory experience. (F; W; S) Mr. Hafter (W).

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. Laboratory research on selected topics in hearing. (F; W; S) Mr. Rosenzweig (W).

114. Biology of Learning and Neural Plasticity. (5) Formerly part of 111B. Two 2-hour laboratories per week. Prerequisites: course 101B—102B—102C or consent of instructor. A study of theoretical and experimental investigations of the biological substrates of learning, memory, and the neural forms of plasticity related to the growth and maturation of the nervous system. Mr. Rosenzweig (W).

115. Introduction to Comparative Psychology. (5) Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisites: course 1, I, or equivalent. Studies of animal behavior in evolutionary perspective. Analysis of behavior development, reproduction, aggression, territoriality. (F; W; S) Mr. Rosenzweig (W).

116. Biology of Motivation. (5) Two 2-hour laboratories per week. Prerequisites: course 101B—102B—102C or consent of instructor. Neural and hormonal bases of motivated behavior; treating such topics as neurochemical regulation of feeding and ingestive behavior, aggression, sleep, dreaming, and waking. Mr. Arvey (W).

117. Hormones and Behavior. (5) Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisites: concurrent enrollment in course 116. A study of the neuro-endocrine system. Neural endocrine mechanisms underlying behavior, especially reproduction of non-human species. Process of sex determination and neuroendocrine system will be emphasized. Hormonal influences on feeding, biorhythms and aggressive behavior. (F; W; S) Mr. Arvey (W).

118. Human Sexuality. (5) 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 dimorphism and intersex. Emphasis is placed on the recognition of sex-determining factors, but due attention is given to the interaction with sociocultural factors affecting sexual attitudinal behavior. Reading list of selected readings and studies of clinical cases, animal experiments and cross-cultural comparisons. Class limited to 102. Psychology majors given preference. (F; W; S) Mr. Zedeck (F).

119. Topical Seminars in Biological Psychology. (6) Two 2-hour lectures per week. Prerequisites: consent of instructor. For a precise schedule of courses, check with the Student Services Office each quarter. May be repeated for credit with a different topic and permission of instructor. (F; W; S) Mr. Zedeck (F).

120. Animal Learning. (5) Formerly 120. Two 1 1/2-hour lectures and one hour of discussion per week. Prerequisites: courses 101A—102A—102B—102C or consent of instructor. Course 101A is useful but not necessary. Theoretical and experimental approaches to classical and instrumental conditioning in the study of animal learning. Additional topics of current interest in the area of animal learning will also be considered. Mr. Riley (W).

122A—122B. Human Learning and Memory. (4—4) Formerly 122. Two 1 1/2-hour lectures, one 1-hour discussion per week. Prerequisites: courses 101A—102A—102B—102C or consent of instructor. Course 101A is useful but not necessary. Two sections. Cross-registration permitted. Mr. Kauffman (F); Mr. Arvey (W). 122B covers short-term memory; the role of coding processes and organization in retention and recognition. 122B covers acquisition processes in verbal learning, development.
development of learning skills and transfer of training; mechanisms of retention and forgetting; modern theories of human learning and memory. Students who have taken 122 and want to take 122A or 122B must first check with instructor. Mr. Shaughnessy (W, Sp)

**123. Thinking.** (Formerly 130) Three 1 1/2-hour lectures per week. Prerequisites: course 10. Course 10A is useful but not necessary. Review of principal concepts and research concerning processes of human thinking, including problem solving; critical thinking and creative thinking; other aspects of higher-order cognitive functioning.

**124. Psycholinguistics.** (Formerly 131A) Two 2-hour lectures and one 5-hour laboratory or discussion section per week. Prerequisites: course 1 and an introductory course in linguistics or consent of instructor. Study of linguistic information by bilinguals (perception, recall, translation); structure of bilingual discourse. To be given in alternate years. Background in linguistics and psycholinguistics recommended.

**126. Information Processing.** (Formerly 129) Two 1 1/2-hour lectures and one 2-hour discussion/laboratory per week. Prerequisites: course 100A–100B and 101A–101B or consent of instructor. Principal concepts and research concerning human processes underlying the symbolic information processing, and subjective recognition and classification; perception and comprehension of language; attention; theoretical methods and empirical techniques in the study of imagery and other cognitive processes. Ms. Rosch (W)

**128. Topical Seminar In Cognitive Psychology.** (5) Two hours lecture per week. Prerequisites: consent of instructor and, depending upon the course with which the seminar forms a sequence, course 121, 122, 124, or 126. For a precise schedule of offerings, check with the Student Services Office each quarter. May be repeated for credit with a different topic and permission of instructor.

**129. Laboratory in Experimental Psychology.** (5) Two hours lecture and four 2-hour discussion/laboratory per week. Prerequisites: consent of instructor and, depending upon the course with which the laboratory forms a sequence, course 123, 124, or 126. For a precise schedule of offerings, check with the Student Services Office each quarter. May be repeated for credit with a different topic and permission of instructor.

**130. Principles of Psychopathology.** (Formerly 155) Two 2-hour lectures and one hour of discussion per week. Prerequisite: course 1. Not open to students who have taken course 130A–130B beginning Fall 1978. Critical evaluation of current theoretical models used in the description and explanation of psychological difficulties. Implications of these models for psychotherapy and other forms of psychological intervention. Mr. Snowden (Sp)

**131A–131B. Clinical Psychology.** (5–6) Formerly 156. Two 1 1/2-hour lectures and one 2-hour discussion per week. Prerequisites: course 100A–100B or consent of instructor. The first quarter emphasizes the experiences of "mental illness" or "emotional disturbance" from individual, familial, social setting and societal points of view. The second quarter describes and evaluates traditional and new approaches to psychological intervention. Students are expected to choose both quarters; credit and grade awarded at end of each quarter. 131A. Mr. Coyle (F); 131B. Mr. Korchin (W)

**132. Community Psychology.** (Formerly 158) One 2-hour lecture and two hours of discussion per week. Prerequisites: course 130 or 131A–131B and consent of instructor. Study of mental health problems from a social-psychological perspective, with particular concern for social ecological and sociological factors. Critical examination of emerging methods of community intervention. A field research project is required. Ms. Snowdon (F)

**138. Topical Seminars In Clinical Psychology.** (5) Two 2-hour lectures per week. Prerequisite: consent of instructor. For a precise schedule of offerings, check with the Student Services Office each quarter. May be repeated for credit with a different topic and permission of instructor. Mr. Jones (F)

### Developmental Psychology

**140. Developmental Psychology.** (5) Two 1 1/2-hour lectures and one 1 1/2-hour discussion section per week. Prerequisites: course 1. Survey of the areas of research in developmental psychology with emphasis upon changes in behavior throughout the life span, beginning with infancy, through the school years, and beyond. Mr. Langer (W)

**143. Child Language Development.** (Formerly 144) Two 1 1/2-hour lectures per week. Prerequisite: course 100A–100B or 100C and an introductory course in linguistics or consent of instructor. Theory and research on children's linguistic development, including the sources of the child's language system, basic semantic categories, and sociolinguistic features. Ms. Ervin-Tripp (W)

**144. Personality and Social Development.** (5) Two 2-hour lectures per week. Prerequisite: course 100A–100B or 100C or 142 or consent of instructor. Theory and research on the cognitive and affective aspects of personality development and of social development; relationships with others. Mr. Langer (W)

**148. Topical Seminar in Developmental 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 141, 142, 143, or 144. For a precise schedule of offerings, check with the Student Services Office each quarter. May be repeated for credit with a different topic and permission of instructor. Mr. Coyle (W)

**155. Language In Social Interaction.** (Formerly Rhetoric 152) Two 2-hour lectures per week. Variation in linguistic features, register, style, dialect and language in interaction, in relation to social features of participants and situation. Analysis of sociolinguistic rules, and strategic use to convey social meaning. Recommended background in linguistics and psychology recommended.

**162. Attitudes, Beliefs, and Influence Processes.** (5) Three 1 1/2-hour lectures and two 2-hour discussions/laboratory per week. Prerequisites: course 160 or consent of instructor. Social psychological theories and research methods in the area of social influence. For a precise schedule of offerings, check with the Student Services Office each quarter. May be repeated for credit with a different topic and permission of instructor. Mr. Crank (W); Mr. Block (Sp)

### Social Psychology

**163. Small Group Structure and Processes.** (5) Three 2-hour lectures and three 2-hour discussions/laboratory per week. Prerequisites: course 160 or consent of instructor. Critical evaluation of emerging methods of social psychology including interpersonal processes, small groups, attitudes and attitude change, and social problems. Ms. Maslach (W)

**166. Language In Social Interaction.** (Formerly 158) Two 1 1/2-hour lectures and two 1 1/2-hour discussion sections per week. Prerequisites: course 100A–100B or consent of instructor. Social psychological theories and research methods in the area of social influence. For a precise schedule of offerings, check with the Student Services Office each quarter. May be repeated for credit with a different topic and permission of instructor. Mr. Langer (W)

**168. Topical Seminars In Social 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 161, 162, or 163. For a precise schedule of offerings, check with the Student Services Office each quarter. May be repeated for credit with a different topic and permission of instructor. Mr. Langer (W)

**169. Personality and Social Development.** (5) Two 2-hour lectures per week. Prerequisite: course 100A–100B or 100C or 142 or consent of instructor. Theory and research on the cognitive and affective aspects of personality development and of social development; relationships with others. Mr. Langer (W)

**170. Differential Psychology.** (5) Two 1 1/2-hour lectures and one 1 1/2-hour laboratory per week. Prerequisites: course 100A–100B or consent of instructor. Critical evaluation of emerging methods of differential psychology in the study of personality, and an evaluation of major theories and points of view.
cognitive style, heredity and environmental bases of individual difference, family, sex, class, and race difference.

171. Psychology of Abilities and Aptitudes. (6) Two 1-1/2 hour lectures per week. Prerequisite: course 101B or 102B or equivalent course; course 170 is recommended. Theory and evaluation of the principal tests of abilities and aptitudes. Historical development of psychological test methods. Mr. Tuddenham (W)

**171L. Laboratory in the Psychology of Abilities and Aptitudes. (6) One hour lecture and one laboratory per week. Prerequisites: course 171 and consent of instructor. (May be taken concurrently with 171).

**172. Appraisal of Personality Differences. (6) Two 1-1/2 hour lectures per week. Prerequisite: course 101B or 102B or equivalent course; course 170 is recommended. Evaluation of methods for the description and measurement of individual differences in personality, including personality inventories, measures of interests and values, objective tests, and approaches to ego organization.

**172L. Laboratory in the Appraisal of Personality Differences. (2) One 1-hour lecture and one 1-hour laboratory per week. Prerequisites: course 172 and consent of instructor. (May be taken concurrently with 172).

Industrial–Organizational Psychology

190. Industrial–Organizational Psychology. (5) Three 1-1/2 hour lectures per week. Prerequisite: course 101A or 102A or consent of instructor. Primarily for students who anticipate work in the field of industrial organization psychology, covering fundamental theories and concepts in personnel and social aspects in the field. Concerned with methods used in developing and maintaining organizations. Mr. Arvey (F)

191. Personnel Psychology. (5) Two 1-1/2 hour lectures and two hours of discussion per week. Prerequisite: consent of instructor. Emphasis on psychological contributions in the development of techniques and practices in personnel and social psychology. Mr. Arvey (F)

193. Social Psychology of Organizations. (5) Formerly 183A–183B. Three 1-1/2 hour lectures/discussions per week. Prerequisite: course 180 or consent of instructor. Psychological approaches to organization theory with emphasis on the social, motivational, and attitudinal aspects of the work environment.

**194. Topic Seminars in Industrial–Organizational Psychology. (5) Two 1-1/2 hour lectures per week. Prerequisite: consent of instructor. For a specific schedule of offerings, check with the Student Services Office each quarter. May be repeated for credit with a different topic and permission of instructor.

Special Course Offerings

190. Cluster Seminars. (1) Two hours of lecture per week. Prerequisite: Psychology major and admission to cluster program. Weekly discussion on the nature, nature and aims of contemporary psychology. Course to be taught on a pass/not pass basis. Mr. Koppell (in charge) (F)

197. Field Study in Psychology. (1–5) Individual conferences. Prerequisite: requirement of course 101B or 102B or consent of instructor. Appropriate upper division work in psychology (to be determined by instructor); consent of instructor. Supervision of individual study and supervised research in off-campus settings. Individual and/or group meetings with faculty sponsor and written report required. Conditions for enrollment vary. May be repeated for credit with a different topic and permission of instructor.

198. Directed Group Study. (1–5) Prerequisite: consent of instructor. A selected group study of a selected topics in psychology. To be offered on a pass/not pass basis only. The Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1–5) Prerequisite: consent of instructor. Enrollment is restricted by regulations listed on page 36. Must be taken on a pass/not pass basis. The Staff (F, W, Sp)

GRADUATE COURSES

Graduate standing and the consent of the instructor are prerequisites for all graduate offerings. (Under
theory of family psychopathology (Kackson, et al). Implications of these theories for conceptions of childhood psychopathology and for assessment and treatment. Mr. Cowan (F)

231A-231B-231C. Theory and Method of Clinical Assessment. (5-5-5) Two 2-hour lectures and two hours of supervised observation per week. Prerequisite: consent of instructor. Principles and methods of clinical interviewing, interpretive, objective, and projective personality testing, in the context of personality theory and psychopathology. 231A required of first-year clinical students; 231B-231C required of second-year clinical students. Credit and grade awarded upon completion of the sequence. Consent and credit awarded upon completion of three-quarter sequence for non-clinical students.

232A-232B-232C. Psychotherapy: Theory, Intervention, and Research. (5-5-5) One 2-hour lecture plus 6 hours of practical per week. Prerequisite: courses 231A-231B-231C, and/or consent of instructor. An integration of classroom discussion and supervised practicum in the supervision of clients seen in the Psychology Clinic. Grades reported at end of three-quarter sequence.

233A–233B–233C. Group Psychotherapy. (5-5-5) One 2-hour lecture and six hours of practicum per week. Prerequisite: courses 230A-230B-230C, 231A, 231B, 231C and/or consent of instructor. An integration of classroom discussion and supervised practicum in the study of therapy with groups and their families. Class involves an integration of theory, research, and methods of intervention. Supervised experience with patients seen in the Psychology Clinic. Grades reported at end of three-quarter sequence. 233B: Mr. Coyne (F)

234A–234B–234C. Child and Family Therapy. (5-5-5) One 2-hour lecture and six hours of practicum per week. Prerequisite: courses 230A-230B-230C, 231A, 231B, 231C and/or consent of instructor. An integration of classroom discussion and supervised practicum in the study of therapy with children and their families. Discontinuation of children's needs and development within the context of family intervention. Supervised experience with patients seen in the Psychology Clinic. Grades reported at end of three-quarter sequence. 234A: Mr. Coyne (F, W); 234B: Mr. Coyne (Sp)

235A–235B–235C. Community Psychology. (5-5-5) One 2-hour lecture and six hours of practicum per week. Prerequisite: courses 230A-230B-230C, 231A, 231B, 231C and/or consent of instructor. An integration of classroom discussion and supervised practicum in the study of therapy with children and their families. Discontinuation of children's needs and development within the context of family intervention. Supervised experience with patients seen in the Psychology Clinic. Grades reported at end of three-quarter sequence. 235B: Mr. Snowden (F); 235C: Mr. Snowden (W)

239. Clinical Seminar. (1) One 1/2-hour lecture per week. Prerequisite: consent of instructor. Reports and discussions of original research in the area of clinical psychology. Discussion focuses on theory, research, and methods of intervention. Supervised experience with the integration of clinical intervention with systematic evaluation of results. Topics to be announced weekly. No more than one section may be given each year, and taken for credit. Grades reported at end of sequence.

240A. Proseminar: Early Cognitive Development. (5-5-5) Three 1 1/2-hour lectures per week. Prerequisite: consent of instructor. Focus is on the development of attachment relations will be emphasized.

240B. Proseminar: Socialization and Personality Development. (6) Three 1 1/2-hour lectures per week. Prerequisite: consent of instructor. An introduction to the developmental study of socialization and to the development of personality within communicative contexts. Mr. Ervin-Tripp (F)

240C. Proseminar: Development of Behavior Problems. (5) Three 1 1/2-hour lectures per week. Prerequisite: consent of instructor. An introduction to the developmental study of behavior problems. Mr. Langer (F)

241. Personality Measurement. (5) Three 1 1/2-hour lectures per week. Prerequisite: consent of instructor. Personality assessment, theory, and practice. Includes participation in three or more day-long assessment procedures at the Institute of Personality Assessment and Research. 250A: Mr. Block (F); 250B: Mr. Lazarus (W)

251. Personality Measurement. (5) Three 1 1/2-hour lectures per week. Prerequisite: consent of instructor. Personality assessment, theory, and practice. Includes participation in three or more day-long assessment procedures at the Institute of Personality Assessment and Research.

252. Personality Assessment. (5) One 3-hour lecture per week. Prerequisite: consent of instructor. Personality assessment, theory, and practice. Includes participation in three or more day-long assessment procedures at the Institute of Personality Assessment and Research.

252A. Proseminar: Attitudes and Personality Change in Social Psychology: Human Motivation. (F) Three 1 1/2-hour lectures per week.

252B. Proseminar: Small Groups in Social Psychology: Organizational Behavior. (Sp) Three 1 1/2-hour lectures per week.

253. Social Seminar. (1) One 1 1/2-hour lecture per week. Prerequisite: consent of instructor. A discussion of research in the area of social psychology. Not all participants in the class will be expected to attend and to enter into the discussions. Required for all students in the social psychology course. Satisfactory/Unsatisfactory basis only.

254A–254B–254C. Proseminar: Personality Theories and Applications to Clinical Practice. (5-5-5) One 2-hour lecture and six hours of supervisory practicum per week. Prerequisite: consent of instructor. Supervised experiential learning 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 for all students in the clinical psychology course. Satisfactory/Unsatisfactory basis only.

255. Social Seminar. (1) One 1 1/2-hour lecture per week. Prerequisite: consent of instructor. A discussion of research in the area of social psychology. Not all participants in the class will be expected to attend and to enter into the discussions. Required for all students in the social psychology course. Satisfactory/Unsatisfactory basis only.
Religious Studies

Group Major Office, 301 Campbell Hall
Advisers: Mr. Albert J. Reboulet (Christianity), Mr. Baruch M. Bokser (Judaism), Mr. William Brinner (Islam), Mr. Padmasab S. Jaini (Hinduism), Mr. Lewis Lancaster (Buddhism), Mr. Robert Bellah (General Studies); other advisers: Mr. Michael Nagler, Mr. Weiming Tu.

Major Group in Religious Studies

The group major program is administered through the Division of Special Programs. Students are referred to this office for all administrative matters, and this is where major students will file their study lists.

The major group in religious studies offers specialization in one of five major religious traditions or in more general religious studies, with a core amount of coursework. The major is designed primarily for its intrinsic value or as preparation for graduate work in religious or related areas rather than as preparation for theological studies or a ministerial career, though it can provide the latter options 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 or more 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 cultural area or attempting the degree in religious philosophy and benevolence from the world religions. Gandhi—saint or revolutionary? Historical cases of nonviolent action in interpersonal, civic, and international settings; non-violence in sociological and economics (Schumacher); the role of women.

100. Topis in the Study of Religion. (4) Three hours of lecture per week. Prerequisite: upper division work in religious studies. Selected problems in religion; topics vary from year to year. Students should consult the secretary of the program for offerings in the current academic year. The Staff (F, W, S, Sp).

191A—H198B. Honors Courses. (4—4) Hours to be arranged. Prerequisite: Admission to honors program in Religious Studies. Credit assignment: Student may enroll for a total of 4 units at one quarter, or 8 units for two quarters, with credit to be earned upon completion of a successful thesis. The work may take one or two quarters at the option of the instructor and the student. Successful completion of the course will normally, but not necessarily, mean the awarding of honors.

*198. Directed Group Study for Upper Division Religious Studies Students. (2—5) Two to five hours per week. Tutorial instruction in areas not covered by regularly scheduled courses. The Staff (F, W, S, Sp).

199. Supervised Independent Study and Research. (1—5) Five to ten hours per week. Prerequisite: upper division study in religious studies or related field. Area restriction is restricted by regulations listed on page 36. Must be taken on a passed/not passed basis.

RELATED COURSES IN OTHER DEPARTMENTS

Afro-American Studies 188A. The Black Church: A Historical Perspective. (5) Mr. Reboulet

Afro-American Studies 188B. Sociology of Black Religion (5) Mr. Reboulet (Sp).


History 103. Prossematics: Problems in Interpretation and Research in the Several Fields of History. (5) Mr. Bouwman and Mr. Caspar (Sp).

History 120. The Renaissance. (5) Mr. Brucker (F).

History 139B. European Jewish History Since 1917. (5) Mr. Webster (F).


Near Eastern Studies 35. Introduction to Judaism. (4) Mr. Bokser (F).


Rhetoric

Department Office, 2125 Dwaine Hall

Professors:
Robert L. Beloff, Ph.D.
William J. Branchi, Ph.D.  
(Chaiman)
Seymour B. Chaiman, Ph.D.
Leonard Halton, Ph.D.
Janette L. Richardson, Ph.D.
Barbara Shaprio, Ph.D.

Associate Professors:
Arthur J. Dulin, Ph.D.

Assistant Professors:
Daniel F. Malia, Ph.D.
Clair C. Smith, Ph.D.

Lecturers:
Fred S. Stripp, Th.D.
Ward E. Tahler, A.B., L.H.D.

Departmental Major Advisers: Mr. Leopold, Ms. Shaprio, Mr. Willy.

Graduate Adviser: Mr. Sloane.

Graduate Program

The Department of Rhetoric offers programs leading to both the M.A. and Ph.D. degrees. Students are admitted to the graduate program in the fall quarter only. The first three to four quarters are spent preparing for the M.A. oral examinaion, 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, 302A, 302B, 305, 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 requirement are available. Individual programs for all graduate students are carefully planned in conference with the graduate adviser.

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 deductive discourse (courses numbered 152-159, 161-175). Rhetoric 1A-1B or 10 and 30 are prerequisite 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 Directed Group Studies (186) may be allowed 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 thesis is required of all majors seeking to earn the B.A. degree with honors. Five units of credit for Rhetoric H190 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 the graduate program in the fall quarter only. The first three to four 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, 302A, 302B, 305, 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 requirement are available. Individual programs for all graduate students are carefully planned in conference with the graduate adviser.

Teacher Training

There are opportunities for majors of senior standing to assist professors in teaching certain courses through a special tutorial program. Training and experience in teaching are regarded as an essential part of the program leading to M.A. and Ph.D. degrees. The structure of teacher training in the graduate programs 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. (6-5) 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 response developed in class discussion and analysis of rhetorical strategies. 1B: Intensive argumentative writing drawn from controversy stimulated through selected readings and class discussion.

1C. Fundamentals of Oral Interpretation. (6) Formerly 2. Four to 4 1/2 hours of lecture per week. The use of oral performance as a critical instrument in the rhetorical analysis of literature. The literature is primarily, though not exclusively, lyric poetry. The Staff (F, W, Sp)

10. Principles of Argumentation. (6) Four to 4 1/2 hours of lecture per week. Emphasis on problems of evidence, inference, induction, deduction, semantic arguments, from authority, and rhetorical terms. Students will be required to analyze as well as create argumentative prose. Required of those students who wish to complete a major in Rhetoric and who did not take Rhetoric 1A-1B. The Staff (F, W, Sp)

20. Public Speaking. (6) Formerly 45. Four 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 political 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 other forms of discourse will be examined. Rhetoric 30 is prerequisite to all upper division courses unless otherwise specified. Mr. Brandt

31. Aristotle and Classical Rhetoric. (6) Formerly 111. Four 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 and on the changing conception of rhetorical issues and practices. The Staff

32. Fundamentals of Oral Interpretation. (6) Formerly 3. Four to 4 1/2 hours of lecture per week. A continuation of Rhetoric 1C, which is the prerequisite for this course. Rhetoric 32 will expand the principles acquired in Rhetoric 1C into narrative and dramatic genres.

UPPER DIVISION COURSES

100. Modern Rhetorical Theory. (6) Formerly 112. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30 or consent of instructor. A close reading of the works of those modern students of language whose point of view can be described as rhetorical—Richards, Burke, Cassirer, and others. Mr. Quinn

101. Rhetorical Theory and Practice: Middle Ages. (6) Formerly 154. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 31 or consent of instructor. L&S: Rhetoric / 188

NOTE: For key to symbols, see page 30.
102. Rhetorical Theory and Practice: Re-Enactment. (8) Formerly 151A. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 31 or consent of instructor. Consideration of the special problems of an author's or speaker's presentation of self in relation to the character of the intended audience. Mr. Stone

103. Rhetorical Theory and Practice: Eighteenth Century. (5) Formerly 15B. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 31 or consent of instructor. Consideration of the special problems of an author's or speaker's presentation of self in relation to the character of the intended audience. Mr. Willy

104. Rhetorical Theory and Practice: Nineteenth Century. (5) Formerly 15C. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 31 or consent of instructor. Consideration of the special problems of an author's or speaker's presentation of self in relation to the character of the intended audience. Mr. Willy

110. Advanced Writing: Argument and Discourse. (6) Four to 4 1/2 hours of lecture per week. Prerequisite: Any 1A-1B sequence, upper division standing, or permission of instructor. Designed for candidates for the general elementary and/or secondary credential, prospective writers, frequent writers, frequent writers wishing to persuade, mainly on topics of current concern. Will not fulfill Rhetoric major requirements. The Staff

111. The Practice of Poetry. (3) Formerly 181. Three lecture hours per week. Prerequisites: Rhetoric 1C or 141, Rhetoric 30, or consent of instructor. A rhetorically based approach to composing poetry. Students will be expected to read their work aloud and criticism will be given in an effort to produce effective orally and medially in poetry. Intensive coursework may be repeated once for credit with a different instructor. Mr. Nathan

116. Rhetoric and Aesthetics. (6) Four to 4 1/2 hours of lecture and 2 hours of discussion per week. Prerequisite: Any 1A-1B sequence, upper division standing, or consent of instructor. Problems and issues in theory of poetic speech. Special attention to conceptions of speaker, situation, intention, language, meaning, and the relation of poetic perception and knowledge. Specific poems for examination. Staff

121. The Rhetoric of the Novel. (5) Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. An examination of the articulation of selected novels, working from an identification of basic contrastive units to gross structure, directed toward an understanding of the relation of writing to reading. Mr. Chatman

122. Rhetoric of Drama. (5) Formerly 122A, 122B, 122C. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. A consideration of the way character is created, the structuring of conflicts, the resolution of conflicts and the way themes are defined by the manipulation of such patterns. Topic to be announced. Mr. Chatman

129. Narrative Structure in Fiction and Cinema. (5) Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. The nature of narrative, including tales, novels, shorter stories, historical accounts, etc., as reported in literature and in the cinema. The structures of plot, character, setting, point of view, and related matters. Mr. Chatman

126. Rhetoric of Poetry. (5) Formerly 146. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Consideration of the relationship between the texture of poetry and the implications, both private and social, of the interaction of speech and overall poetic structures. Mr. Brandt

125. Rhetorical Stance in Lyric Poetry. (5) Formerly 129. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Analysis and constructionist implication for interpretation of short poems considered as the utterances of dramatic speakers. Staff

128. Rhetoric of Symbolism. (5) Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Functions of language in literature, especially poetry; the literary symbol; the nature and function of figures of speech. Mr. Willy

127. Style in Cinema and Literature. (5) Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. The concept of style and stylistics in general, and the stylistic characteristics of literature. A study of stylistic theory. Concentration generally is on one or two directors (e.g. Antonioni, Bergman, Resnais), Course may be repeated for credit as course content varies. Mr. Chatman

130. Political Oratory. (6) Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Knowledge of basic principles of rhetorical argumentation would be helpful, but not required. The course would include an introduction to deliberative oratory. Theory and Practice of deliberative oratory, with emphasis on the study of actual speeches from Thucydides, the Attic orators, Cicero, Salutii, Tacitus, and 18th and 19th century British and American parliamentary orators. Mr. Leopold

131. Rhetoric of Religious Discourse. (5) Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Consideration of the context of religious rhetoric, including its influences upon the character of the intended audience. Mr. Willy

135. Rhetoric of Narrative Genres In Non-Literate and Literate Societies. (5) Formerly 146 and 143D. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30 or consent of instructor. An investigation of the rhetorical and cultural principles common to non-literate and literate societies, including consideration of the ways in which the nature of an author's or speaker's presentation of self in relation to the character of the intended audience. Mr. Chatman

136. Rhetorical Theory and Practice: Eighteenth Century. (5) Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Consideration of the special problems of an author's or speaker's presentation of self in relation to the character of the intended audience. Ms. Stripp

140. Rhetoric of Literary Discourse. (5) Formerly 140. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Consideration of the rhetoric of hermeneutics or the interpretation of short poems considered in the shape of a meaning-bearing system, that is, a code, or combination of codes and as an expression of codes and as an expression of codes and as an expression of codes and as an expression of codes. Reference to related codes will be made. Mr. Chatman

145. Rhetorical Theory and Practice: Re-Enactment. (6) Formerly 141. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30 or consent of instructor. An investigation of the rhetorical and cultural principles common to non-literate and literate societies, including consideration of the ways in which the nature of an author's or speaker's presentation of self in relation to the character of the intended audience. Mr. Chatman

151. Rhetoric of Rhetoric Discourse. Four to 4 1/2 hours of study of problems and methods of interpretation in such documents as contracts, statutes, constitutions, reference to major authors in legal and rhetorical theory. The Staff

152. Rhetoric of Legal Discourse. (5) Formerly 144. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. An introduction to legal rhetoric through an analysis of structure and style in judicial opinions, study of problems and methods of interpretation in such documents as contracts, statutes, constitutions, reference to major authors in legal and rhetorical theory. The Staff

150. Oral Argument. (3) Three hours of lecture per week. Principles and practice of oral argument. May be repeated for a maximum of 9 units. United credit for this course may not be applied to the major program. Mr. Stripp

156. Rhetoric of the Political Novel. (5) Formerly 145 and 147. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. The nature of political rhetoric, with a special emphasis on the comparison of intellectual perspectives from the realms of politics, social science, and the study of social theory. Mr. Quin

159. Oral Argument. (5) Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Consideration of basic philosophical issues in legal theory and in the intellectual history of the law. Methods include rhetorical analysis of legal philosophical disputes, as well as conventional legal documents. The Staff

161. Rhetoric of Scientific Discourse. (5) Formerly 161B. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Analysis of how rhetoric operates in the rhetorical limitations and the discreteness of modern scientific (as distinct from primarily suasive and epideictic) discourse: scientific discourses. Mr. Quin

172. Rhetoric of Social Theory. (5) Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Systematic rhetorical analysis of selected texts from Madison, Webber, Smith, Ricardo and Bentham, to contemporary representatives of social and economic thought. Mr. Quin

173. Rhetoric of Historical Discourse. (5) 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 discreteness of modern descriptive (as distinct from primarily suasive and epideictic) genres; History. Mr. Quin

174. Rhetoric of Psychological Discourse. (5) Formerly 142. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. An introduction to the rhetorical limitations and the discreteness of modern descriptive (as distinct from primarily suasive and epideictic) genres: History. Mr. Quin

175. Rhetoric of Philosophical Discourse. (5) Formerly 147B. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Consideration of basic philosophical issues in legal theory and in the intellectual history of the law. Methods include rhetorical analysis of legal philosophical disputes, as well as conventional legal documents. The Staff

185. Rhetoric of the Political Novel. (5) Formerly 146 and 147. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. The nature of political rhetoric, with a special emphasis on the comparison of intellectual perspectives from the realms of politics, social science and the study of social theory. Mr. Quin

186. Rhetoric of Continental European Ideology. (5) Formerly 146 and 147. Four to 4 1/2 hours of lecture per week. Prerequisite: Rhetoric 30. Rhetorical delineation of formal ideological structures as they appear in modern continental European and American works of fiction in which political stances are exploited as dominant themes. Close reading of authorial viewpoints and rhetorical strategies. Mr. Willy

Independent Studies

190. Senior Thesis. (5) Four to 4 1/2 hours of lecture per week. Prerequisite: Consent of instructor. Independent study under guidance of a faculty director culminating in a written thesis. May be used as an upper division elective in the major. The Staff
200. Introduction to Graduate Study in Rhetoric. (Formerly 29A) Four hours of seminar per week. Prerequisites: Graduate status and approval of the graduate adviser. Introductions to research methodology, bibliography, and scholarly writing in the field of Rhetoric. Mr. Nathan

202A–202B–202C–202D. Principles of Rhetorical Investigation. (Formerly 29B) Four to 4 1/2 hours of seminar per week. Prerequisites: Graduate status and approval of the graduate adviser. An overview of the major historical and theoretical approaches to rhetoric. Mr. Florio

203. Contemporary Rhetorical Criticism. (Formerly 29C) Four to 4 1/2 hours of seminar per week. A methodological examination of the assumption in the research methodology of Rhetoric. Mr. McLaughlin

204. Methodology of Oral Interpretation. (Formerly 29D) Three hours of lecture per week. A study of the various methodological approaches to the interpretation of speech and their application in various fields of study. Mr. Calkins

210–210B. History of Oral Literature and Oral Traditions in Anglo-Saxon England. (201B) Four to 4 1/2 hours of seminar per week. Prerequisites: Graduate status and approval of the graduate adviser. The history and development of oral literature and oral traditions in Anglo-Saxon England. Mr. Wilson

211. Contemporary Theory of Interpretation. (Formerly 210B) Four to 4 1/2 hours of seminar per week. A study of the various theoretical approaches to the interpretation of literary works. Mr. Taylor

213–213B. Intellectual History of the Classical World. (Formerly 221B) Three hours of seminar per week. A study of the intellectual history of the Classical World, focusing on the development of rhetoric and oratory. Mr. Bloom

214B. Poetics and the Lyric Voice. (Formerly 231B) Three hours of seminar per week. A study of the poetics and the lyric voice in ancient Greek and Roman literature. Mr. Meola

217. Poetics and the Lyric Voice. (Formerly 231B) Three hours of seminar per week. A study of the poetics and the lyric voice in ancient Greek and Roman literature. Mr. Meola

220. Rhetoric and Rhetorical Criticism: Ancient Greece. (Formerly 232) Four to 4 1/2 hours of seminar per week. Prerequisites: Competence in Greek. Rhetoric in Ancient Greece, both as it was expounded by theorists and as it permeated subsequent discourse. Topics to be announced. The Staff

231. Rhetoric and Rhetorical Criticism: Ancient Rome. (Formerly 233) Four to 4 1/2 hours of seminar per week. Prerequisites: Competence in Latin. Rhetoric in Ancient Rome, both as it was expounded by theorists and as it permeated various forms of Latin discourse. Topics to be announced. The Staff

232. Rhetoric and Rhetorical Criticism: The Middle Ages. (Formerly 234) Four to 4 1/2 hours of seminar per week. Prerequisites: Competence in Latin. Rhetoric in the Middle Ages and Renaissance, with attention to the consequences for poetic practice. Credit will be awarded upon completion of the full sequence. Ms. Richardson

233. Rhetoric and Ideology. (Formerly 235) Four to 4 1/2 hours of lecture per week. Rhetorical delineation of formal ideological structures that appear in modern political and ideological treatises. Ms. Smith (W)

234A–234B. Rhetoric and Poetics in the Middle Ages and Renaissance. (Formerly 236) Examination of the developments concerning both theoretical and aesthetic and ethical criteria of Invention theory. This course is normally required of all graduate students. Ms. Richardson

238. Style and Discourse. (Formerly 240) 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. The Staff

246. Studies In Legal Rhetoric. (Formerly 245) 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. The Staff

252. Advanced Stylistics. (Formerly 247) Four to 4 1/2 hours of seminar per week. The linguistic specification of literary style, rhetorical devices, and structural and stylistic devices in grammar (especially syntax), in vocabulary, (diction, " tropes" and related phenomena), and in discursive structure. Mr. Chatman

253. Rhetoric in Contemporary America. (Formerly 248) Formerly 257. Four to 4 1/2 hours of seminar per week. Modern theories of narrative structure, in the tradition of Continental (Russian Formalist and American New Critical) thinking, as well as Aristotelian and Neo-Aristotelian schools and independent theorists like James, Lubbecke, and Forester. Mr. Chatman

256. Values and World View: Cultural Uses of Communication. (Formerly 255) Four to 4 1/2 hours of seminar per week. The linguistic specification of literary style, rhetorical devices, and structural and stylistic devices in grammar (especially syntax), in vocabulary, (diction, " tropes" and related phenomena), and in discursive structure. Mr. Chatman

280. Linguistic History of the Roman Empire. (Formerly 259) Three hours of lecture per week. Prerequisites: Consent of instructor. The spread of the Latin language over the Western Mediterranean area, and its gradual change into the Romance languages, with emphasis on substrata and superstrata. Mr. Melville (F)

291A–291B. Romance Linguistics. (Formerly 260) Formerly 299. Three hours of lecture per week. Prerequisites: Consent of instructor. The internal history of colloquial Latin and Late Latin, down to the Carolingian period, on the basis of original sources. Mr. Melville (W)

292. General Romance Linguistics. (Formerly 261) Three hours of lecture per week. Prerequisites: Consent of instructor. An introductory study of Old Provençal language and literature, with emphasis on questions of cultural origins and influences. Mr. Faulhaber (W, Sp)

295. From Romanic Dialect Geography to Sociolinguistics. (Formerly 263) Three hours of lecture per week. Prerequisites: Consent of instructor. Classical and experimental methods of eliciting, recording and analyzing dialect data, with equal attention to regional and social dialects. Mr. Melville (Sp)

296. Medieval Latin and Romance Learning. (Formerly 264) Three hours of lecture per week. Prerequisites: Consent of instructor. Medieval Latin and Romance Learning. Mr. Faulhaber (W)

297. Hispano-Romance Dialectology. (Formerly 265) Three hours of lecture per week. Prerequisites: Consent of instructor. Interpretation of original texts in Latin, Old French, and Old Spanish, and the cultural problems involved in their translation. Mr. Faulhaber (W)

299. Directed Research. (Formerly 266) One to six hours of meeting per week. Prerequisites: Graduate status and approval of graduate adviser. Open to qualified graduate students who wish to pursue special studies and research under the direction of a member of the staff. Primarily for students engaged in preparation of the doctoral thesis. May be taken satisfactory/unsatisfactory or for letter grade. The Staff

300. Problems In Teaching Rhetoric. (Formerly 267) Up to four and one-half hours of lecture per week. Prerequisites: Graduate students and approval by consent. 300A. Oral Interpretation. 300B. Argumentative Composition. 300C. Speech Sciences. 300D. Rhetoric. The Staff

601. Individual Study for Master’s Students. (Formerly 269A) One to five hours of meeting per week. Prerequisites: Consent of instructor. Individual study for the comprehensive or language examinations 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

602. Individual Study for Doctoral Students. (Formerly 269B) Three to six hours of meeting per week. Prerequisites: Consent of instructor. Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified graduate students to prepare for the comprehensive or language examinations required of candidates for the Ph.D. May not be used for unit or residency requirements for the doctorate. Must be taken on a satisfactory/unsatisfactory basis. The Staff
Scandinavian
Department Office, 1305 Dwinelle Hall
Professor: Eric O. Johannesson, Ph.D.
Associate Professors: James L. Larson, Ph.D. \(\text{and} \) John F. Lindqvist, Ph.D.
Assistant Professor: Carol J. Clover, Ph.D.

The Department of Scandinavian offers undergraduate majors in three Scandinavian languages, Danish, Norwegian, and Swedish, and courses in English in Scandinavian literature, ancient and modern. A graduate program offering work leading to the M.A. and Ph.D. degree is also available.

The Major

Lower Division. Four courses from the following course sequences: Scandinavian 1A–1B; 3A–3B; 4A–4B; 11A–11B; 13A–14B; or the equivalents.

Upper Division Courses. Ten upper division courses, including at least two language and two literature courses from the following sequences: Scandinavian 101A–101B, 103A–103B, 104A–104B, 141A–141B–141C, 143A–143B–143C, 144A–144B–144C.

Honors Program. Students must complete with distinction the courses required for the major as well as three quarters of course H195. A thesis is also required.

Graduate Degrees

For information regarding admission to the graduate program in Scandinavian and the specific requirements for the M.A. and Ph.D. degree, interested students should consult the graduate adviser.

The M.A. in Scandinavian. General requirements: 36 units of courses in Scandinavian, including courses in Old Icelandic, in history of the language, and in advanced composition. A comprehensive examination will test the student's knowledge of two Scandinavian languages, with emphasis on the literature in his major language. Programs with emphasis on linguistics and folklore are also available. For interdepartmental options, consult the Graduate Adviser.

Ph.D. in Scandinavian. After the master's degree there are no specific course requirements; each student, instead, plans a program that will best prepare him for the qualifying examinations and for the writing of his dissertation. There are two curricula leading to the Ph.D. degree in Scandinavian, one in the field of history and criticism of Scandinavian literature, the other in the field of Scandinavian languages and linguistics. A folklore program is also offered.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSES

1A–1B. Elementary Swedish. (5–6) Five classroom hours and at least a 1-hour language laboratory per week.

1B. Elementary grammar, conversation. (F)

2A. Elementary grammar, conversation, easy prose reading. (W)

3A–3B. Elementary Norwegian. (5–6) Five classroom hours and at least a 1-hour language laboratory per week.

3A. Elementary grammar, conversation. (F)

3B. Elementary grammar, conversation, easy prose reading. (W)

4A–4B. Elementary Danish. (5–6) Five classroom

hours and at least a 1-hour language laboratory per week.

4A. Elementary grammar, conversation. (F)

4B. Elementary grammar, conversation, easy prose reading. (W)

UPPER DIVISION COURSES

Language and Literature Courses

101A–101B. Advanced Swedish. (4–4) Four hours of lecture per week. Prerequisite: course 11A–11B or the equivalent. Grammar review, reading, conversation, composition. 101A (Sp); 101B (F)

103A–103B. Advanced Norwegian. (4–4) Four hours of lecture per week. Prerequisite: course 13A–13B or the equivalent. Grammar review, reading, conversation, composition. 103A (W); 103B (Sp)

104A–104B. Advanced Danish. (4–4) Four hours of lecture per week. Prerequisite: course 14A–14B or the equivalent. Grammar review, reading, conversation, composition. 104A (Sp); 104B (Sp)

141A–141B–141C. Introduction to Swedish Literature. (4–4–4) Three classroom hours per week. Prerequisite: 20 units of lower division courses in Swedish or the equivalent. Reading and analysis of selected representative Swedish works. 141A: From the 1500s to 1700. 141B: From Strindberg to World War I. 141C: From World War I to the present. 141B: Mr. Johannesson (F); 141C (Sp)

143A–143B–143C. Introduction to Norwegian Literature. (4–4–4) Three classroom hours per week. Prerequisite: 20 units of lower division courses in Norwegian or the equivalent. Reading and analysis of representative Norwegian works. 143A: From the 1600s to 1870. 143B: From Ibsen to World War I. 143C: From World War I to the present. Mr. Stoklask 143B (F); Mr. Nybo 143C (Sp)

144A–144B–144C. Introduction to Danish Literature. (4–4–4) Three classroom hours per week. Prerequisite: 20 units of lower division courses in Danish or the equivalent. Reading and analysis of representative Danish works. 144A: From Holberg to 1870. 144B: From Brandes to World War I. 144C: From World War I to the present. Ms. Gray 144B (F); 144C (W)

150. The Scandinavian Languages: History and Structure. (4) Three hours of lecture and discussion per week. Prerequisite: elementary knowledge of a Scandinavian language or an equivalent course in another language. An introduction to the Scandinavian languages and a comparative survey of the modern Scandinavian languages, with reading of selected texts. Recommended for Scandinavian majors. (W)

H195. Special Study for Honors Candidates. (2–6)

The Staff (F, W, Sp)

198. Directed Group Study for Advanced Undergraduates. (2–6) Prerequisite: at least two years of one of the Scandinavian languages, one reading and interpretation of modern Scandinavian texts.

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

199. Supervised Independent Study and Research. (1–6) Enrollment is restricted by regulations listed on page 38. 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 now 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.

Ms. Gray (W)

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.

109. Scandinavian Drama of the Twentieth Century. (4) Three 1-hour lectures per week. Reading of major Scandinavian dramas in translation; discussions.

110. Hans Christian Andersen. (4) Three 1-hour lectures and discussions per week. Emphasis will be on the tales and stories, but some attention will be given also to Andersen’s novels, travel books, and autobiographies.

112. Knut Hamsun. (4) Three 1-hour lectures and discussions per week. Reading and discussion of Ham- sun’s major novels. Some attention will also be given to Hamsun’s essays and articles.

Mr. Nybo (W)

114. Isak Dinesen. (4) Three 1-hour lectures and discussions per week. Reading and discussion of Den- sen’s best stories and tales.

Mr. Johannesson (F)

*120A–120B. 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. A survey of early Scandinavian culture and civilization from the first Viking raids to the end of Norse saga-writing. Reading of selected texts in English translation and discussion of problems connected with the nature of the sources and archaeological evidence.

125. Old Icelandic Literature. (4) Three 1-hour lectures per week. Reading and discussion of some of the oldest and most representative selections from the Eddas and the Scaldic songs.

160. Scandinavian Mythology. (4) Three 1-hour lectures per week. Critical survey of mythology in ancient Scandinavia. Lectures and readings of selected material in English translation.

165. Scandinavian Folklore. (4) Three 1-hour lectures per week. A survey of Scandinavian folklore, with particular emphasis on oral narrative traditions (legends, folktales, and ballads). Proverbs, riddles, folk belief, customs, and other totemistic material, including folk magic, are also considered.

171. Contemporary Swedish Literature. (4) Three classroom hours per week. Reading and discussion of representative Swedish works in translation from World War II to the present.

173. Cultural and Intellectual Trends in Modern Sweden. (4) Formerly 51. Three hours of lecture per week. Discussion of topics illustrating cultural and intellectual developments in Sweden during this century. Reading of selected texts. May be repeated for credit with consent of the instructor.

Mr. Larson (W, Sp)

202. Old Icelandic. (4) Three 1-hour lectures per week. Descriptive and historical phonology and grammar, texts. Some attention is given to Old Norwegian.

203. History of the Norwegian Language. (4) Three 1-hour lectures per week. Prerequisite: an A.B. degree with an undergraduate major in Scandinavian Phonology, historical grammar, texts.

205. Runology. (4) Three 1-hour lectures per week. Prerequisite: course 202 or the equivalent. Interpretation and discussion of runic inscriptions in the Germanic, Danish, and Swedish-Norwegian futharks (900-1200 A.D.).

206. The Poems of the Poetic Edda. (4) Three 1-hour lectures per week. Reading of some important poems with emphasis on the mythological songs.

215. Scandinavian Dialects. (4) Three 1-hour lectures per week. A survey of the Scandinavian dialects with special reference to their relation to the standard languages of the different countries.

*250. Seminar in Scandinavian Linguistics. (4) Saga as narrative art. Conference work on chosen or assigned topics; at least one shorter paper a quarter is normally required.

Lecture Courses

210. Graduate Readings. (4) Graduate lecture course covering broad areas and directing students in wide reading. Offerings vary from year to year. May be repeated for credit with the permission of the Graduate Adviser and the Instructor.

Swedish Literature. Mr. Johannesson, Mr. Larson

Danish Literature. Mr. Nybo

Old Icelandic and Medieval Literature.

Swedish Language.

Norwegian Language.

Danish Language.

Icelandic.

*220. The Icelandic Saga. (4) Three 1-hour lectures per week. Prerequisite: courses 202 and 206 or the equivalent. Reading and analysis of representative works with emphasis on problems of origin and on the development of the saga as narrative art.

225. The Scandinavian Ballad. (4) Three 1-hour lectures per week. A comparative and historical study of the medieaval ballad in Scandinavia, its later derivates, its relation to ballads of other European countries. Some attention will also be paid to modern folk songs, broadsides, and the troubadour tradition from C. M. Bellman to the present.

Mr. Nybo

*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.

241. Modern Swedish Literature. (4) Three 1-hour lectures per week. Reading and analysis of representative works.

Mr. Johannesson (W)

243. 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.

W

298. Special Study. (2–6) Designed for students engaged in exploration of a restricted field, involving the writing of a report. May not be substituted for available seminars for general study.

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

Graduate Adviser: Mr. Reif.

Description of the Program

The group in Science and Mathematics Education offers a graduate program designed to allow students to become acquainted with one of the natural sciences with the pursuit of central interests in the area of education. Students enrolled in the program will be expected to attain in their chosen scientific discipline a degree of competence comparable to that of a departmental Ph.D. candidate in that discipline. Their thesis research will consist of some project dealing with the development of improved educational approaches or research on new instructional models. Upon satisfactory completion of their studies and thesis work, students will obtain the degree of Ph.D. in science (or mathematics) education.

Admission Requirements

Requirement for admission to the program is ordinarily a distinguished course record and a master's degree in a particular scientific discipline. Students without such a degree may express their intentions of joining the program while enrolling in the Berkeley science department of their field. Their application for formal admission to the program will then be considered after they obtain a master's degree from that department.

More detailed information about the program and its requirements can be obtained from the group office.

John L. Kelley, Ph.D. (Mathematics)

Walter J. Freeman, Ph.D. (Physiology)

Robert M. Glaesser, Ph.D. (Medical Physics)

John E. Hears, Ph.D. (Chemistry)

P. Haas, Ph.D. (Education)

Leon J. Steinkin, Ph.D. (Mathematics)

William A. Jensen, Ph.D. (Biology)

Robert Karplus, Ph.D. (Physics)

Associate Professors:

Lawrence F. Lowry, Ed.D. (Education)

John David Miller, Ph.D. (Education)

Lecturers:

David R. Cudeback, Ph.D. (Astronomy)

Jess Larson, Ph.D. (Science and Mathematics Education and Physics)

Alan H. Schoenfield, Ph.D. (Science and Mathematics Education and Mathematics)

M. L. Charles Woodson, Ph.D. (Education)

Ruth von Blum, Ph.D. (Science and Mathematics Education and Biology)

Graduate Adviser: Mr. Reif.
Slavic Languages and Literatures

Department Office, 5416 Dwinelle Hall

Professors:
- Simon Kartinskii, Ph.D.
- Hugh McLean, Ph.D.
- Marlin Landau, Ph.D.
- Gleb Struve, A.B., LL.D.

Associate Professors:
- Joan Grossman, Ph.D. (Chairman)
- Olga Hughes, Ph.D.
- Robert P. Hughes, Ph.D.

Assistant Professors:
- Mary P. Coote, Ph.D.
- Johanna Nichols, Ph.D.

Visiting Associate Professor:
- John E. Malmstad, Ph.D.

Senior Lecturers:
- Sergei Kassakint, M.A.
- Olga Sorokin-Yaslov, Ph.D.

Lecturers:
- Julia Bosky, M.A.
- Lone Leskovar, Diplomirani Filozof

Departmental Major Advisers: Ms. M. P. Coote, Mr. F. J. Whitfield

Departmental Graduate Advisers: Ms. O. Hughes, 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 honors students may choose Czech, Polish, or Serbo-Croatian as their special field of study. For all students the major program includes an introduction to the cultural history and the literatures of other Slavic peoples and requires 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.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.
**134G. Gogol. (6) Three 1-hour lectures and one hour of discussion section per week. Prerequisite: course 6 or 21C. Sequence beginning (F), O. Astromoff. S. Kassatkin (F)

**103A–103B–103C. Advanced Russian. (6–6–6) Three 1-hour lectures and one 1-hour laboratory per week. Prerequisite: course 6 or 21C. S. Kassatkin (F, W, Sp)

**104A–104B–104C. Russian Composition and Style. (5–5–5) Three 1-hour meetings and one individual consultation per week. Prerequisite: course 103C. Sequence beginning (F), O. Sokorin-Vasiliev (F)

**108A–109B. Polish Reading, Grammar, and Composition. (8–8) Four 1-hour meetings per week. Prerequisite: course 24B. Sequence beginning (F), F. J. Whitfield in charge

**112A–112B. Serbo-Croatian Reading, Grammar, and Composition. (8–8) Four 1-hour meetings per week. Prerequisite: course 26B. Sequence beginning (F), M. P. Coote

**116A–116B. Czech Reading, Grammar, and Composition. (8–8) Four 1-hour meetings per week. Prerequisite: course 306. Sequence beginning (F), W. Schamschula

**120A–120B–120C. Advanced Russian Conversation. (2–2–2) Open to students enrolled in courses 103 or 104 or who have completed their equivalent courses. Two 1-hour classes and one 1-hour laboratory per week. Recommended for majors. Sequence beginning (F, W, Sp)

**125A–125B. Introduction to Descriptive Russian Grammar. (5–5) Three 1-hour meetings and one 1-hour discussion section per week. Prerequisite or corequisite: course 103A (to 125A), course 103B (to 125B). Phonology, morphology, and syntax of standard literary Russian. Recommended for prospective teachers. Though it is not a prerequisite, students are urged to take Linguistics 20 before taking this course. Sequence beginning (W), J. Nichols

**128A–128B. Readings in Russian Literature. (6–6) Three hours of lecture per week, one hour of discussion section per week. Prerequisite or corequisite: course 103A (to 128A), course 103B (to 128B). Survey of Russian literature (tales, epics, lyrics, proverbs), but customs, beliefs, and other forms of folklore will also be discussed. Sequence beginning (W), M. Coote (Sp)

**160A–160B. Survey of Russian and Slavic Literature. (6–6) Three 1-hour lectures and one hour of discussion section per week. Sequence beginning (F), C. Milosz

**160A–160B. Survey of Russian and Slavic Literature. (6–6) Three 1-hour lectures and one hour of discussion section per week. Sequence beginning (W), C. Milosz

**170A–170B. Survey of Serbian and Croatian Literature. (6–6) Three 1-hour lectures and one hour of discussion section per week. Sequence beginning (W), O. Hughes

**189A–189B. Survey of Russian and Slavic Literature. (6–6) Three 1-hour lectures and one hour of discussion section per week. Sequence beginning (F), C. Milosz

**187A–187B. Russian Poetry. (5–5) Three 1-hour lectures and one hour of discussion section per week. Prerequisite: course 103B (may be taken concurrently); 128B; course 103B (may be taken concurrently). Required for majors in Russian. Sequence beginning (F), C. Milosz

**191A–191B. Readings in Russian Literature. (5–5) Three 1-hour lectures and one hour of discussion section per week. Sequence beginning (W), C. Milosz

**229. Russian Oral Traditions. (3) 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 epics (bylina), but other forms of orally transmitted literature will also be discussed. H. McLean (F)


**230A. Eleventh through thirteenth century. O. Hughes, H. McLean (Sp)

**230B. Fourteenth through sixteenth centuries. O. Hughes (W)

**230C. Seventeenth century. H. McLean (Sp)

**231. Eighteenth Century Russian Literature. (4) Three hours of lecture per week. Sequence beginning (F)

**280. Studies in Slavic Languages and Literatures. (4) One 2-hour meeting per week. Advanced studies in the several fields of Slavic literature and linguistics. Course content varies. Course may be repeated without duplication of credit.

**281. Proseminar. (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.

**290. Directed Research. (2–9) Normal credit to students directly engaged upon the doctoral dissertation. To be taken on a satisfactory/unsatisfactory basis.

**301A–201B–301C. Methods of Teaching Slavic Languages. (1–1–1) One hour of lecture and 1-2 hours of laboratory per week. Weekly lecture on practical teaching methods, grading, testing, with demonstration lessons, conferences and discussions. Required of all teaching assistants and associates.

**310. Individual Study for Graduate Students. (No Credit) Three 1-hour meetings per week. Preparation for graduate reading examinations.

**311G–312G. Spoken Russian for Graduate Students. (No Credit) Three 1-hour meetings per week. Prerequisite: course 108A–108B–108C or its equivalent. Preparation for candidacy examination in spoken Russian. Open only to candidates for graduate degrees in the Department. Credit in this course will also be given for dissertation. R. Hughes, H. McLean (Sp)

**101A–201B–201C. Advanced Russian. (6–6–6) Three 1-hour lectures and one hour of discussion section per week. Prerequisite: course 103A–103B–103C or its equivalent. Preparation for candidacy examination in spoken Russian. Open only to candidates for graduate degrees in the Department. Credit in this course will also be given for dissertation. R. Hughes, H. McLean (Sp)

**101A. Eighteenth Century. H. McLean (Sp)

**101B. Nineteenth Century. H. McLean (Sp)

**101C. Twentieth Century. H. McLean (Sp)

**190. Undergraduate Seminar. (4) Three hours of lecture per week. Close reading of one major work of Russian fiction. Readings will be in English. In addition to a close analysis of the work, students will read some criticism. Topic to 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.

**192. Special Study for Graduate Students. (2–9) Preliminary exploration of a restricted field involving research and written work. Credit and grade to be awarded at close of sequence. The Staff, F, W, Sp

**199. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations listed on page 36. Additional limitation: overall grade-point average must be at least 3.00, to be taken on a satisfactory/pas basis. The Staff, F, W, Sp

**GRADUATE COURSES

Graduate Colloquium. (No Credit) Three meetings per quarter. Reports on current scholarly work by faculty, graduate students, and visitors. Graduate students are expected to attend.

**210A–210B. Old Church Slavic. (3–3) Two 1-hour meetings per quarter. Sequence beginning (W), F. J. Whitfield

**211. Readings in Old Russian. (4) Russian Literary Criticism. (2–2) Three 1-hour meetings and one hour of discussion section per week. Prerequisite: course 201A–201B. F. J. Whitfield (Sp)

**220. Comparative Slavic Linguistics. (4) Two 1-hour meetings per week. Prerequisite: courses 210A–210B. W. Schamschula

**229. Historical Russian Grammar. (4) Three 1-hour meetings per week. Prerequisite: courses 210A–210B.

**210A. Seventeenth century. J. Nichols (W)

**210B. Eighteenth century. H. McLean (Sp)

**210C. Nineteenth century. H. McLean (Sp)

**231. Eighteenth Century Russian Literature. (4) Three hours of lecture per week. Sequence beginning (F)

**280. Studies in Slavic Languages and Literatures. (4) One 2-hour meeting per week. Advanced studies in the several fields of Slavic literature and linguistics. Course content varies. Course may be repeated without duplication of credit.

**281. Proseminar. (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.

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**310. Individual Study for Graduate Students. (No Credit) Three 1-hour meetings per week. Preparation for graduate reading examinations.

**311G–312G. Spoken Russian for Graduate Students. (No Credit) Three 1-hour meetings per week. Prerequisite: course 108A–108B–108C or its equivalent. Preparation for candidacy examination in spoken Russian. Open only to candidates for graduate degrees in the Department of Slavic Languages and Literatures. Credit in this course will also be given for dissertation. R. Hughes, H. McLean (Sp)

**190. Undergraduate Seminar. (4) Three hours of lecture per week. Close reading of one major work of Russian fiction. Readings will be in English. In addition to a close analysis of the work, students will read some criticism. Topic to 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.

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**NOTE: For key to symbols, see page 36.
Social Science

Field Major Office, Division of Special Programs, 301 Campbell Hall

Field Major in Social Sciences: The Major Program

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 (Social Sciences 103A-103B and 190); (2) three 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 15 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, Economics, 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 either Social Sciences 1A–1B–1C, 2A–2B–2C or a sequence in reading and composition with a grade of C+ or higher are urged to elect 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 3.5 in the major program may, upon approval from the Honors Program, elect to work 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 Special Programs.

UPPER DIVISION COURSES

100. The Study of the Social Sciences. (4) Four 1-hour lectures per week. Prerequisite: upper division standing or instructor's permission. Examination of materials from the Social Sciences, with attention both to the historical and the non-historical social sciences. 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. Mr. Von Blum (F). (Sp)

103A–103B. Alms and Materials of the Social Sciences. (4–4) Three hours of lecture per week. Prerequisite: completion of a reading and composition sequence. Examination of the province and the goals of the Social Sciences in comparison to those of the other disciplines. Prof. Von Blum in charge (F, W, Sp).

190. Problems in the Social Sciences: Senior Thesis. (4) Prerequisite: 103A–103B and at least 12 upper division units in history and other social sciences, 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 Social Science field major. Students work tutorially under the supervision of a member of the faculty. (F, W, Sp).

191B. Social-Psychological Aspects of Imprisonment. (6) Three and one-half hours of meetings and 8 hours of supervised field placement per week. Prerequisite: upper division standing or instructor's permission for students in the fields of social science, psychology, criminology, social work, welfare, and law and society. The goal of this interdisciplinary seminar is to examine in detail lectures, guest lectures, class discussions, field work, extensive reading, and research some of the many complex issues, problems, and controversies relevant to the social psychology of imprisonment. To be offered 1977-78, 1978-79 only. (F, W, Sp)

**198. Directed Group Study for Upper Division Students.** (1–5) Hours to be arranged. Prerequisite: consent of the instructor. Directed group study on special topics approved by the Division. (F, W, Sp)

**H198. Honors Course.** (1–5) Meetings to be arranged. Prerequisite: honors standing, 20 units of upper division history and other social sciences including courses 103A–103B and 190A, Alms and Materials of the Social Sciences. Preparation and writing of an honors thesis under the supervision of a member of the faculty. (F, W, Sp)

199. Supervised Independent Study and Research. (1–8) Meetings to be arranged. Enrollment is restricted by regulations on page 36. Must be taken on a passed/not passed basis. (F, W, Sp)

Social Welfare

Group Major Office, 117 Haviland Hall

Major Advisers: Mr. Neil Gilbert, Mr. James R. W. Leby

Staff and courses are listed under the School of Social Welfare.

Group Major in Social Welfare

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 to the major are considered in fall on a first-come/first-served basis. The number of units and prerequisite courses completed are considered for admission.

Major Requirements


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, 144, 149, 150, 152; Economics 100A, 100B, 155, 157; Political Science 108, 181, 182, 183; Psychology 130, 140, 150, 151, 160; Public Policy 181, 182, 184, 185; Sociology 120, 140, 142, 157, 162.

Honors Program. Eligible social welfare majors, upon recommendation of their advisors, may enroll in an honors program. A candidate for honors must complete an honors seminar in social welfare and social work problems (Social Welfare 119SA–H195B–H195C). A senior essay is part of the work of the final quarter of the seminar. The essay, which will be of a creative and integrative nature, will be the culmination of an individual library research project on a topical 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 completion. Time in the senior seminar is devoted to the planning and writing of the essay.

Sociology

Department Office, 410 Barrows Hall

University Professor: Neil J. Smelser, Ph.D.


Assistant Professors: Robert Blauner, Ph.D. Troy Duster, Ph.D. Harry Edwards, Ph.D. Barbara Heyns, Ph.D.

Assistant Professors: Victoria Bonetti, Ph.D. Mitchell Leiby, Ph.D. Ronald Burt, Ph.D.

Claude S. Fischer, Ph.D. Richard J. Olstra, Ph.D. Albert R. Hochschild, Ph.D. Philippe Nonet, Ph.D. Ronald Burt, Ph.D. Rodolfo de Oleo, Ph.D.

Gall Lapidus, Ph.D.

Talcott Parsons, Ph.D.
The Major

Students intending to major in sociology are advised to prepare for the major by taking courses 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 a course in either statistics or logic prior to enrolling in the major.

Lower Division: Sociology 1, Evaluation of Evidence (for courses taken in other departments). A student should take this course in their sophomore year.

Upper Division: A student must take not less than 36 upper division units in sociology selected to fulfill the following requirements:

2. Three courses from the following core list: 107 of 119, 110A or 110B, 118, 124, 125, 130, 132, 140, 146, 147 or 149, 178 or 179.
3. Five elective upper division or graduate courses. Two of these may be elected from the sociological theory course.

Honors Program: Majors who enter their senior year with a 3.3 grade-point average overall and a 3.3 grade-point average in the major and students should take this course in their senior year. No units in course 661 will be counted toward the required 36 graduate units.

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 methodology. A maximum of 12 units may be counted from work taken in: upper division sociology courses, Sociology 298, or in upper division or graduate courses in other departments. Four additional units from this category may be applied to the 36 unit requirement for the M.A. if the student has obtained permission from both the personal and graduate advisers for this exception.

No units in course 661 will be counted toward the required 36 graduate units.

Deadlines for Completion. During the first five quarters of residence the student must complete (a) the theory and method requirements, including a paper in each of these areas; (b) at least three additional papers on sociological theory, courses, or concepts other than those for whom the theory and methods papers were written. The three additional papers may or may not be written as assignments in sociology courses; if not, however, the paper must be submitted for approval to an instructor in the department. (c) 36 units as above.

There is no foreign language requirement for the M.A. degree.

Ph.D. Degree Requirements. A master's degree is required. Students who have taken the M.A. at another university may have course requirements for M.A. students at Berkeley by passing the courses or documenting that they have had courses comparable to those required by the department.

Required: Beyond any work taken for the M.A., (1) a course or seminar in methods, and (2) two more seminars.

Before the qualifying examination, the student must have completed all required courses and demonstrated competence in quantitative analysis at a specific level. A foreign language or knowledge of advanced methodology may be required by a student's Qualifying Examination Committee if deemed necessary for the dissertation research. The graduate secretary in 422 Barrows, has written a statement of procedures to be followed for the qualifying examination.

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 extend the time for the dissertation. The graduate secretary in 422 Barrows, has written a statement of procedures to be followed for the qualifying examination.

Lowers and Letters: 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: one lower division sociology courses, or permission of the instructor. 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 interaction, role behavior, culture, socialization, groups and organizations, social stratification, collective behavior.

Mr. Blumner (F); Mr. Burawoy (W); Mr. Edwards (W); Mr. Duster (Sp), (F).

1B. Dynamics of Modern Society. Growth and competition of human populations; changes in industrialization in western and non-western societies; social trends and crises as they affect major institutions, race relations, economic structures. (5-5) Two hours of lecture and two hours of discussion per week. Prerequisite: one lower division sociology course, or permission of the instructor. Credit and grade to be assigned at the completion of each course. (F); Mr. Blumner (W); Mr. Edwards (Sp).

5. Evaluation of Evidence. (6) Three hours of lecture and one hour of discussion per week. Prerequisite: one lower division sociology course, or consent of the instructor. Major view of the scientific method; examination of the properties of evidence; testing of social hypotheses. (F).

20. Population and Society. (4) Three lecture hours per week. Introduction to sociological analysis using demographic data and concepts. Mr. Czajka (F).
117. American Society: A Comparative Analysis. (5) Three lecture hours and two consultation hours per week. Prerequisite: restricted to majors in sociology and to those who have completed two lower division sociology courses. Various aspects of American values and behavior patterns over time; sources of differences from other developed societies. Mr. Metz (Sp)

118. Introductory Political Sociology. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course, or consent of the instructor. Political processes in organized groups, the social bases of power. The role of social classes, occupational groups, and religious groups, and the influence of cultural values. Mr. Kornhauser (F); Mr. Montejano (W)

*119. Law and Society. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course, or consent of the instructor. Selected legal rules, principles, and institutions. Group behavior in and beyond law; the functioning of the legal system. Mr. Burt (W)

120. Organizations and Institutions. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course, or consent of the instructor. Administrative organizations and voluntary associations: major institutions in industry, government, religion, and education. Mr. Schumann (Sp)

123. Population Theories. (5) Three lecture hours and two consultation hours per week. Prerequisite: course 1A-1B or consent of instructor. A critical review of theories of population growth, structure, and distribution, from Malthus to modern demographers. In relation both to the history of social thought and to social, economic, and demographic trends. Mr. Czaika (W)

124. Sociology of Education. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course, or consent of the instructor. Educational systems in relation to the religious, cultural, economic, and political forces shaping their character. Mr. Kornhauser (W); Mr. Nonet (Sp)

126. Sociology of Science. (4) Three lecture hours per week. Prerequisite: 1A-1B or consent of instructor. Introduction to sociological issues in the practice of science, the sociology of organization and the informal organization of scientists provide a social context. The methods by which rewards are distributed and the growth of knowledge is discussed as a consequence of scientists pursuing careers within this context. Mr. Burt (W)

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 labor force; social control within and of occupations and professions (professionalization, professional associations vs. labor unions, codes of ethics, legal controls); social structure of work; male-female role contrasts, race and sport; economics of sport; the roles of experts and authority (e.g., in medicine and law); social relationships and complexities; current turmoil in sport and the ideological struggle which has developed. Mr. Hermaas (F)

135. The Study of Social Change in New Nations. (4) Three lecture hours per week. Prerequisite: course 1A-1B or consent of instructor. Major changes and historical perspectives on structural change in new nations. Factors and conditions influencing transformation of societies; the sociology of social change; the analysis of major problems confronting the peoples of the new states of Asia, North Africa, and Latin America. Mr. Hermass (F); Mr. Swanson (Sp)

140. Social Change. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course, or consent of the instructor. Major changes and historical perspectives on structural change in new nations. Factors and conditions influencing transformation of societies; the sociology of social change; the analysis of major problems confronting the peoples of the new states of Asia, North Africa, and Latin America. Mr. Hermass (F); Mr. Swanson (Sp)

141. Social Organization of Modern Western Societies. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course, or consent of the instructor. Mr. Montejano (Sp)

142. Comparative Institutions. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course or consent of instructor. Comparison of selected social institutions; their relation to ideas and social change. Mr. Burt (W)

146. Sociology of Religion. (5) Three lecture hours and two consultation hours per week. A systematic survey including historical, structural, and comparative perspectives on the role of religion in social change; social aspects of the administration of justice; social knowledge and the law. Mr. Hellis (W)

148. Elementary Collective Behavior. (5) Three lecture hours and two consultation hours per week. Prerequisite: course 1A-1B or consent of instructor. Social contagion and crowd behavior, psychic epidemics, popular arts and interests, fads and fashions, group behavior, formation and public opinion. Mr. Montejano (Sp)

149. Social Movements and Public Action. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course or consent of instructor. The role of formal education in modern society: the nature of change and its social consequences; the role of education in the United States in the professions and interest groups. Mr. Kornhauser (W)

150. Human Migration. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course or consent of instructor. History of international migration and analysis of its causes, types, and consequences. Study of international migration in the United States and in selected foreign countries. Statistical, geographical, and demographic problems connected with migration. Mr. Wilensky (W)

151. Sociology of Woman. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course or consent of instructor. The role of formal education in modern society: the nature of change and its social consequences; the role of education in the United States in the professions and interest groups. Mr. Kornhauser (W)

152. Sociology of Gender Roles. (4) Three hours of lecture per week. Prerequisite: Sociology 151 or consent of the instructor. This course examines the roles of post-war American women and men from structural and social psychological perspectives. We analyze the distribution of labor and rewards in the family and community, as well as how men influence personal identity. Ms. Hochschild (W)

153. Sex Stratification and the Social Experience of Men. (4) Three lecture hours per week. Prerequisite: Sociology 1A-1B or consent of instructor. The roles of men in American society examined from the standpoint of socialization and role analysis, group structure, politics, and social change, and personal experience. Mr. Blauner (F)

154. Sociology of Illness and Medicine. (4) Three lecture hours per week. Prerequisite: Sociology 1A-1B or consent of instructor. Major concepts associated with the definition, occurrence and experience of illness. Analysis of the sick role and the role systems in which it occurs. Mr. Hermans (F)

155. Psychoanalysis and Society. (4) Three lecture hours per week. Prerequisite: Sociology 1A-1B or consent of the instructor. Interaction between individual and society from the perspective of psychoanalytic theory. Mr. Meehan (F)

157. History of Sociological Theory. (5) Three lecture hours and two tutorial hours per week. Prerequisite: one lower division Sociology course, or consent of the instructor. History of social thought as a source of present-day problems and hypotheses. Mr. Grayson (W)

158. Contemporary Sociological Theories. (5) Three lecture hours and two tutorial hours per week. Prerequisite: course 157. Major theoretical perspectives in sociological theory. Mr. Montejano (Sp)

160. Urban Sociology and Ecology. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course, or consent of the instructor. The sociology of personal and group social structures and processes in the pursuit of national objectives; analysis of attempts to specify the causes of war. Mr. Wilensky (W)

*164. Folklore and Society. (5) Formerly numbered 191F. Three lecture hours and two tutorial hours per week. Prerequisite: one lower division sociology course, or consent of instructor. An introduction to social and cultural factors underlying folk culture, and the role of folklore in the formation and continuity of culture. Mr. Bock (W)

166. Agricultural Oriental Societies. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course, or consent of instructor. Main characteristics of medieval Chinese, Japanese, and Indian cultures as compared with the West. Research methods. Mr. Byer (W)

167. Modern Social Structure in the Near East. (5) Three lecture hours per week. Prerequisite: course 1A-1B or consent of instructor. Social organization of contemporary societies, particularly the relationship between rural and urban groups. Processes of modernization in both groups. Mr. Fischer (Sp)

168. Soviet Society. (4) Three lecture hours per week. Prerequisite: one lower division sociology course, or consent of the instructor. The Soviet Union from 1917 to the present. Social structure, political and economic development, and projections for Soviet society. Mr. 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. (Sp)

175. Social Conflict. (4) Three lecture hours per week. Prerequisite: course 1A-1B or consent of instructor. The study of social conflict, its causes, and consequences, including social conflict and group reactions to urban life. Mr. Burt (W)

176. Interpersonal Behavior in Small Groups. (5) Three lecture hours and two consultation hours per week. Prerequisite: one lower division sociology course or consent of instructor. An examination of sociological theories and research on behavior in small groups. Topics such as status relations, communication, coalitions and interpersonal conflict are examined in light of field and laboratory research. Mr. Ofsth (F)

179. 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 person-
GROUNDOURCISES

*203A-203B-203C, Research Methods Seminar Sequence. (1-4-4) Two hours of seminar meetings biweekly throughout the year. Prerequisite: 203A prerequisite to 203B, 203A-203B prerequisite to 23C. An alternative format for methods seminars, satisfying the same requirements as comparable 200 Seminars. Format similar to staff-meeting-seminar of research assistants planning, discussing, or analyzing a major research activity in which the faculty member is currently engaged. Credit and grade will be assigned only upon completion of the sequence. (A Staff, F, W, S)

205A-205B, Basic Viewpoints. In Social Psychology. (4-4) Three lecture hours and one tutorial hour per week. Prerequisites: Students may take 205A by itself, or they may take 205A-205B in sequence, with credit and grade assigned separately for each course. A critical and comparative examination of major theoretical approaches in social psychology and of paradigmatic empirical studies associated with each. The approaches will include: symbolic interactionism, neo-behaviorism, psychodynamic analysis, cognitive theories, and theories of exchange. (A Staff, F, W, S)

206, Socialization and Personality. (4) Two lecture hours and two consultation hours per week. Goals and processes of socialization; the self; organized social roles as mediated through the norms and patterns of interaction of family, peer group and school. (A Mr. Clausen (W)

207, Analysis of Social Action. (4) Two lecture hours and two consultation hours per week. Advanced social psychology, particularly from the viewpoint of George Homans. Nature of the social situation, social roles, the self, socialization, the social act. (A Staff, F, W, S)

208, Social Interaction and Organization. (4) Three lecture hours and two consultation hours per week. Prerequisite: graduate standing in sociology or psychology. (A Mr. Swanson (W)

209A-209B, 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 209B. 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. Intensive study of selected topics in interpersonal behavior and small group processes: evolution of power and prestige orders, balance and exchange processes, interpersonal conflict, and social influence processes. (A Mr. Ofshe (F)

210A-210B, Racial and Ethnic Minorities. (4-4) Two hours of lecture or seminar and two hours of tutorial hour per week. Prerequisite: course 210A is recommended but not prerequisite to 210B. Students may take 210A-210B in sequence, with credit and grade assigned upon completion of the full sequence. Focuses on the nature of minorities and their relations with dominant members of society. Stresses processes of subjugation, accommodation, and mobilization. Different kinds of minorities compared to convey the range of differences as well as similarities. (A Mr. Montejo (W)

212, Deviance and Social Control. (4) Two lecture hours and two consultation hours per week. Deviance and social system analysis; ethnography of deviant communities. (A Mr. Duster (W)

217, History of Social Thought. (4) Two lecture hours and two consultation hours per week. Development of major historical thought of the full sequence. (A Mr. Durant (W)

219, Sociology of Law. (4) Two lecture hours and two consultation hours per week. Functions of law in society; social sources of legal change; social conditions affecting the administration of justice; role of social science in jurisprudence. (A Mr. Bock (F)

222, Sociology of Education. (4) Two lecture hours and two consultation hours per week. The study of educational systems and processes, with special emphasis on the relations of education to other social institutions. (A Staff, W, S)

224A-224B, Social Change. (4-4) Two lecture hours and 1 tutorial hour per week. Prerequisite: Students may take 224A or 224B, or they may take 224A and 224B in sequence with credit and grade assigned upon completion of the full sequence. 224A: An examination in-depth of the major theoretical approaches to the study of societal change. 224B: A consideration of the problems involved in the transformation of specific societies and cultures. (A Mr. Hermassi (F, W)

226A-226B, Marxism and Functionalism. (4-4) Two seminar courses and one tutorial hour per week. Prerequisites: Students may take the seminar 226A or the seminar 226B, or they may take 226A-226B 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. (A Staff, F, W, S)

227A-227B, Basic Issues in Sociological Theory. (4-4) Two lecture hours plus two tutorial hours per week. Prerequisite: Students may take 227A or 227B, or they may take 227A-227B in sequence, with credit and grade assigned upon completion of the full sequence. Credit and grade will be assigned upon completion of the full sequence. Representatives of major theoretical traditions in sociology will be examined intensively and critically, and an effort will be made to identify its recurrent and sporadic sociological issues that arise in sociological theorizing. (A Mr. Selznick (F)

228, Seminars in Sociological Theory. (4) Two seminar hours and two consultation hours per week. Prerequisite: course 227 or equivalent. (A Staff, F, W, S)

229, Sociology of Work. (4) Two seminar hours and two consultation hours per week. Course 229 may be taken in one quarter or in two. When course 229 is followed by one quarter of Sociology 290 with the same instructor, it may be considered a sequence course; credit and grade will then be assigned upon completion of the full sequence. The organization of work and varieties of work experience. Topics: occupational roles and career patterns, the interplay of machines, colleagues, and complex organizations; worker participation in management; social aspects of industrial conflict; labor, industry, and society. (A Staff, W, S)

230, Population. (4) Three hours of lecture and one hour of tutorial per week. Prerequisite: a course in population or consent of instructor. Problems in the theory of population; institutional and motivational aspects of demographic behavior. (A Staff, F, W, S)

231, Sociology of Marriage, Family, and Kinship. (4) Two lecture hours and two consultation hours per week. Family structure and behavior, including kinship, marriage, divorce, reproduction, and parental relations; interrelations between family and stratification, economy, class, and religion. (A Ms. Hochschuld (Sp)

232, Social Stratification. (4) Two lecture hours and two consultation hours per week. Theoretical and methodological problems in the field, with special emphasis on comparative materials. (A Ms. Hayns (W)

241, Organizations and Institutions. (4) Two lecture hours and two consultation hours per week. (A Staff, F, W, S)

242A-242B, Comparative Social Structure. (4-4) Two lecture or seminar hours and two tutorial hours per week. Prerequisite: course 242A is recommended but not prerequisite to 242B. Students may take the lecture course 242A or the seminar 242B, or they may take 242A-242B in sequence with credit and grade assigned upon completion of the full sequence. (A Staff, F, W, S)

246, Sociology of Religion. (4) Two lecture hours
two and consultation hours per week. Course 261A is recommended but not prerequisite to 262A or 262B. Students may take courses 260A or 260B or 260A-260B-260C in sequence with credit and grade assigned upon completion of the full sequence. The course is appropriate for comparative-historical analysis, topics to be covered include authenticity of historical data, variables appropriate for comparative-historical analysis, and cross-national surveys. 275A or 275B, Participant Observation. (4-4) Two lecture hours and two consultation hours per week. Prerequisites: consent of instructor. Credit may be earned in 275A alone, or students may take 275A-275B in sequence with credit and grade assigned upon completion of the sequence. The relation between the methods of participant observation and main conceptions of human interaction in sociology. Observation of participant observer skills through discussion of practical questions of field work. 275A: Mr. Burawoy (F) 275B: Mr. Woolf (W)

276. Mathematical Sociology. (4) Two hours of lecture and one hour consultation per week. Prerequisite: consent of instructor. Credit may be earned in 276A alone, or may be taken in 276A-276B in sequence with credit and grade assigned upon completion of the full sequence. 276A is an overview of the field of mathematical sociology. Basic concepts of structural equation models are used to analyze social networks of relations. Markov chains are used in models of social mobility. Optimization methods in equilibrium statics and comparative statics are used to analyze planned economies. 276B is concerned with problems of economic behavior and interdependence of economic systems. 276A: Mr. Heyns (F) 276B: Mr. Burt (W)

277. Structural Equation Models. (4-4) Formerly 214A-214B. Two lecture hours plus one tutorial hour per week. Prerequisite: introductory statistics course covering inference and analysis up to correlation/regression, such as Statistics 131-132, or the instructor's consent. 277A or equivalent prerequisite is for 277B. An introduction to basic methods in using structural equation models to capture and interpret social processes, and to evaluate structural constraints on flows of effects in systems of observed and unobserved variables. Substantive and methodological issues are emphasized. 277A: Mr. Burt, Ms. Heyns (F) 277B: Mr. Burt, Ms. Heyns (W)

290. Seminar. (4) Two seminar hours and two consultation hours per week. Prerequisite: consent of instructor. Two-hour seminar and two consultation hours per week. 290A, 290B, and 290C are seminars which, in addition to the regular seminar, may be combined into a one-quarter course or as a two-quarter sequence with course 290 with the same instructor. 290A may be taken after the completion of 272 or the seminar 276. Students may take the course 290A or the seminar 276, or they may take 281A-281B in sequence with credit and grade assigned upon completion of the full sequence. 281A is an overview of the field of social and political theory, with emphasis on the role of social and political theory in the shaping of social movements. 281B is a seminar on social and political theory, with emphasis on the role of social and political theory in the shaping of social movements. 281A: Mr. Fischer (F) 281B: Mr. Fischer (W)

296. Directed Group Studies for Graduates. (1-6) Prerequisite: consent of instructor. Group studies for advanced students in various fields of study. 296A or 296B or 296C in sequence with credit and grade assigned upon completion of the full sequence. 296A is an overview of the field of mathematical sociology. Basic concepts of structural equation models are used to analyze social networks of relations. Markov chains are used in models of social mobility. Optimization methods in equilibrium statics and comparative statics are used to analyze planned economies. 296B is concerned with problems of economic behavior and interdependence of economic systems. 296C: Mr. Selznick, Mr. Wilensky (Sp), Mr. Blumer, Mr. Burt, Mr. Edwards, Mr. Glock (F) 296D: Mr. Burt, Mr. Edwards, Mr. Glock (W) 296E: Mr. Burt, Mr. Edwards, Mr. Glock (Sp)

299. Seminar. (4) Two seminar hours and two consultation hours per week. Prerequisite: consent of instructor. Two-hour seminar and two consultation hours per week. 299A, 299B, and 299C are seminars which, in addition to the regular seminar, may be combined into a one-quarter course or as a two-quarter sequence with course 299 with the same instructor. 299A may be taken after the completion of 272 or the seminar 276. Students may take the course 299A or the seminar 276, or they may take 281A-281B in sequence with credit and grade assigned upon completion of the full sequence. 272A or 272B is an introduction to basic concepts of social science. 272A or equivalent prerequisite is for 272B. An introduction to basic methods in using structural equation models to capture and interpret social processes, and to evaluate structural constraints on flows of effects in systems of observed and unobserved variables. Substantive and methodological issues are emphasized. 272A: Mr. Burt, Ms. Heyns (F) 272B: Mr. Burt, Ms. Heyns (W) 272C: Mr. Burt, Ms. Heyns (Sp)

301. Individual Study for Master's Students. (1-8) Individual study for comprehensive requirements in consultation with the 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)

South and Southeast Asian Studies
Department Office, 4115 Dwinelle Hall
Professors: George F. Dales, Ph.D. Leonard Nathan, Ph.D. P. S. Jark, Ph.D. J. F. Stahl, Ph.D.
Associate Professors: Bernard A. van Nooten, Ph.D. Director of Graduate Studies. George L. Hart, Ph.D. Bruce R. Pray, Ph.D. Assistant Professor: Karine Schomer, Ph.D.
Lecturers: Usha R. Jain, M.A.
Departmental Major Advisers: Hindi-Urdu, Mr. Karine Schomer; Sanskrit, Mr. B. A. van Nooten; South Asian Archaeology, Mr. George Dales; South and Southeast Asian Civilization and Tamil, Mr. George Hart.
Graduate Advisers: Hindi-Urdu, Mr. Bruce Pray; South Asian Archaeology, Mr. George Dales; Sanskrit, Mr. Robert P. Goldman; Tamil, Mr. George Hart.

The Department offers programs of both undergraduate and graduate instruction and research in the languages and civilizations of South and Southeast Asia from the most ancient period to the present.

The program maintains a balance between ancient and modern studies, and between the various linguistic and cultural disciplines. Programs of study thus can be devised to fit the needs of students with a wide range of interests. Opportunities exist for a limited number of students to participate in both archaeological projects and language training programs in Pakistan. The Department has at its disposal the resources of the Center for South and Southeast Asia Studies, the South/Southeast Asia Library Service, and is closely related to 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, archaeology, or civilization. Since the major requirements have been revised recently, it should be noted that the revisions affect only those students who declare majors 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:
Graduate Study

Programs of graduate study and research leading to the M.A. degree will be based on a reading examination in a non-South or Southeast Asian language which the student and his or her advisor decide is relevant to the student's program. In addition, first-year proficiency in a second area-related language is required for the M.A. degree in Hindi and Urdu, Sanskrit, and Tamil. Two additional courses in relevant areas are required for the M.A. degree in modern South or Southeast Asian literature, which must be demonstrated by passing a reading examination in each area. This requirement must be met before the student can take the comprehensive examination.

Before being admitted to candidacy for the Ph.D., a student must demonstrate competence in the languages in his or her program, and must pass a written and oral qualifying examination in the two areas of specialization. This examination is designed to test the student's knowledge of the historical periods, regions, and languages of the area. It will consist of a written examination and an oral examination. The written examination will consist of a list of 20-25 questions on the historical periods, regions, and languages of the area. The oral examination will consist of a 30-minute interview in which the student will be asked to discuss the topics covered in the written examination.

South Asian

LOWER DIVISION COURSE

10A. Introduction to the Civilization of India. (5) 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 Brahmanic civilization to the advent of Islam. Special emphasis on the development of religious, philosophical, and aesthetic systems of traditional India. Staff (F)

10B. Introduction to the Civilization of India. (5) Four and one-half hours of lecture per week. Prerequisite: course 10A. Readings, lectures, and discussions in the culture and civilization of India from the Indus valley and Brahmanic civilization to the advent of Islam. Special emphasis on the development of religious, philosophical, and aesthetic systems of traditional India. Staff (W)

15. Great Books of India. (4) Three hours of lecture per week. Reading and discussion of 10 classic works in Indian literature in English translation, from Sanskrit literature, with concentration on pre-modern traditions. Staff, Mr. Nathan and Staff

101. Early Indian Literature. (4) Three hours of lecture per week. Readings, lectures, and discussions in the culture and civilization of India from the advent of Islam to the present. Special emphasis on the medieval religious movements of Bhakti and Indian Islam and the conflict of traditional and modern values in contemporary India. Staff (W)

UPPER DIVISION COURSES

100. Methods for Reading South and Southeast Asian Texts. (5) Four and one-half hours of lecture per week. Readings, lectures, and discussions in the culture and civilization of India from the advent of Islam to the present. Special emphasis on the medieval religious movements of Bhakti and Indian Islam and the conflict of traditional and modern values in contemporary India. Staff (W)

112. Early Indian Literature. (4) Three hours of lecture per week. A study of early Indian literature, primarily using translations from classical Sanskrit literature, and the development of the genre of Indian literature. Staff

122. Medieval Indian Devotional Literature. (4) Three hours of lecture per week. A study of medieval Indian literary and cultural traditions, through readings in English translation, primarily of devotional poetry. Staff (W)

112A. Early Indian Literature continued. (4) Three hours of lecture per week. A continuation of the study of early Indian literature, with emphasis on the development of the genre of Indian literature. Staff (W)

122A. Medieval Indian Devotional Literature continued. (4) Three hours of lecture per week. A continuation of the study of medieval Indian literary and cultural traditions, through readings in English translation, primarily of devotional poetry. Staff (W)

NOTE: See key to symbols, page 36.
20th century Indian literature, based on readings in English or in English translation. Stress is placed upon the interpretation of contemporary Indian society and culture through this literature. Staff (Sp)

126. Tamil Literature in Translation. (3) Three 1-hour lectures per week. Prerequisite: a knowledge of Tamil will be presupposed or required. The flavor, aesthetic goals, and structure of classical Tamil literature will be a focus of a few representative works with special emphasis on the nature-love poetry of the earlier period of Saivite religious poetry. Staff (W)

127. Brahmanism and Hinduism. (4) Three hours of lecture per week. Readings in selections from the Hindu scriptures - the Vedas, the Brāhmaṇas, the Upāniṣads, the Epics, the Purāṇas, and the Sutras of the traditional systems of Indian philosophy. Mr. Jali (F)

130. Historical Survey of Indo-Aryan Languages. (4) Three hours of lecture per week. Prerequisite: One year of Sanskrit or consent of instructor. Relationship of Indo-Aryan to the non-Indo-European languages. Linguistic development of Old Indo-Aryan (Vedic and Sanskrit), Middle Indo-Aryan (Pali, Prakrit, Apabhramsha) and Modern Indo-Aryan languages. The rise of literary languages. South Asian religions. Staff (Sp)

131. Indian Buddhism. (4) Three hours of lecture per week. General introduction to the systems of Buddhism thought in India. Selected readings from the Hinayana and Mahayana schools. Brief survey of the historical development of the Buddhist samgha and its impact on the peoples of South and Southeast Asia. Staff (Sp)

140. Hindu Mythology. (4) Three 1-hour lectures per week. Literary and religious aspects of Hindu myths. Reading of selected mythological texts in translation. Staff (Sp)

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 included: the indigenous religion, the effect of Brahmanical religion, Dravidian movements, and the practice of Hinduism in modern South India. Staff (Sp)

142. Indian Poetry In Translation. (6) Four and one half hour lectures per week. Lectures and discussions on ancient Indian Poetry, based on readings of selected translations from the Vedas, Sanskrit drama, Sanskrit and Prakrit poetry. Mr. Nathan

145. Eroticism and Religion in Indian Literature. (4) Three hours of lecture per week. Studies in the relation of the religion and religion in Indian literature. Course work includes lecture and readings (in translation) on Vedic, epic, classical, devotional, and tantric literature.先生 will be selected on the basis of a student's major. Staff (Sp)

160. Jainism and Other Heterodox Systems. (4) Three hours of lecture per week. Prerequisite: course 131 and/or consent of instructor. Selected readings from the Jain scriptures and commentaries culminating in the 12th century A.D. Rise of other Heterodox systems: the Nāthas and Sādhus in the North. General Introduction to the various aspects of the non-Vedic religious movements of ancient and medieval India. Mr. Nathan

182. Problems of Asian Mysticism. (4) Three hours of lecture per week. Readings in Hindu, Buddhist, Taoist and Sufi mysticism; discussion of methodology and research in this area; meditation and Other mystical practices. Mr. Staal (W)

192A-192B. South Asian Prehistory. (4-4) Three hours of lecture per week. A survey of archaeological discoveries in India, Pakistan, Ceylon, and Afghanistan relative to the 10,000 years of human occupation. The prehistoric period of South Asia will be placed on the factors leading up to the rise of South Asia's earliest civilization. Mr. Dales

193A-193B. South Asian Archaeology; Prehistoric and Historical Perspectives. (4-4) Three hours of lecture per week. A survey of archaeological discoveries in India, Pakistan, and Afghanistan relating to the 5000 years of human occupation. The prehistoric period and the rise leading up to the rise of Buddhism. Mr. Dales (W)

194. Field Project In Pakistan. (10-15) Four to six hours of lecture and 50 hours field and laboratory per week. Emphasis will be placed on the use of basic archaeological techniques, either from previous field experience or from a class such as Anth 133 and 35. Practical training in archaeological techniques at UC Berkeley's excavations at Balakot, Pakistan: excavation strategy, recording of strata, sections, objects; super-vision of local workmen; drawing of objects; collecting scientific samples; preparation of preliminary reports.

197. Field Studies In South and Southeast Asia. (1-5) Individual conferences to be arranged. Prerequisite: consent of instructor. Supervised experience relevant to the student's major. Of the various Southeast 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. Staff (F, W)

199. Supervised Independent Study and Research. (1-5) Must be taken on a pass/fail/does not pass basis. Enrollment is restricted by regulations shown on page 36. Staff (F, W, Sp)

GRADUATE COURSES

201. Readings In Jaina 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 a firsthand acquaintance with Jaina doctrine and practice through selections from both canonical and non-canonical sources, notably the Aca-ranga, Udrattarayana, Samayasara, and Tattinghuratha, and relevant commentaries in Sanskrit. Staff (Sp)

202. Problems of Analysis of South Asian Texts. (4) Three hours of lecture per week. Prerequisite: graduate standing. Students will study techniques to garner South Asian poetry from the various languages. Class discussions and student work will culminate in an edition of some selection, with translation and apparatus. Mr. Nathan

210. Linguistics In India. (4) Three 1-hour meetings per week. Prerequisite: some familiarity with linguistic and/or elements of an Indian language, or consent of instructor. Mr. Staal

212. 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. Staff (W)

214A-214B-214C-214D-214E-214F. Special Readings In Indian Buddhist Texts. (4-4-4) Three hours of lecture per week. Prerequisite: one year of Sanskrit and/or consent of instructor. Staff (W)

223A. Seminar In Advanced Tamil. (3) Three hours of seminar per week. Prerequisite: 1st year Tamil. Selections in modern Tamil literature. An analysis in depth of a few representative works. Staff (Sp)

226. 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. Mr. Hart (W, Sp)

230A-230B-230C. Readings In Indian Buddhist Sutras and Commentaries. (4-4-4) Three hours of seminar per week. Prerequisite: consent of instructor. Staff (Sp)

250A-250B-250C-250D-250E-250F. Special Studies. (1-8) Hours of meeting variable. Prerequisite: consent of instructor. Staff (Sp)

260. Seminar In South Asian Archaeology. (4) Three hours of seminar per week. Prerequisite: consent of instructor. Discussions of and research into a major aspect or problem of South Asian Archaeology. Students selected by consultation with a consultation and instructor. Mr. Dales (F, W)

298. Seminar (3) Hours of meeting are variable. Directed Independent 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. Staff (F, W)

401. Individual Studies For Master Students. (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 a Master's degree. Must be taken on a satisfactory/unsatisfactory basis.

402. 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 residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

IDS 165. Philosophies of India. (4) See interdepartmental studies for the complete description of this course.

Mr. Staal (F)

Southeast Asian

UPPER DIVISION COURSES

110. 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

112. Indonesian Literature In Translation. (4) 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, essays. Staff

116. 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

118. Directed Group Study For Upper Division Students. (1-4) Tutorial instruction in areas not covered by regularly scheduled courses. Staff (F, W, Sp)

120. Supervised Independent Study and Research. (1-5) Must be taken on a passed/not passed basis. Enrollment is restricted by regulations shown on page 36. Staff (F, W, Sp)

Draavidian

LOWER DIVISION COURSE

1A-1B-1C. Introductory Tamil. (5-5-5) Five hours of lecture per week. The grammar of 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) Five 1-hour meetings per week. Prerequisites: Draavidian 1A-1B-1C. Sequence begins 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: 2nd year Tamil. This course consists of readings in advanced Tamil. The exact texts to be determined by the needs of the students. May be repeated for additional credit with consent of instructor.

Mr. Hart (W, Sp)

286. 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.

Mr. Hart (W, Sp)

Hindi-Urdu

LOWER DIVISION COURSE

1A-1B-1C. Introductory Hindi and Urdu. (5-5-5) Five hours of lecture and two hours laboratory per week. Hindi and Urdu writing systems. 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.

Mrs. Jali (F, W, Sp)

UPPER DIVISION COURSES

100A-100B-100C. Readings In Hindi and Urdu. (5-5-5) Five hours of lecture and one hour laboratory per week. Prerequisites: Hindi-Urdu 1A-1B-1C or equiva-
**UPPER DIVISION COURSES**

**Sanskrit**

100A–100B–100C. Elementary Sanskrit. (6—5—5) Four and one-half hours per week. Elements of Sanskrit grammar and first practice in reading Sanskrit texts. Attention will be paid to speaking Sanskrit.

Mr. Goldman (F, W, Sp)

101. Epic Sanskrit. (6) Four and one-half hours per week. Prerequisite: course 100C or equivalent. Readings from the Sanskrit Epic and Purana. This course may be repeated for credit as material varies from year to year.

Mr. Goldman (F, W, Sp)

102. Classical Sanskrit Poetry. (6) Four and one-half hours of lecture per week. Prerequisite: course 100C or equivalent. Introduction to Sanskrit scientific, scholary, and commentarial texts. Selections of material will vary according to needs and interests of students. May be repeated for credit with consent of instructor.

Mr. van Nooten (W)

103. Readings in the Bhāṣā. (5) Four and one-half hours of lecture per week. Prerequisite: course 100C or equivalent. Selection of materials will vary. Introduction to grammar of the Bhāṣā texts. Selections will vary from year to year. The course may be repeated for credit with consent of instructor.

Mr. van Nooten (Sp)

104. Introduction to the Veda. (5) Four and one-half hours of lecture per week. Prerequisite: course 100C or consent of instructor. Introduction to the grammar of the Veda literature. Readings of selected passages from the Rg Veda, other samhitā, brāhmaṇa, and upanisadic texts. May be repeated for credit as material varies from year to year. The course may be repeated for credit with consent of instructor.

Mr. van Nooten (W)

105. Pall. (5) Four and one-half hours of lecture per week. Prerequisite: course 100C or consent of instructor. Introduction to grammar of Buddhist Pall texts. Readings will vary from year to year. The course may be repeated for credit with consent of instructor.

Mr. Goldman (F, W, Sp)

106. Buddhist Sanskrit. (6) Four and one-half hours of lecture per week. Prerequisite: course 100C or consent of instructor. Introduction to grammar of Buddhist Pall texts. Readings of advanced Buddhist texts. Readings will vary from year to year. The course may be repeated for credit with consent of instructor.

Mr. Goldman (F, W, Sp)

107. Linguistic Theories of the Hindus. (4) Four 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 structural rules and sensitivity.

Mr. van Nooten (F)

150. Sanskrit Prose Composition. (4) Three hours of lecture per week. Prerequisite: course 100C or equivalent. Practice in translation from English to Sanskrit. Consolidation of basic grammatical skills through composition. Discussion and evaluation of the composition will be conducted in Sanskrit. Staff (W)

198. Senior Honors. (1—4) Hours of meeting are variable. Prerequisite: limited to senior honors candidates. Directed study centering upon preparation of an honors thesis. Staff (F, W, Sp)

Upper Division Course

**Thai**

1A–1B–1C. Introductory Thai. (5—5—5) Four hours of lecture and one-hour laboratory per week. Survey of grammar, graded exercises and readings drawn from Thai literature, leading to a mastery of basic structural patterns, essential vocabulary and achievement of basic reading and writing competence.

Staff (F, W, Sp)

**Graduate Courses**

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 (gṛhiva) and sruti ritual. Sources for the study of the ritual. The Vedic schools and their principal texts. The Soma sacrifices. The principal recitations, chants, and offerings. Discussion of representative textual passages and readings.

Mr. Steal (F)

205A–205B. Kavya. (4—4) Three hours of lecture per week. Prerequisite: two years of Sanskrit, or consent of instructor. A study of Sanskrit orante poetry with emphasis on the canon of poetic analysis of the Indian aesthetic tradition.

Mr. Goldman (F, W)

206. Middle Indic. (4) Three hours of lecture per week. Prerequisite: course 105, or an equivalent introduction to Middle Indic. An intensive study of texts in one or more of the Praṅkī dialects.

Mr. van Nooten (Sp)

**290. Seminar in Sanskrit Grammar.** (5) Four and one-half hours of lecture per week. Study of the phonology, morphology and syntax of Awadhi and Braj. A rapid introduction to the historical roots of modern South Asian languages other than Hindi-Urdu. Introduction to Bhaṣa—a, the main literary forms of medieval Hindi. Literature in a South Asian language, or two courses in linguistics, or permission of Instructor. A rapid Introduction to the development of the Indian aesthetic tradition. Staff (F, W, Sp)

**Graduate Courses**

198. Directed Group Study in Thai Literature. (1—4) Variable hours of lecture per week. Prerequisite: reading knowledge of Thai. Selected readings in Thai literature, from early poetic works to modern fiction.

Staff (F, W, Sp)

**Spanish and Portuguese**

Department Office, 4321 Dwinelle Hall

Professors:

Arthur L. Askins, Ph.D.

J. Adolfo Chapmen, Ph.D.

Lroy R. Crockett, Ph.D.

Joseph D. DellaSala, Ph.D.

Luis Monguld, Ucenclado en Derecho, LL.D. (Emeritus)

Carlos F. Moldes, Olladem in Derecho, LL.D. (Emeritus)

Derek R. Paul, Ph.D.

Cebarn (Emeritus)

Milton M. Azevedo, Ph.D.

Lesley B. Simpson, Ph.D.

Derecho, LL.D. (Emeritus)

Benjamin M. Woodbridge, Jr.

S. Mtz, Ph.D.

Charles B. Faulhaber, Ph.D.

D. E.苗, Ph.D.

John K. Winter, Ph.D.

European R. Maskell, Ph.D.

D. R. Dougherty, Ph.D.

English amateurs of Spanish.

L. E. M. Hooper, Ph.D.

Fadi R. Marzouke, Ph.D.

L. M. Hooper, Ph.D.

Charles B. Faulhaber, Ph.D.

D. E.苗, Ph.D.

John K. Winter, Ph.D.

European R. Maskell, Ph.D.

D. R. Dougherty, Ph.D.

L. E. M. Hooper, Ph.D.

Fadi R. Marzouke, Ph.D.

David R. Dougherty, Ph.D.

Alden Hooper, Ph.D.

Fadi R. Marzouke, Ph.D.

J. Adolfo Chapman, Ph.D.

L. M. Hooper, Ph.D.

Charles B. Faulhaber, Ph.D.

Fadi R. Marzouke, Ph.D.
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 201.

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 100 to be completed before enrollment in any of the elective courses; Spanish 104A-104B or Spanish 107A-107B-107C to be completed before enrollment in any elective course in Spanish-American or Spanish literature, respectively; and Spanish 141, 142, or more than one quarter of 192 and 193 not to be included as one of the four. With the approval of the major advisor, one upper division course in Portuguese literature may be substituted for one of the four elective courses.

Students will normally complete the core courses in the first four quarters of study and the elective courses in the final two quarters of study. Recommended: further study in Western European and Latin American history, languages, and literatures. Although the Department does not offer a major in Portuguese, an option, within the Spanish major, allowing emphasis on Luso-Brazilian language and literatures was approved by the College of Letters and Science too late for inclusion in this catalog. Information can be obtained from the Department.

Candidates for the teaching credential in Spanish as a single subject are advised to include courses 112, 113, and 125 in their program.

Honors Program. To be admitted to the honors program in Spanish, students shall have completed at least three quarters of work on this campus with an overall average of at least 3.3 and a grade-point average of at least 3.3 in courses in the major. Students must also have the approval of the major advisor in consultation with other members of the Department.

Students admitted to the honors program shall complete, preferably before, but not later than the first quarter of the senior year, the eight core courses, or give evidence, by special examination, of equivalent preparation. Students passing an examination in lieu of any of the core courses shall be deemed to have satisfied the corresponding requirement for the major, though without obtaining unit credit.

Students in the honors program shall complete the special honors course or a three-quarter graduate course. The special honors course (H195A–H195B) shall be offered each quarter. This course shall consist of independent study and the writing of a thesis under the direction of an appropriate member of the Department.

Graduate Study

Preparation for Graduate Study. Students who may wish to pursue work toward advanced degrees in the Department of Spanish and Portuguese must complete a second-year course in Spanish (Spanish 202A or 202B, or 205) to be 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 Spanish (Beginner's Course). (8) Five 1-hour class meetings per week. (F, W, Sp)

2. Elementary Spanish (Continuation of 1). (5) Five 1-hour class meetings per week. Prerequisite: course 1 or equivalent. (F, W, Sp)

3. Elementary Spanish (Continuation of 2). (5) Five 1-hour class meetings per week. Prerequisite: course 2 or equivalent. (F, W, Sp)

4. Intermediate Spanish (Continuation of 3). (5) Five 1-hour class meetings per week. Prerequisite: course 3 or equivalent. (F, W, Sp)

5. Intermediate Spanish (Continuation of 4). (5) Five 1-hour class meetings per week. Prerequisite: course 4 or equivalent. (F, W, Sp)

8A. Spoken Spanish. (4) Five 1-hour class meetings per week. Prerequisite: course 8 or equivalent. May be taken in conjunction with course 4, 5, or 25. Course designed to increase vocabulary and to improve grammar and pronunciation by means of oral expression. (F, W, Sp)

8B. Spoken Spanish. (4) Five 1-hour class meetings per week. Prerequisite: course BA (formerly Spanish 8) or equivalent. A continuation of Spanish 8A (formerly Spanish 8B). May be taken in conjunction with course 4, 5, or 25. Course designed to increase vocabulary and to improve grammar and pronunciation by means of oral expression. (F, W, Sp)

12A. Beginning Spanish, Intensive Course. (10) Ten 1-hour class meetings per week. Two hours per week obligatory laboratory attendance. An intensive course in beginning Spanish, equivalent to Spanish 1 and Spanish 2. (F)

12B. Intermediate Spanish, Intensive Course. (10) Ten 1-hour class meetings per week. Ten hours per week obligatory laboratory attendance. An intensive course in intermediate Spanish, equivalent to Spanish 3 and Spanish 4. (W)

12C. Advanced Spanish, Intensive Course. (10) Ten 1-hour class meetings per week. Ten hours per week obligatory laboratory attendance. An intensive course in advanced Spanish, equivalent to Spanish 5 and Spanish 25. (Sp)

14A–14B–14C. Individualized Instruction in Elementary Spanish (1, 1, 1) may be determined on an individual basis. Prerequisite: open to any student whose program, including this course, meets the minimum study list requirement. This course covers the material of Spanish 1–3. Divided into 15 units (14A: 1–5 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 no 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 contracted for are expected to be completed during the quarter that the student is enrolled in the course.

25. Advanced Spanish. (6) Four 1-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. A maximum of 15 students in all departments of the University. No knowledge of Spanish necessary.

*39A. Spain: Medieval Period, Renaissance, and Golden Age.

39B. Spain: Neo-Classical Period to Present Day.

39C. Spanish America: To the end of the Nineteenth Century.

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.**

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Units</th>
<th>Time</th>
<th>Instructor(s)</th>
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</thead>
<tbody>
<tr>
<td>102. Advanced Composition. (3) Formerly 117. Three class hours per week.</td>
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<td></td>
<td>Mr. Dougherty, Miss Masielo (F, W)</td>
</tr>
<tr>
<td>104A-104B. Survey of Spanish-American Literature. (4-4) Three class hours per week.</td>
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<td></td>
<td>Mr. Chapman, Mr. Durand, Miss Masielo (F, W)</td>
</tr>
<tr>
<td>112. Studies in Spanish Culture. (4) Three class hours per week.</td>
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<td>Mr. Durand</td>
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<tr>
<td>125. Spanish Phonetics. (4) Three class hours per week.</td>
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<td>Mr. Walsh (F, Sp)</td>
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<tr>
<td>127. Eighteenth-Century Spanish Literature. (4) Three class hours per week.</td>
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<td>Mr. Murillo (W)</td>
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<tr>
<td>128. The Spanish-American Essay. (4) Three class hours per week.</td>
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<td>Mr. Murillo</td>
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<tr>
<td>130. Twentieth-Century Spanish-American Poetry. (4) Three class hours per week.</td>
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<td>Miss Masielo (Sp)</td>
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<tr>
<td>131. The Spanish-American Short Story (Twentieth Century). (4) Three hours of lecture per week.</td>
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<td>Mr. Murillo (W)</td>
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<tr>
<td>132. Medieval Spanish Literature. (4) Three class hours per week.</td>
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<td>Mr. Polt</td>
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<tr>
<td>137. Medieval Epic Poetry. (3-3) Two hours of lecture per week.</td>
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<td>Mr. Murillo</td>
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<tr>
<td>138A-*138B. Introduction to Medieval Hispanic Literature. (3-3) Formerly 200A-200B. Two hours of lecture per week.</td>
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<td>Mr. Faulhaber</td>
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<tr>
<td>139A-*139B. Major Poets of the Golden Age. (3-3) Two hours of lecture per week.</td>
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<td>Mr. Murillo</td>
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<tr>
<td>142. The Spanish-American Novel in English Translation. (4) Three class hours per week.</td>
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<td>Mr. Chapman (W)</td>
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<tr>
<td>146. Hispanic Paleography. (3-3-3) Two hours of lecture per week.</td>
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<td>Mr. Craddock (Sp)</td>
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<tr>
<td>149A-*149B. The New Novel in Latin America. (3-3) Two hours of lecture per week.</td>
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<td>Mr. Murillo</td>
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<tr>
<td>150. Medieval Spanish Prose. (3-3-3) Two hours of lecture per week.</td>
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<td>Mr. Craddock</td>
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<tr>
<td>156A-*156B. The Generations of 98, 99, 1850. (3-3-3) Two hours of lecture per week.</td>
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<td>Mr. Murillo</td>
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<tr>
<td>158. Medieval Prose. (3-3-3) Three hours of lecture per week.</td>
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<td>Mr. Craddock</td>
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<tr>
<td>161. Advanced Spanish for Bilingual Students. (3-3) Three hours of lecture per week.</td>
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<td>Mr. Murillo</td>
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<tr>
<td>162. The Spanish-American Essay. (4) Three class hours per week.</td>
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<td>Mr. Murillo</td>
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<tr>
<td>163. Advanced Course in Hispanic Linguistics. (4) Three hours of lecture per week.</td>
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<td>Mr. Polt</td>
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<tr>
<td>164A-*164B. The Golden Age. (3-3) Two hours of lecture per week.</td>
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<td>Mr. Polt</td>
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<tr>
<td>165. Romance Prose. (3-3) Two hours of lecture per week.</td>
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<td>Mr. Polt</td>
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<tr>
<td>167. Spanish Renaissance Literature. (3-3) Three hours of lecture per week.</td>
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<td>Mr. Polt</td>
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</tbody>
</table>

**L&S: Spanish and Portuguese / 205**

**Literature: Theory and Bibliography**

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Units</th>
<th>Time</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>240A-*240B. Techniques of Literary Scholarship. (3-3) Formerly 205A-205B. One 2-hour meeting per week.</td>
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<td>Mr. Askins</td>
</tr>
<tr>
<td>242. Literary Theory and Criticism. Formerly 202A-202B. Two 2-hour meeting per week.</td>
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<td>Mr. Faulhaber (Sp)</td>
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<tr>
<td>244. Spanish Verification. (3) Formerly 216. One 2-hour meeting per week.</td>
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<td>Mr. Chapman</td>
</tr>
</tbody>
</table>

**Literature: Studies**

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Instructor(s)</th>
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</thead>
<tbody>
<tr>
<td>155A-*155B. The Comedia and Related Minor Genres. (3-3) One 2-hour meeting per week.</td>
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<td>Mr. Polt</td>
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<tr>
<td>156A-*156B. Lyric Poetry. (3-3) One 2-hour meeting per week.</td>
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<td>Mr. Polt</td>
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<tr>
<td>262A. Epic Poetry. (3) One 2-hour meeting per week.</td>
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<td>Mr. Murillo (W)</td>
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<tr>
<td>262A-*262B. A Single Author or a Special Topic. (3-3) One 2-hour meeting per week.</td>
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<td>Mr. Murillo</td>
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<tr>
<td>265A-*265B. Studies in the Literature of the Enlightenment. (3-3) Formerly 204A-204B. One 2-hour meeting per week.</td>
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<td>Mr. Polt</td>
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<tr>
<td>266A-*266B. Narrative and Exploatory Prose. (3-3) One 2-hour meeting per week.</td>
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<td>Mr. Polt</td>
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<tr>
<td>267A-*267B. Drama. (3-3) One 2-hour meeting per week.</td>
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<td>Mr. Polt</td>
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</tbody>
</table>

**Modern Spanish**

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Instructor(s)</th>
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</thead>
<tbody>
<tr>
<td>272A-272B-*272C. The Spanish Novel Since 1850. (3-3) Two hours of lecture per week.</td>
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<td>Mr. Polt</td>
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<tr>
<td>272A-*272B. Modern Spanish Poetry (After Romanticism). (3-3) Two hours of lecture per week.</td>
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<td>Mr. Polt</td>
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<tr>
<td>272A-*272B. Colonial Spanish American Literature. (3-3) Two hours of lecture per week.</td>
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<td>Mr. Durandy</td>
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<tr>
<td>272A-*272B. Modern Spanish American Poetry. (3-3) Two hours of lecture per week.</td>
<td></td>
<td>Mr. Chapman (W)</td>
</tr>
</tbody>
</table>

**NOTE: For key to symbols, see page 36.**
Topic. (3–3) One 2-hour meeting per week. Course may be repeated for credit when topic changes.

Spanish American

*170A–*170B. The Colonial Period. (3–3) One 2-hour meeting per week. Mr. Durand

*172A–*172B–*172C. The Modern Period. (3–3–3) Five 1-hour class meetings per week. Mr. Chapman

*174A–*174B. Poetry. (3–3) Formerly 205A–205B. One 2-hour meeting per week. Course may be repeated for credit when topic changes.

*176A–*176B–*176C. The Novel. (3–3–3) Formerly 204A–204B–204C. One 2-hour meeting per week. Mr. Chapman

*178A–*178B–*178C. The Literature of a Single Country. (3–3–3) Formerly 228A–228B–228C. One 2-hour meeting per week. Course may be repeated for credit when topic changes. 278C. Topic for Spring 1978: Argentina. Mr. Chapman

*179A–*179B. A Single Author or a Special Topic. (3–3) One 2-hour meeting per week. Course may be repeated for credit when topic changes.

Literature: Seminars

*180A–*180B–*180C. Seminar in Spanish-American Literature. (3–3–3) One 2-hour meeting per week. Course may be repeated for credit when topic changes.

*185A–*185B–*185C. Seminar in Spanish Literature. (3–3–3) One 2-hour meeting per week. Course may be repeated for credit when topic changes.

287. Seminar on Cervantes. (3) Formerly 229. One 2-hour meeting per week. Prerequisites: course 111A–111B and/or course 221A–221B, or equivalents. Course may be repeated for credit when topic changes. Topic for Spring 1978: Cervantes and Heroic Poetry. Mr. Murillo

289. 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/unsatisfactory grading. The Staff (Graduate Advisers in charge) (F, W, Sp)

601. Individual Study for Master's Students. (1–6) Individual study in consultation with the graduate adviser, to provide an opportunity for student to prepare for the comprehensive examination. May be taken only in the quarter in which the examination will be taken. May not be taken on a satisfactory/unsatisfactory basis. The Staff (Graduate Advisers in charge) (F, W, Sp)

602. Individual Study for Doctoral Students. (1–6) Individual study in consultation with the major field adviser, 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) Three 1-hour meetings per week. Preparation for the graduate reading examination. Grading to be on a satisfactory/unsatisfactory basis. Sequence beginning Winter quarter.

Portuguese

LOWER DIVISION COURSES (Mr. Azevedo in Charge)

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) Five 1-hour class meetings per week. (F, Sp)

2. Elementary Portuguese (Continuation of 1). (5) Five 1-hour class meetings per week. Prerequisite: course 1 or equivalent. (F, W)

3. Intermediate Portuguese (Continuation of 2). (5) Five 1-hour class meetings per week. Prerequisite: course 2 or equivalent. (F, Sp)

4. Intermediate Portuguese (Continuation of 3). (5) Five 1-hour class meetings per week. Prerequisite: course 3 or equivalent. Reading, translation, and oral interpretation of modern texts. Mr. Woodbridge (F)

5. Advanced Portuguese. (5) Five 1-hour class meetings per week. Prerequisite: course 4, or equivalent. (W)

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

*190C–*190D. 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 credit in Portuguese literature may be applied toward the M.A. degree in Spanish.

101. Portuguese for Advanced Students. (3) Three class hours per week. An intensive course for students with no previous study of Portuguese. Mr. Molés (F)

102. Advanced Grammar and Composition. (4) Three class hours per week. Prerequisite: course 5 or equivalent. Mr. Woodbridge (Sp)

111A–111B. The Literatures of Portugal. Sequence beginning Fall quarter. Mr. Askins, Mr. Azevedo, Mr. Moises (W)

122A–122B–122C. Portuguese Literature. (4–4–4) Three class hours per week. Studies in the literature of Portugal. Sequence beginning Fall quarter. Mr. Askins, Mr. Moises (Sp)

123A–123B. Survey of Brazilian Literature. (4–4) Formerly course 123. Three class hours per week. Sequence beginning Fall quarter. Mr. Woodbridge (W)

135. Studies in Luso-Brazilian Literature. (4) Three class hours per week. Course may be repeated for credit when topic changes. Mr. Molés (Sp)

150. Introduction to Portuguese Linguistics. (4) Three class hours per week. Prerequisite: consent of instructor. Study of selected problems of the Portuguese language, in an effort to contrast it with Spanish and with other varieties of Romance speech. Mr. Azevedo (Sp)

H185A–H185B. Portuguese Honors Course. (4–4) Honors thesis. (F, W, Sp)

198. Special Study for Undergraduates. (2–4) Prerequisite: consent of instructor. Special tutorial or seminar on selected topics. Mr. Askins, Mr. Azevedo, Mr. Moises, Mr. Woodbridge (F, W, Sp)

199. Supervised Independent Study and Research. (2–4) Enrollment is restricted by regulations listed on page 36. Restricted to senior honor students with an adequate preparation for the subject proposed for special study, and by previous arrangement with members of the departmental staff. Must be taken on a passed/not passed basis. Mr. Askins, Mr. Azevedo, Mr. Moises, Mr. Woodbridge (F, W, Sp)

GRADUATE COURSES

Concerning conditions for admission to graduate courses, see Index under Graduate Division.

Literature: Comprehensive Courses

*220. Early Portuguese Literature. (3) Formerly 200. One 2-hour meeting per week. Mr. Askins

Literature: Studies

*269. A Single Author or Special Topic in Portuguese Literature. (3) One 2-hour meeting per week. Course may be repeated for credit when topic changes. Mr. Askins

276. The Brazilian Novel. (Formerly 201. One 2-hour meeting per week. Mr. Woodbridge (F)

279. Single Author or Special Topic in Brazilian Literature. (3) One 2-hour meeting per week. Course may be repeated for credit when topic changes. Topic for Winter 1978: Brazilian Romantic Poets Mr. Woodbridge (W)

298. Special Study for Graduate Students. (2–6) Hours of meeting are variable. Prerequisite: graduate standing. Individual conferences on special projects of study or research in a restricted field not covered by available courses or seminars. Mr. Askins, Mr. Azevedo, Mr. Moises, Mr. Woodbridge (F, W, Sp)

299. Special Advanced Study. (2–6) Restricted to candidates for higher degrees with an adequate preparation for the subject proposed for special study, by previous arrangement with members of the departmental staff. Sections 1 through 20: letter graded; Sections 21 through 40: satisfactory/unsatisfactory grading. Mr. Askins, Mr. Azevedo, Mr. Moises, Mr. Woodbridge (W, Sp)

Catalan

LOWER DIVISION COURSES (Mr. Azevedo in charge)

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.

11. Elementary Catalan (Beginner’s Course). (5) Five 1-hour class meetings per week. (F, W, Sp)

12. Elementary Catalan (Continuation of 1). (5) Five 1-hour class meetings per week. Prerequisite: Course 1 or equivalent.

13. Elementary Catalan (Continuation of 2). (5) Five 1-hour class meetings per week. Prerequisite: Course 2 or equivalent.

UPPER DIVISION COURSES

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. Azevedo (W)

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. Azevedo

Special Programs

Division Office: 301 Campbell Hall

Professors:

Gene A. Brucker, Ph.D. (History)

Erich S. Gruen, Ph.D. (History)

William V. Nestrick, Ph.D. (History)

Norman G. Rabkin, Ph.D. (English)

William B. Stottman, Ph.D. (Associate Dean)

Associate Professors:

Stephen J. Greenblatt, Ph.D. (English)

William V. Nestrinck, Ph.D. (English)

Lecturer:

Paul Von Blum, J.D.

The Division of Special Programs (formerly Division of Interdisciplinary and General Studies or D. I. G. S.) was established in 1968. Its mission is to develop and administer innovative and interdisciplinary courses and programs in the College of Letters and Science that do...
not belong to a single department. At present it administers the fields majors in the humanities and the social sciences and the group majors in environmental studies, film, genetics, neurobiology, religious studies and women's studies. In addition to these majors, it offers special interdisciplinary courses such as Introduction to Western Civilization and Human Social studies, and administers the Summer Threshold Program. For complete descriptions of the Special Programs majors and major courses, please see the entries listed alphabetically by major.

At the present time the humanities field major is undergoing revision, but it is expected that it will be offering courses and admitting new major students in the fall quarter 1977. Students interested in the major should contact the Division Office for further information.

LOWER DIVISION COURSES
10. Human Sociology. (9) Three hours of lecture and one hour of discussion per week. The inter-relation of social and biological science will be explored, using a series of cases employing both kinds of methodology. The importance of different methodologies and of history of science will be stressed.
Mr. Washburn (W)
44A-44B-44C. Topics in Western Civilization. (5-6-W) Three hours of lecture and four hours of discussion per week. Prerequisites: completion of Subject A required. Introduction to the history, literature, and other cultural aspects of selected periods of western civilization from its beginnings 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. Rabin in charge (F, W, Sp)
UPPER DIVISION COURSE
191A. Forum of Interdisciplinary and General Studies. (3) Two to 3 hours of lecture per week. May be repeated for credit with topic changes. An exploration of issues of central concern to students as members of society and of this educational institution. Selected speakers from various disciplines will lecture and participate in discussion, providing a forum where the different disciplines can be brought together in the fashioning of informed, well-rounded ideas. The class will demonstrate the pertinence of higher education in dealing with vital questions. To be offered 1977-78 only.

Summer Threshold Program
Threshold is an experimental program administered by the Division of Special Programs that is designed to help entering first-year students adjust to academic life on a large campus. Each of the approximately 500 students who will participate in the eight-week session each summer will be placed in small groups with other students who have similar academic interests. Each group will take introductory core courses together for regular University credit. In addition, they will meet each week with a faculty member and a student adviser for counseling and guidance. Each student will be enrolled in a course for each quarter (either Subject A or English 1A) and one course from a selection of introductory courses. All students will also be enrolled in a special course entitled "Introduction to the Berkeley Campus" which will provide a general overview of campus facilities and programs. The Summer Threshold Program is tentatively scheduled to run from July 24 through September 16.

Statistics
Department Office, 367 Evans Hall

Professors:
Edward W. Barankin, Ph.D.  David Blackwell, Ph.D., O.DSc.
Richard E. Barlow, Ph.D.  Peter J. Bickel, Ph.D.  (Chairman)
L.L.D. (Hon.)  L.L.D. (Hon.)  L.L.D. (Hon.)  M.A.  (Hon.)  M.A.
Albert H. Bowker, Ph.D.  Letterman (Hon.)  David R. Brillinger, Ph.D.  Lester D. Dubin, Ph.D.  Jacob Feldman, Ph.D.
David A. Freedman, Ph.D.  Joseph L. Hodges, Ph.D.  George M. Kuczma, Ph.D.  Juden Lescan, Ph.D.  Erich L. Lehmann, Ph.D.
P. Wawrick Miller, Ph.D.  Roy Radner, Ph.D.  Elizabeth L. Scott, Ph.D.  Asem J. Thomasian, Ph.D.  Michel Loeve, Doctor de Science (Emeritus)
Jerzy Neyman, Ph.D.  O.L. Lil (Hon.).  Ph.D. (Hon.) (Emeritus)
Howard Saffett, Ph.D.  (Emeritus)

Associate Professors:
Rudolph J. Beran, Ph.D.  Kjell A. Doksum, Ph.D.

Assistant Professors:
Howard J. D'Ambra, Ph.D.  Norman L. Kaplan, Ph.D.

Acting Assistant Professors:
Ching-Shiul Cheng  James A. Reeds

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 of some of their applications in general and in special fields such as social science and economics.

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-B-C (or 200A-200B-200C). Statistics 100 requires two quarters of calculus (Statistics 200 requires more); the first half is devoted to probability and the second half to statistics. A second cycle, requiring three quarters of calculus and emphasizing interpretation and concepts, is based on 134A and 147 (the first quarter is devoted to probability, the second to statistics) or 134A-134B and 142 (probability theory and 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 one quarter of calculus (statistical theory), is the sequence 130A-130B-130C; the probability material is developed as needed for the statistics. A cycle intended mainly for social scientists, requiring less mathematics, involves 2, 131 with 131L with 132L.

A student may not receive full credit for partially parallel sequences.

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 160 to 181A cover a wide range; attention is also drawn to 191, given to recent developments.

The Major
Lower Division Courses. Required: Mathematics 1A-1B-1C and 51A-51B-51C, or preferably the corresponding honors courses. Recommended: Statistics 1A-1B or 20 is helpful preparation for the upper division courses. An equivalent of object programming (e.g., Computer Science I) is very useful in applied statistical work.

Upper Division Courses. Statistics 100A-100B-100C, 111, 112A or 112B. At least four courses from Statistics 142, 160, 161, 162, 165 (with 166L), 168, 169, 161A, *191C. In addition, either two courses from Mathematics 104A, 104B, 105, 113A, 125A, 128A, 135 and 165; or at least three advanced nonoverlapping courses from another scientific field. The courses selected for the 40 or more upper division units required for the major must be approved in advance by the major adviser.

Honors Program. Students with an overall 3.3 grade-point average or better and a 3.3 grade-point average of courses in the major may apply for admission to the honors program with the approval of the major adviser. The program will include course H19S, reading in a special topic and writing a thesis.

Double Major. Students are encouraged to consider a double major, combining statistics with mathematics or with a field of application.

Engineering Mathematical Statistics. The College of Engineering with the cooperation of the Department of Statistics offers a curriculum in engineering mathematical statistics leading to the degree of Bachelor of Science. Major Adviser: Mr. Hodges (see section on Program of Study in Engineering Science).

Preparation for Graduate Study. Those interested in the graduate statistics major should include in the undergraduate courses a strong foundation in mathematics as well as probability and statistics. For advanced degrees of the theoretical type, Mathematics 104B, 105, 113B and 185 are needed. For advanced degrees of the applied type, at least a year of upper division probability and statistics (or course 200A-200B-200C with 200L-200M-200N). It is also recommended that all students acquire some familiarity with French, German, or Russian.

The Graduate Major
Higher degrees may be of the theoretical or of the applied type. The program for the theoretical type of M.A. or Ph.D. degree usually includes the course sequence 200A-200B-200C; the program for the applied type of M.A. will usually include 230A-230B, 236A-236B, and 240 and at least one of 232, 238, 242, 248. The master's degree may be taken either under Plan I or Plan II.

For the M.A. degree, the program may emphasize theoretical probability, theoretical statistics, or applied probability and statistics. For details contact the Ph.D. adviser.

Biostatistics. A program in biostatistics, leading to the M.A. or Ph.D. degrees, is offered jointly with the School of Public Health. The program may be toward theory or toward the substantive field. For information, consult Ms. Scott.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSES
1A. Introduction to Probability. (3) Three 1-hour lectures per week. Prerequisite: high school algebra. Students who have completed a course in probability will receive only partial credit. A prior knowledge of probability; random variables; expected value and variance; binomial and hypergeometric distribution; normal and Poisson approximation. (F, W, Sp)

1B. Introduction to Statistical Inference. (3) Three 1-hour lectures per week. Prerequisite: course 1A. Students who have completed a course in statistics will receive only partial credit. Review of probability concepts. Estimation with applications to the estimation of means, differences, variance. Determination of sample size; choice of estimate and problems of design. Testing hypotheses; simple examples of tests; the concept of power. (Sp)

2. Introduction to Statistics. (6) Three 1-hour lectures and three 1-hour laboratories per week. Prerequisite: high school algebra. Students who have completed a course in probability or statistics will receive only partial credit. An introduction to basic ideas in probability and statistical inference; Models; conditional probability; measures of location, spread, association; binomial distribution, normal approximation. Sampling; point estimation; some standard significance tests; power. (F, W, Sp)

20. Introduction to Probability and Statistics. (4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: one quarter of calculus. Students who have completed a course in probability or statistics will receive only partial credit. An introduction to basic ideas in probability and mathematical background who wish to acquire basic concepts. Relative frequencies, discrete probability, random variables, some random processes. Estimation, illustration from various fields. (F, W, Sp)

26. Introduction to Probability and Statistics for Engineers. (4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: One year of calculus. (Students who have completed a course in probability or statistics will receive only partial credit.) Intro-
fraction to probability emphasizing concepts and appli-
cations. Conditional probability, independence, ex-
ception. Discrete and continuous random variables. Testing hypotheses. Estimation. Illustrations from en-
ingineering.

UPPER DIVISION COURSES

100A. Introduction to the Theory of Probability and Statistics. (4) Three 1-hour lectures and one 1-
hour laboratory per week. Prerequisite: course 13A or 134. Gaussian processes, illustrative applications from var-
cious fields. (W, Sp)

100B: (W); 100C: (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 any part of Statistics 100, 131, 132, 134A, 135 may receive only two units for 130A–130B–130C. Basic concepts, facts, and applications. Conditional probability, independence, expectation. Discrete and continuous random variables: binomial, Poisson, normal, gamma, and their applications. DeMolvo-Laplace theorem. (F, W, Sp)

131. Statistical Inference for Social Scientists. (4) Three hours of lecture and 1-hour discussion per week. Prerequisite: a mathematics course at the level of Mathematics 100A or equivalent. Basic concepts, facts, and applications of statistical inference. (W, Sp)

132. Second Course in Statistical Inference for Social Scientists. (4) Three lectures per week. Prerequisite: course 131. May not be taken for credit by students having completed Statistics 130A. (F, W, Sp)

134A–134B. Concepts of Probability. (4–4) Three hours of lecture per week. Prerequisite: course 134A. An introduction to probability emphasizing concepts and illustrative applications from various fields. (F, W, Sp)


142. Introduction to Discrete Parameter Stochastic Processes. (4) Three hours of lecture per week. Prerequisite: course 134A or 140A. A thorough coverage of the main topics in a two-semester introduction to stochastic 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, 100B, 130B, or 131. A comprehensive survey course in statistical theory and methodology basic to applications in science and engineering. It is recommended to students who have not been well exposed to good background in the concepts of probability theory. (W, Sp)

160. Elements of Nonparametric Inference. (5) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: Statistics 100C or 130B or 132, or 135A. Common nonparametric tests such as the sign test, Wilcoxon test and rank correlation tests. Null distributions and their approximations. Efficiency properties. Estimation of location and scale parameters. (W, Sp)

161. Statistical Inference in Linear Models. (6) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: one of the courses Statistics 100C, 130B, or 132, or Mathematics 111B, 111B, or 190B. May not be taken for credit by students having completed 135B. Optimum point estimation in the linear model. Hypothesis testing and related confidence sets in the normal case. (W, Sp)

162. Introduction to Multivariate Analysis. (6) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: one of the courses Statistics 100C, 132, or 161, and one of the courses Mathematics 111B, 113B, or 190B. Multivariate normal distribution, partial and multiple correlation, Hotelling's $T^2$-test, multivariate analysis of variance. (W, Sp)

166. Sampling Surveys. (4) Three 1-hour lectures per week. Prerequisite: course 100A or 130A or 134A or consent of instructor. Theory of sampling and analysis of data. Coefficient of variation, random, stratified, cluster and double sampling procedures. (Sp)

166L. Laboratory Course in Sampling Surveys. (1) Three 2-hour laboratory periods per week. May be taken only concurrently with course 166. Study of sampling mate-

181A. Bayesian Statistics. (4) Three hours of lecture per week. Prerequisite: one upper division course in statistics. Factorization of joint distributions. Conjugate prior distributions and their applications. DeMolvo-Laplace theorem. (F, W, Sp)

181B. Mathematical Bases of Probability Theory. (4-4) Three hours of lectures per week. Prerequisite: Mathematics 105 or consent of instructor. Probability space. Random variables. Types of convergence. Expectation. Conditional probability and conditional ex-
pectation. Daniel-Kolmogorov consistency theorem. Tulcea theorem. (F, W, Sp)

180A–200A–200B–200C. Probability and Statistics at an Advanced Level. (4–4–4–4) Three 1-hour lectures per week. Prerequisites: a year of upper division mathematics. Course covers material of two quarters 200A–200B in two quarters. May be taken only by students having completed a course in probability or statistics will receive only partial credit. (200A (W), 200B (W))

200. Laboratory Course in Probability. (1) Two 2-hour laboratory periods per week. Prerequisite: course 200A or equivalent. triangular, normal, stratified, and double sampling pro-

200L. Laboratory Course in Probability. (1) Two 2-hour laboratory periods per week. Prerequisite: course 200A or equivalent. Ideal for and open only to students in 200A. Applications of probability to "real" problems in various fields. (F, W)

200M–200N. Laboratory Course in Probability and Statistics. (1–1) Two 2-hour laboratory periods per week. Strongly recommended for and open only to students in 200A or 200B respectively. Any of 200A, 200B, 200C may be taken without the others. Applications of prob-

210A–210B–210C. Advanced Theory of Statistics. (4–4–4) Three 1-hour lectures per week. Prerequisite: a year of upper division probability and sta-

tistics. Mathematics 111 (or 130B). Course 200A or 200B is prerequisite to 210A. 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 normal theory, analysis of variance, multivariate analysis, non-


218. Directed Study for Undergraduates. (1–5) Prerequisite: consent of instructor. Special tutorial or seminar on selected topics. The Staff (F, W, Sp)

219. Specialized Independent Study and Research. (1–6) Enrolment is restricted to regular students listed on page 36. Must be taken on a pass/next basis. (F, W, Sp)

GRADUATE COURSES

Courses 201A–210B–210C consist of the bases of the graduate curriculum: all students whose primary interest is in mathematics statistics; course 201A–205B–205C, for those with primary interest in probability. Courses 203, 206, 240, and one of 232, 242 represent core course options. The Staff (W, Sp)

210A. Introduction to Probability and Statistics at an Advanced Level. (4) Three 1-hour lectures per week. Prerequisite: a year of upper division mathe-
matics. Sec. 1 has stronger emphasis on theory. In-

tended for students who have not taken probability. (W, Sp)

217A–217B–217C. Asymptotic Methods in Statis-
tics. (4) Three 1-hour lectures per week. Prerequisite: course 205A or consent of instructor. 217B, 217C, changes of variable, distribution functions, binomial, hyper-

218. Mathematically Based Probability Theory. (4) Three 1-hour lectures per week. Prerequisites: Mathematics 105 or consent of instructor. Probability space, random variables. Types of convergence. Expectation. Conditional probability and conditional ex-

219A. Bayesian Statistics. (4) Three hours of lecture per week. Prerequisite: one upper division course in statistics. Factorization of joint distributions. Conjugate families. Bayesian inference in binomial, Poisson, and normal models. Bayesian interpretation of the chi-

220A–220B–220C. Probability Theory. (4–4–4) Three 1-hour lectures per week. Prerequisites: Mathematics 200A may be corequisite) or consent of the instructor. Expectations, conditioning. Distributions and char-

230A–230B–230C. Advanced Theory of Statistics. (4–4–4) Three 1-hour lectures per week. Prerequisite: a year of upper division probability and sta-

tistics. Mathematics 111 (or 130B). Course 203A or 203B is prerequisite to 230A. 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 normal theory, analysis of variance, multivariate analysis, non-

240. Elements of Nonparametric Inference. (3) Three 1-hour lectures per week. Prerequisite: one upper division course in statistics. Nonparametric and robust methods for problems such as the one- and two-sample problems, the hypotheses of regression, and independence testing and estimation occurring in linear models. Asymptotic null distribu-

tions, power and efficiency. (216A: F, 216B: W, 216C: W)

241A–241B–241C. Asymptotic Methods in Statis-
tics. (4) Three 1-hour lectures per week. Prerequisite: course 205A or consent of instructor. 241B, 241C, convergence of probability measures. Large sample properties of maximum likelihood estimators, distribution theory, asymptotically normal families of probability measures. Asymptotic sufficiency, Von Mises differentiable sta-

tistics. Best asymptotically normal estimates and related tests including the $x^2$ test, likelihood ratio
tests and asymptotically similar tests. Sequence beginning (F). (F, W, Sp)


230A-230B. Analysis of Variance. (5-8) Three 1-hour lectures and one 2-hour laboratory per week. Pre-requisite: knowledge of analysis of situations, a year of calculus, two quarters of upper division or graduate probability and statistics. 230A, theory of least squares estimation, interval estimation, and tests under the general linear fixed-effects model. One-way layout. Two- and higher-way layouts. Multiple comparisons. 230B, incomplete block designs, variance components and mixed models. Effects of departures from underlying assumptions. Sequence beginning (F).

230A (F, 230B (W)

233. 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^k experiments. Surface exploration. (F)


238. Sequential Experimentation. (4) Two 1-hour lectures and one 2-hour laboratory per week. Prerequisite: one of course 100C, 130B, 132A, 232, 235, 255B. Sequential tests. Transient sequential tests. Sequential design. Industrial inspection. Sequential estimation. Two-stage procedures. (Sp)


242. Multivariate Analysis. (6) 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. Classification and discriminant analysis. Component and factor analysis. Canonical correlations. Stochastic difference equations. (W)


278A. Current Literature. (3) Special topics with informal lectures by research workers. (F, W, Sp)

Women's Studies

Group Major Office, Division of Special Programs, 301 Campbell Hall

Major Advisers: Gloria Bowles (Women's Studies), Carol Christ (English), Arlie R. Hochshchild (Sociology)

Group Major in Women's Studies

The group major in women's studies groups together courses from various departments to create an undergraduate interdisciplinary major. It is designed to allow students to examine in depth traditional and changing sex roles and gender relations, to study the role of women from the perspective of different disciplines, and to explore new alternatives for women and men in our society.

Major Program

I. One course from each of the following six groups:

Lower Division Literature. Comparative Literature 40A, 40B, 40C, 40D, Women and Literature (4-4-4-4); French 41, Women in French Literature (4) (in translation); German 40, Women in German Literature (4) (in translation); Women's Studies 10, Introduction to Women's Studies (5).

Upper Division Literature. Comparative Literature 165, Women's Perspective in Literature (4); English 171, Literature and Sexual Identity (5).

Ethnic Studies. Afro-American Studies 152H, Black Women Writers (5) (prerequisite: Afro-American Studies 3 and 150A, 150B or 150C); Asian American Studies 151, Asian Women (5); Chicano Studies 139, La Chican (6); Ethnic Studies 147, Third World Women (5); Native American Studies 159, Native American Women (5) (prerequisite: Native American Studies 50 or consent of instructor).

History 119, Society and the Sexes in Early Modern Europe (5).

Biology. Psychology 118, Human Sexuality (5) (prerequisite: Psychology 1); Physiology 10, The Biology of Men (4); Physiology 169, Biology of Human Reproduction (5) (prerequisite: Biology 14A or equivalent); Physiology 10, Anatomy of Reproduction (5). (Sp)

Sociology. Sociology 151, Sociology of Women (5) (prerequisite: lower division sociology course or instructor's consent).

II. Three additional courses in the humanities and one additional social science course, or three additional courses in the social sciences and one additional humanities course, selected from the following list.

NOTE: For key to symbols, see page 56.
Humanities Courses: Afro-American Studies 152H, Black Women Writers (5) (prerequisite: Afro-American Studies 3 and 150A, 150B or 150C); Afro-American Studies 154A, 154B, Women Writers (5); Afro-American Studies 156, Major Afro-American Authors (5) when a woman writer is being considered (prerequisite: Afro-American Studies 150A, 150B or 150C or one of the 152 series); Comparative Literature 40A, 40S, 40C, 40D, Women and Literature (4–4–4–4); Comparative Literature 165, Women's Perspectives Literature (4); English 151G, Major Authors (5) when a woman writer is being considered; English 171, Literature and Sexual Identity (5); English 175, Women Writers (3); French Women In Literature (4); French 150A, 150B, Women in French Literature (4) (prerequisite: two courses from 103, one of which must be 103D or 103E or the equivalent. Open to students who have received credit for French 41 with consent of instructor); German 40, Women in German Literature (4); Italian 128, Women in Italian Literature (4); Women's Studies 116, Directed Group Study (1–5)*; Women's Studies 119, Supervised Independent Study and Research (1–5)*.

Social Science Courses: Afro-American Studies 118A, Issues in Domination: Race and Sex (5); Afro-American Studies 118B, Issues in Domination: Selected Topics (5) when topic is judged appropriate by the adviser; Anthropology 110, Primate Social Behavior (5) (prerequisite: Anthropology 1 or equivalent); Anthropology 111, Problems in Primate Social Behavior (4) (prerequisite: Anthropology 1 or 110); Anthropology 142, Kinship and Social Structure (5) (prerequisite: Anthropology 1 or 110); Anthropology 141 and 3 or 140); Asian American Studies 105, Asian American Women (5); Ethnic Studies 147, Third World Women (5); Interdepartmental Studies 105, Women's Studies 195A-195B, Thesis (4-4); Women's Studies 198, Directed Group Study (1-5)*; Women's Studies 199, Supervised Independent Study and Research (1-5)*.

Women's Studies Majors with the consent of the Instructor. Restricted by regulations listed on page 36. Reading and conference with the instructor in a field that shall not coincide with that of any regular course and shall be specific enough to enable the student to write an essay based upon the student's study. Must be taken on a pass/no pass basis.

Zoology

Departmental Office, 4079 Life Science Building

Professors:
Max Allert, Ph.D. (Vice Chairman)
Peter A. Bell, Ph.D.
William Beman, Ph.D.
George W. Bower, Ph.D.
William E. Borg, Ph.D.
Howard A. Born, Ph.D.
Cedric R. Hend., Ph.D.
Morgan Harris, Ph.D.
Ned K. Johnson, Ph.D.
A. Starker Leopold, Ph.D.
Paul Licht, Ph.D. (Chairman)
William L. Ludden, Ph.D.
Daniel Maze, Ph.D.
Sebastiana Nandi, Ph.D.
Frank A. Piskla, Ph.D.

Assistant Professors:
David R. Bertlow, Ph.D. (Vice Chairman)
Roy L. Caldwell, Ph.D.
Robert R. Cole, Ph.D.
Michael T. Glesn, Ph.D.
James L. Patton, Ph.D.

Assisted Professors:
G. Steven Martin, Ph.D.

Professors:
Phyllis B. Blez, Ph.D. (Electrobiology)
Werner Loher, Ph.D. (Entomology)

Associate Professor:
George Oster, Ph.D. (Entomology)

Visiting Professor:
Herbert MacGregor, Ph.D.

Lecturers:
Lloyd F. Austin, B.A.
Joan Egrie, Ph.D.

The Department of Zoology presents a broad coverage of animal biology, ranging from cell and molecular biology to ecology and ethology, and including intensive offerings in vertebrate and invertebrate zoology. The zoology major may be entered after a basic year course in biology (see Biology), supported by courses in chemistry and physics. The "core" of the division major program consists of a selection of courses representing the areas of (1) genetics, (2) cell biology, (3) organismal form and function, (4) organismal diversity, (5) populations. These courses represent the common ground upon which more specialized senior programs and graduate study may be developed.

The Major

Life Division. Biology 1A, 1B; Chemistry 1A, 1B, 8A, 8B; Mathematics 15A or equivalent plus 18B; Physics 6A, 6B, 6C. Recommended: Zoology 1, German, French, additional mathematics, statistics, chemistry, biochemistry, and basic courses in other biological sciences.

Upper Division. Thirty-six units of upper division zoology courses.

a) Upon permission of the major adviser, up to 16 units may be substituted by courses in related areas.

b) The minimum course work indicated in the five categories below must be included.

c) One quarter with laboratory, one quarter with field work, and a third quarter with laboratory or field work must be included. Courses which may be counted toward the field requirement include Zoology 107A-B, 108, 142L, 143, 144, 157, Biology 130, Entomology 100, Forestry and Conservation 173.

d) Seniors with a B average or better in courses in the major are encouraged to seek faculty sponsorship for independent study and research under course 199, and to participate in the preseminar (Zoology 198).

Genetics (minimum of 5 units)

Genetics 100 (5) Genetics 150A-B (3–3)

Cell Biology (minimum of 4 units)

Zoology 104 (5) Zoology 113 (4)

Zoology 110A-B (3–3) Physiology 101 (5)

Organismal Diversity (minimum of 5 units)


Zoology 158 (10) Zoology 157 (10)

Zoology 155 (6) Entomology 100 (5)

Organismal Form and Function (minimum of 6 units)

Zoology 105 (6) Biology 131L (5)

Zoology 108 (4) Biology 132 (5)

Zoology 129L (3) Zoology 135 (4)

Zoology 120A (4) Zoology 133L (3)

Zoology 123B (4) Zoology 133 (3)

Zoology 124 (4) Physiology 123L (4)

Zoology 134 (4) Physiology 123L (4)

Population (minimum of 3 units)

Zoology 109 (4) Biology 151 (4)

Zoology 145 (3) Biology 157 (3)

Zoology 143 (10) Entomology 105 (10)

Biology 150 (4)

Note: Transfer students with 84 to 105 units must already have had general chemistry and general biology. Those with 106–120 units must have had, 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 195B) for admission to the honors program. Students accepted in the honors program will complete the preseminar (Zoology 198) and prepare a thesis (Zoology 198). 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 the equivalent of a major in zoology or biology. Foreign language requirement: five quarters or four semesters of college work with a grade of C or better, or competence at an equivalent level in one of the following: German, French, or Russian (other language may be acceptable if of scientific importance). Ordinarily this requirement will have been satisfied as a condition for admission to graduate study, but if not, the foreign language deficiency must be rectified by further course work while in graduate status.

Graduate Degrees in Zoology. The Department of Zoology offers the M.A. by either thesis or examination plan, details of which may be obtained from the departmental office. The Ph.D. program is the same in all respects, according to the background and interests of the individual student. 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.

Research Facilities

The Museum of Vertebrate Zoology is a research institute and repository for specimens and information relative to the higher vertebrate animals and has a large and growing collection of mammals, birds, rep-
tiles, and amphibians. Research activities center on problems in evolutionary biology, with emphasis on systematics, ecology, functional morphology, biogeography, and conservation. The Museum serves many educational functions and houses a number of graduate students. The Museum also operates the Frances Stites Hastings Natural History Reservation, in upper Carmel Valley. The flora and fauna of the 1700-acre tract are completely protected for study of ecologic relations in undisturbed communities. Qualified graduate students and guest workers may pursue advanced studies and use the facilities of the Museum and reservation under the sponsorship of a member of the Museum staff. Persons interested may address the Director of the Museum, 2563 Life Sciences Building; or Dr. John Davis, in charge of Hastings Reservation, Carmel Valley, California.

The Cancer Research Laboratory is an interdepartmental laboratory which carries on a research, teaching, and service program designed to foster faculty, predoctoral, and postdoctoral students' participation in cancer research. The central research program represents a multidisciplinary approach to an understanding of the neoplastic transformation and involves investigators in other parts of the University, as well as the Laboratory staff. Graduate student interdepartmental research programs are supported in various areas of tumor biology: cytology, endocrinology, immunology, tumor virology, genetics, histo-pathology and somatic genetics. The Laboratory also houses a major source of inbred mouse strains and the Secretariat of the University’s Cancer Research Coordinating Committee. Those interested in the Laboratory’s program may communicate with the Director, 230 Earl Warren Hall.

Letters and Science List: for regulations governing this list, see the Announcement of the College of Letters and Science.

LOWER DIVISION COURSES

Perspectives in the Life Sciences

The following courses are designed to provide some overlapping but different introductions to the life sciences. Most are offered primarily for the student not majoring in biological sciences but may be useful as well to lower division students who desire to explore areas of elementary biology before embarking on a major. Students should note carefully the credit restrictions indicated.

1. Animal Diversity. (4) Three hours of lecture and two hours of laboratory per week. A survey of animal diversity including marine and terrestrial vertebrate and invertebrate types with emphasis on phylogeny and ecology. Strongly recommended for Zoology majors. Mr. Rowell (Sp)

*10. Animal Biology. (4) Formerly 10A. Three hours of lecture per week and demonstrations to be arranged. Prerequisite: open without prerequisite to all students, but designed for those not specializing in Zoology. An outline of the main facts and principles of biology and an extended coverage of animal groups. Students may not receive credit for this course if they have previously taken Zoology 30, Biology 1A–1B, or 110A-110B. (W)

*11. Man in the Tropics. (4) Formerly 10B. Three hours of lecture per week and demonstrations to be arranged. Prerequisite: open without prerequisite to all students, but designed for those not specializing in Zoology. An outline of the main facts and principles of biology and an extended coverage of animal groups. Students may not receive credit for this course if they have previously taken Zoology 30, Biology 1A–1B, or 110A-110B. (W)

30. Introductory Human Biology. (4) Three hours of lecture and one hour of discussion per week. Open to all students but designed for those not majoring in Biology or Zoology. No credit given to students who have taken Zoology 10, Biology 1A–1B, or 110A-110B. Mr. Alfert (W)

31. Principles of Human Biology. (4) Three hours of lecture and one hour of discussion per week. Mr. Alfert (W)

103. Animal Behavior. (4) Three 1 1/2-hour lectures and six hours of laboratory per week. Prerequisites: Biology 1A–1B or equivalent; organic chemistry, general physics. Students without prerequisites may be admitted with consent of instructor. The living cell as an integrated molecular system; its structural organization, growth, reproduction, and work output; environmental tolerances and adaptations, intercellular communication, interactions of cells in populations. Mr. Smith (Sp)

104. Introduction to Physicochemical Biology. (5) Three 1 1/2-hour lectures and optional conferences/demonstrations per week. Prerequisite: Biology 1A–1B or equivalent; organic chemistry, general physics. Students without prerequisites may be admitted with consent of instructor. The living cell as an integrated molecular system; its structural organization, growth, reproduction, and work output; environmental tolerances and adaptations, intercellular communication, interactions of cells in populations. Mr. Smith (Sp)

105. Vertebrate Embryology. (6) Two 1 1/2-hour lectures, two 3-hour laboratories per week. Prerequisites: Biology 1A–1B or equivalent; organic chemistry, general physics. Students without prerequisites may be admitted with consent of instructor. The living cell as an integrated molecular system; its structural organization, growth, reproduction, and work output; environmental tolerances and adaptations, intercellular communication, interactions of cells in populations. Mr. Smith (Sp)

106. Evolutionary and Functional Vertebrate Anatomy. (5) Three 1-hour lectures and one 1 1/2-hour discussion section per week. Prerequisites: an introductory course in biological science; elementary math or Physics 6A. Functional and evolutionary significance of the structures of the vertebrate body. Mr. Rowell (Sp)

106L. Laboratory in Evolutionary and Functional Vertebrate Anatomy. (3) Two 3-hour laboratories per week. Prerequisite: course 106 or concurrent enrollment therein. Comparative study of the organismal, evolutionary and functional significances of organs and structures of vertebrates. Ms. T. Rowell (Sp)

107A–107B. Natural History of the Vertebrates. (6–8) Two 1-hour lectures, one 3-hour laboratory and one 4-hour field period per week. Prerequisite: Biology 1A–1B. Biology of the vertebrates exclusive of fish. Field work is emphasized. Sequence beginning (W). Credit and grade will be awarded upon completion of the sequence. Mr. Stebbins, Mr. Johnson, Mr. Linderer (W, Sp)

108A–108B. Invertebrate Zoology. (5–6) Formerly 108A. Two 1-hour lectures and two 3-hour laboratory periods per week, plus several Saturday field trips. Prerequisites: Biology 1A–1B. An introductory survey of the biology of invertebrates, stressing natural history, comparative anatomy, and evolution. Sequence beginning (W). Credit and grade awarded upon completion of sequence. Mr. Simmons, Mr. Smith (W); Mr. Smith (Sp)

109. Animal Evolution. (6) Three 1-hour lectures and four 1 1/2-hour discussion periods per week, plus written reports and special readings. Prerequisites: Biology 1, Genetics 100. Biology 150 or equivalent recommended. A course in evolutionary theory, with emphasis on basic processes, selection theory, adaptive responses, and patterns of speciation and phylogenetic diversity. Mr. Weibe (F)

110A–110B. Cytology. (3–4) Two 1-hour lectures per week. Prerequisite: Biology 1A–1B or equivalent. Sequence beginning (F). The structure and function of the cell and its organelles from an historical perspective; mitosis, meiosis, introduction to cytogenetics. Credit and grade will be awarded upon completion of the sequence. Mr. Alt (F, W)

110L. Cytology Laboratory. (3) Two 4-hour laboratory periods per week. Prerequisite: course 110A–110B or concurrent enrollment therein. Microscope study of cell organelles, mitosis and meiosis; selected staining procedures and preparatory methods. Mr. Alt (F, W)

111. Experimental Embryology. (4) Three 1-hour lectures per week. Prerequisite: course 105. A survey of experimental and biochemical studies of animal development and cell differentiation. Mr. Berg (W)

111L. Experimental Embryology Laboratory. (4) Two 4-hour laboratory periods per week. Prerequisite: course 105, recommended 111. Enrollment limited to ten students. Experimental embryology of sea urchin and amphibian embryos. Mr. Berg (W)

113. Normal and Abnormal Growth. (4) Two 1 1/2-hour lectures per week, plus written reports. Prerequisite: Biology 1. Biosynthesis at molecular, cellular, and organismal levels; regulatory aspects of growth seen in cell cultures and in the development of tumors. Mr. Harris (W)

114. Laboratory in Cell Biology. (3) One hour of lecture and six hours of laboratory per week. Prerequisite: course 104 or equivalent and permission of instructor. An advanced treatment of methods used in cell biology, including experiments on living cells and on isolation and characterization of organelles and their constituents. Mr. Harris (W)

120A. Biology of Chemical Mediation. (4) Formerly numbered 120. Two 1 1/2-hour lectures and one 1-hour discussion per week. Prerequisite: Biology 1. Recommended: organic chemistry, general and organic physiology with emphasis on general principles and comparative vertebrate endocrinology. Mr. Born (F)

*120B. Biology of Chemical Mediation. (4) Two 1 1/2-hour lectures and one 1-hour discussion per

NOTE: For key to symbols, see page 38.
week. Prerequisite: Biology 1. Recommended: 120A or equivalent or consent of instructor. Hormonal and parahormonal mechanisms with emphasis on neuroendocrine interrelationships. Hormonal control of behavior, learning, and teratology. May be repeated with the consent of the instructor. Mr. Paren (W)

124. Invertebrate Physiology. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: Biology 110 or equivalent. Comparative physiology of protozoa, nematodes, arthropods, mollusks, and echinoderms. Mr. Smith (W)

125. Vertebrate Reproductive Biology. (5) Three hours of lecture and five hours of laboratory per week. Prerequisite: Biology 110 or equivalent. Advanced study of the reproductive biology of vertebrates. Mr. Atkins (W)

130. Animal Behavior. (4) Three hours of lecture and two hours of discussion per week. Prerequisite: Zoology 1. Strongly recommended: Psychology 10A. The relationships of behavior and environment; evolutionary aspects of the reproductive behavior of vertebrates and invertebrates. Mr. Wake (SP)

131. Physiological Ecology. (4) Two 1 1/2-hour lectures per week. Prerequisite: Biology 110A or equivalent. Advanced study of the population biology of plants and animals. Mr. Jorgensen (SP)

132. Laboratory in Ecological Behavior. (3) Three hours of lecture and five hours of laboratory per week. Prerequisite: Biology 110A or equivalent. Advanced laboratory methods in ecological behavior. Mr. Wake (SP)

133. Animal Behavior. (4) Three hours of lecture and two hours of discussion per week. Prerequisite: Zoology 1. Strongly recommended: Psychology 10A. The relationships of behavior and environment; evolutionary aspects of the reproductive behavior of vertebrates and invertebrates. Mr. Wake (SP)

134. Neurobiology. (3) Three 1-hour lectures per week. Prerequisite: Biology 1 recommended. An introductory course designed to provide a general understanding of the nervous system and nervous control of behavior. Mr. Smith (SP)

135. Evolutionary Behavioral Ecology. (3) Two 1-hour laboratories per week. Prerequisite: Biology 110A-110B. Advanced laboratory methods in evolutionary behavioral ecology. Mr. Simmons (SP)

136. Behavioral Ecology. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: course 135 and 140, or equivalent and consent of instructor. The measurement, analysis, and interpretation of social behavior, covering such topics as development of social units, cooperation, and the ecological and evolutionary significance of group living. Mr. Piteika (W)

137. Ecological Aspects of Behavior. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 135 or equivalent. Description of behavioral and ecological interactions at the population and community levels, covering such topics as population dynamics, interaction, and adaptation. Mr. Smith (SP)

140. Animal Ecology. (3) Three hours of lecture and one hour of optional discussion section per week. Prerequisite: course 135 or equivalent. Development of behavioral and ecological interactions at the population and community levels, covering such topics as population dynamics, interaction, and adaptation. Mr. Smith (SP)

144. Ecology and Evolution of Biological Communities. (4) Two 1 1/2-hour lectures per week. Prerequisite: course 110A or equivalent and one of the following: elementary statistics and elementary predictions or numerical methods and elementary statistics. Lectures and discussions concerning the structure, development, and functional organization of natural and manipulated communities. Analytical methods and mathematical approaches. Mr. Cowles (W)

145. Marine Ecology. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: Biology 150. Population structure and organization of marine communities. The laboratory section will review nutrient cycles in the marine environment. Mr. Finley (W)

146. Lithology and Field Studies in Marine Ecology. (6) One field trip, one formal discussion section, five or more hours of laboratory per week. Prerequisite: course 142, proposed research outline, consent of instructor and University of California. Field study of marine habitats in northern California. Mr. Smith (W)

148. Marine Biology Laboratory. (3) Two 1-hour lectures per week. Prerequisite: course 135 or concurrent enrollment therein and consent of instructor. Laboratory study of the marine organisms in the ecology of a coastal marine area. Mr. Tidwell (SP)

149. Marine Biology Laboratory. (3) Two 1-hour lectures per week. Prerequisite: course 135 or concurrent enrollment therein and consent of instructor. Laboratory study of the marine organisms in the ecology of a coastal marine area. Mr. Tidwell (SP)

151. Advanced Vertebrate Reproduction. (5) Three hours of lecture and five hours of laboratory per week. Prerequisite: Biology 110A-110B. Advanced study of the reproductive biology of vertebrates. Mr. Simmons (SP)

152. Vertebrate Reproduction. (5) Three hours of lecture and five hours of laboratory per week. Prerequisite: Biology 110A-110B. Advanced study of the reproductive biology of vertebrates. Mr. Simmons (SP)

153. Developmental Biology. (3) See Biology 153. Mr. M. MacGregor (SP)

154. Ecological Aspects of Behavior. (3) Two 1-hour laboratories per week. Prerequisite: course 135 or equivalent. Theoretical and practical aspects of the experimental study of behavior and ecology. Mr. Wake (SP)

155. Theoretical and Practical Aspects of the Experimental Study of Behavior and Ecology. (3) Two 1-hour laboratories per week. Prerequisite: course 135 or equivalent. Theoretical and practical aspects of the experimental study of behavior and ecology. Mr. Wake (SP)

156. Laboratory in Animal Parasympathy. (3) Three 1-hour lectures per week, plus one hour of discussion per week. Prerequisite: Biology 1, or equivalent. General concepts and comparative aspects of parasitism. Emphasis upon properties common to diverse taxonomic groups of animal parasites. Mr. Simmons (W)

157. Biology of Marine Invertebrates. (10) Full-time study at Bodega Marine Laboratory during six weeks of summer. Prerequisite: Biology 1A-1B or 11A-11B or consent of instructor. Lectures, laboratory, field work, and individual study of marine invertebrates. Class limited to twenty-five students. Mr. Smith (SP)

158. Experimental Protozoology. (4) One hour of lecture and six hours of laboratory per week plus special problem. Prerequisite: Biology 1. Recommended: Biology 110A or equivalent. Developmental biology. Experimental analyses of genetic organization. Protozoa as cells and organisms; aspects of growth and nutrition, cyclic differentiation and regeneration, sexuality and genetics. Mr. Brown (W)

161. Evolutionary Cytogenetics of Vertebrates. (3) One 1-hour lecture and one 3-hour laboratory per week, to include student projects and reports. Prerequisite: Biology 1 recommended; and consent of instructor. The theoretical and practical applications of cytogenetics to vertebrate population structures, systematic relationships, and evolutionary biology. Mr. MacGregor (SP)

163. Mammalogy. (6) Two 1-hour lectures and two 3-hour laboratories per week, plus two weekend field trips. Prerequisite: course 107A or 107B. An advanced course in the biology of mammals. Mr. Patton (F)

164. Ornithology. (6) Two 1-hour lectures and one 4-hour laboratory or field trip per week, plus two-week end field trips. Prerequisite: course 107A. An advanced course in the biology of birds. Mr. Johnson (SP)

165. Herpetology. (6) Two 1-hour lectures and one 3-hour laboratory per week, plus two field trips. Prerequisite: course 107A-107B or equivalent. Advanced study of amphibians and reptiles. Mr. Patton (W)

166. Ichthyology. (6) Two 1-hour lectures and two 3-hour laboratories per week; some weekend field trips. Prerequisite: course 107A-107B or equivalent. An advanced course in the biology of fishes. Mr. Wake (SP)

170. American Game Birds and Mammals. (2) Formerly numbered IDS 170. One hour of lecture and three hours of laboratory per week. Prerequisite: Forestry 3 recommended; and consent of instructor. An introduction to the economically important birds and mammals including game species, predators, and fur bearers. Identification, natural history, and conservation. Mr. Leopold (F)

181. Tumor Biology. (4) Three hours of lecture per week, plus individual conferences. Prerequisite: open to senior and graduate students and by consent of instructor. Lectures, assigned reading, and individual reports on biological aspects of experimental cancer research. Mr. Mandi, Mr. Harris (F)

182. Special Topics in the Biology of Neoplasias. (2) One 2-hour meeting per week. Prerequisite: course 181 or equivalent, and consent of instructor. Lectures and discussions covering topics of current interest in the field of neoplasia with special emphasis on the biology of human neoplasma. Mr. Mandi (W)

199A. - 199B. Thesis Course. (3-3) Prerequisites: overall grade-point average of 3.00 and a grade-point average of 3.30 in the major. Individual study and research on a special problem to be chosen in consultation with a member of the staff; preparation of a thesis on broader aspects of this work. H199A may be taken alone, if both H199A and H199B are taken, grade is given on completion of both courses. (F,W,S)
202. Cell Biology Research Reviews. (1) One and one-half hours of lecture per week. Prerequisite: consent of instructor. Review of current research in modern aspects of cell and developmental biology with emphasis on the biochemical aspects of studies of morphology, cell membranes, cellular interactions during development, and relationships of RNA metabolism to differentiation and the regulation of cellular metabolism. \( MR. \) \( W \) \( \text{(Sp)} \)

210. Seminar In Cytology. (2) One 2-hour meeting per week. Prerequisite: course 110A-110B. Critical discussion of basic problems and recent literature in descriptive cytology and cytochemistry. \( MR. \) \( A \) \( \text{(Sp)} \)

215. Seminar In Physicochemical Biology. (2) One 2-hour meeting per week. Prerequisite: course 104 or consent of the instructor. Seminar discussion of recent literature. \( MR. \) \( S \) \( \text{(Sp)} \)

216. Botanic Cell Heredity. (2) One 2-hour meeting per week. Prerequisite: consent of the instructor. Developmental, genetic, and neoplastic changes in leaf, stem, and cell abnormalities. Mr. \( W \) \( \text{(Sp)} \)

216. Seminar In Developmental Biology. (2) One 2-hour meeting per week. Prerequisite: course 106 or equivalent. Mr. \( B \) \( \text{(Sp)} \)

220. Special Topics In Biology of Chemical Maturity. (2) One 2-hour meeting per week. Prerequisite: consent of instructor. Topics to vary from year to year. Mr. \( W \) \( \text{(Sp)} \)

221. Seminar In Comparative Endocrinology. (2) One 2-hour meeting per week. Prerequisite: course 120, or Physiology 141, or equivalent. Recommended: course 220. Mr. \( B \) \( \text{(Sp)} \)

223. Seminar In Marine Biology. (2) One organizational meeting (arranged) and one weekend meeting at Bodega Marine Laboratory. Prerequisite: consent of instructor. Topics to vary. May be repeated for credit. Mr. \( H \) \( \text{(W)} \)

231. Seminar In Physiological Ecology. (2) One 2-hour meeting per week. Prerequisite: consent of instructor. Mr. \( L \) \( \text{(W)} \)

236. Seminar In Comparative Neurophysiology. (2) One 2-hour meeting per week. Prerequisite: consent of instructor. Discussion of current problems. Mr. \( R \) \( \text{(W)} \), Mr. \( S \) \( \text{(Sp)} \), Mr. \( B \) \( \text{(W)} \)

237. Seminar on Speciation In Vertebrates. (2) One 1/2-hour meeting per week. Prerequisite: course 107A-107B. Review of problems of speciation and isolation mechanisms in vertebrates, with emphasis on current literature. Mr. \( J \) \( \text{(W)} \)

283. Tumor Biology Research Review. (1) Two 1-hour meetings per week. Prerequisite: course 156 or equivalent. General biology of a selected major group of invertebrates. May be repeated for credit. Mr. \( S \) \( \text{(Sp)} \)

284. Seminar on Biology of Neoplasia. (2) One 2-hour meeting per week. Prerequisite: course 181 and consent of instructor. Mr. \( L \) \( \text{(Sp)} \)

320. Molecular and Cellular Aspects of Development. (3) Two 1 1/2-hour lectures per week. Prerequisite: courses 104, 105, and 159 or equivalent. Advanced treatment of cellular and developmental biology. \( MR. \) \( W \) \( \text{(Sp)} \)

326. Seminar In Protozoology. (2) One 2-hour meeting per week, plus outside preparation of papers. Prerequisite: consent of instructor. Mr. \( B \) \( \text{(Sp)} \)

327. Advanced Biology of Marine Invertebrates. (5) Full-time study at Bodega Marine Laboratory during the first summer session. Lectures, seminar discussions, and individual study of selected problems. Class limited to six students. Prerequisite: 108 or 157 and consent of instructor. Mr. \( S \) \( \text{(Sp)} \)

328. Advanced Invertebrate Zoology. (3) Two hours of lecture per week, plus individual conferences. Mr. \( A \) \( \text{(W)} \)

348. Seminar In Reproductive Biology. (2) One 2-hour meeting per week. Prerequisite: consent of instructor. Presentation and discussion of current research and literature in reproductive biology. Mr. \( W \) \( \text{(W)} \)

356. Biology of Fishes. (2) One 2-hour seminar per week. Prerequisite: course 166 or consent of instructor. Topics to vary from year to year depending on the group but will be on functional aspects of fish biology, such as behavior, physiology, ecology, zoogeography, or systematic. Mr. \( J \) \( \text{(W)} \)

367. Seminar on Speciation In Vertebrates. (2) One 1 1/2-hour meeting per week. Prerequisite: course 107A-107B. Review of problems of speciation and isolation mechanisms in vertebrates, with emphasis on current literature. Mr. \( J \) \( \text{(W)} \)

370. Vertebrate Review. (2) One 1 1/2-hour meeting per week. Review of current literature on ecology and evolution of higher vertebrates. May be repeated for credit. Mr. \( L \) \( \text{(Sp)} \)

377. Seminar In Wildlife Ecology And Population Dynamics. (2) One 2-hour meeting per week. Prerequisite: course 170 or equivalent. Mr. \( L \) \( \text{(Sp)} \)

383. Tumor Biology Research Review. (1) Two hours of discussion per week. Prerequisite: graduate standing, basic courses in biology of neoplasia, and consent of instructor. Report and discussion of original research and defense of research proposals. Mr. \( N \) \( \text{(F)} \)

384. Seminar In Biology Of Neoplasia. (2) One 2-hour meeting per week. Prerequisite: course 181 and consent of instructor. Presentation and discussion of current research in biology of neoplasia. Mr. \( M \) \( \text{(Sp)} \), Mr. \( N \) \( \text{(F, W)} \), Mr. \( B \) \( \text{(Sp)} \)

388. Malignancy Transformation. (2) Two 1-hour lectures per week. Prerequisite: Course 181, or consent of instructor. Lectures and discussions concerning current research on gene expression and neoplastic transformation by viruses and other agents. Mr. \( M \) \( \text{(Sp)} \)

424. Principles And Concepts Of Modern Zoology. (4) One 2-hour lecture and discussion per week and recommended reading. Prerequisite: graduate standing and consent of instructor. Beginning graduate students are expected to attend. Must be taken on a satisfactory/unsatisfactory basis. Mr. \( M \) \( \text{(Sp)} \)

426. Research. (1-12) Credit awarded according to work planned and accomplished. Must be taken on a satisfactory/unsatisfactory basis. The Staff (Su, F, W, Sp)

429. Special Study For Graduate Students. (1-4) Reading or other advanced study by arrangement with the instructor. The Staff (Su, F, W, Sp)

401. General Biological Microtechniques. (3) Two hours of lecture and four hours of laboratory per week. Prerequisite: a course in general biology with laboratory laboratory preparation of vertebrates and invertebrates 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. \( A \) \( \text{(W)} \)

601. Individual Study For Master's Students. (1-6) Individual study for the comprehensive examinations or language requirements in consultation with the graduate staff. 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 Students. (1-6) Individual study in consultation with the graduate 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.

Zoology Seminar. (One credit) Meetings for the presentation of original work by the faculty, visiting lecturers, and graduate students. Attendance by all graduate students is recommended. Mr. \( C \) \( \text{(F)} \), Mr. \( M \) \( \text{(W)} \), Mr. \( S \) \( \text{(Sp)} \)

RELATED COURSES IN OTHER DEPARTMENTS

Biology 221. Comparative Physiology And Endocrinology Seminar. (1) Sea Biology for the complete description of this course.

Biology 250. Tropical Biology—An Ecological Approach. (12) See Biology for the complete description of this course.

Biology 251A—251B. Professional Preparation: [1] Biology for the complete description of this course.

IDS 200. Comparative Neurophysiology. (4) Formerly Zoology 226. See Interdepartmental Studies for the complete description of this course.

IDS 201. Laboratory Animal Mechanics Underlying Nervous Activity. (3) See Interdepartmental Studies for the complete description of this course.

IDS 204. Animal Behavior Research Reviews. (1) See Interdepartmental Studies for the complete description of this course.
Bibliography

1. Methods of Library Use. (3) Three hours of lecture per week. Survey of the techniques of accessing and retrieving the U.C. Library's resources in a systematic way to meet their needs, via lecture, section, problem sets, examinations, and a term paper. Specific topics and techniques will change as new techniques evolve. Mr. Wilson.

104. The Book as Artifact. (3) Three hours of lecture per week. A survey of the history of writing and the manuscript to the printed book, with emphasis on typography, typography, papermaking, printing processes, bookbinding and book design. Mrs. Shosid.

128. Survey of Children's Literature. (3) Three hours of lecture per week. An introduciton to the literature of childhood, with an emphasis on the lives of children. Historical perspective; milestones and the current scene in publication, including types of books read by children will be included. Not acceptable towards fulfillment of requirements for the M.L.S. degree. Mrs. Roger.

141. Information Access and Retrieval: Problems and Prospects. (3) Two hours of lecture per week. Prerequisite: consent of instructor. An examination and analysis of key problems of information access and retrieval systems, intended as an introduction for undergraduates to the philosophical, scientific and technical background which wish to acquaint themselves with the challenges and opportunities in this field. Topics to be covered will include: data retrieval vs. document retrieval. Mr. Maron.

199. Individual Study. (1-5) Enrollment is restricted to students who have completed a minimum of sixty hours of lower division work. Topics, hours, and credit vary from section to section and from year to year. May be repeated for credit, with change in content. Mr. Swank, Ms. Shosid.


202L. Typographical Laboratory. (1) One hour of laboratory per week. Prerequisite: course 202 or may be taken concurrently. Operational aspects of book construction, including typesetting, papermaking, hand printing, typesetting, papermaking, hand printing.

203A. Origins and Spread of Printing and Pub- lishing. (4) Three hours of lecture and two hours of laboratory per week. Mr. Swank.

203B. History of Printing and Publishing: 1550-1600. (4) Three hours of lecture and one hour of labora- tory per week. Prerequisite: course 202.

203C. History of Printing and Publishing: 1600-1850. (4) Three hours of lecture and one hour of labora- tory per week. Prerequisite: course 202.

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. Ms. Shosid.

209. Library In the Community. (3) Three hours of lecture per week, two hours per week by the community for the librarian. Relationships between library services and the community. Mr. Wilson.

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 library practices. Mr. Blake.

220. Reference and Bibliography. (4) Three hours of lecture per week. Reference and bibliographic service; general and special reference and bibliographical sources, including national and subject bibliographies. Mr. Wilson.

221. Special Topics in Reference and Biblio- graphy. (1-8) One to eight hours of lecture per week. Prerequisite: consent of instructor. Specific topics, hours, and credit vary from section to section and from year to year. May be repeated for credit, with change in content. Mr. Wilson.

222. Computer-Based Reference Services. (4) Four hours of lecture and one hour of laboratory per week. Application of computer techniques to library reference work. Examine computer data bases in machine-readable form, current awareness services, batch and on-line retrospective searching, query formulation and search strategy, management considerations. Student work and demonstration with real systems. Mr. Wilson.

225. Law Librarianship: Legal Research, Refer- ence, and Bibliography. (3) Three hours of lecture per week. Open to students in the School of Li- brarianship only. Specialized aspects of Law School. Introduction to legal bibliography; cases and re- ports, statutes, administrative regulations and de- claraions, legislation, and articles and digests. Legal periodicals and indexes, secondary materials, la- gal bibliography tools. Mr. Maron.

228A. Children's Literature. (4) Three hours of lecture per week. Historical background and der- opment; twentieth-century trends; criticism and evalu- ation; trends in use of illustration. Mrs. Roger.

228B. Library Work with Children and Young Adults. (3) Three hours of lecture per week. Prerequisite: course 228A. Reading interests; types of li- brary materials; levels of reading ability; book selection; library programs. Mrs. Roger.

228C. Children's Literature; Oral Interpretation. (3) One 2 1/2-hour lecture per week. Prerequisite: consent of instructor. Historical and critical analysis of folktales, legends, myths, and more imaginative literature: their role in the library program for children and young adults. Mrs. Roger.

224. Problems of Organization of Knowledge. (4) Three hours of lecture per week. An introduction to the conceptualization of knowledge, information, inter- pretation, meaning, and of related concepts, from the point of view of computer science. Problems of description and organization of recorded discourse. Mr. Wilson.

226. Library and Information Service Policy. (3-4) Two or three hours of class meetings per week. Prerequisite: consent of instructor. Problems in analysis and evaluation of alternative policies for provision of bibliographical, library, and information service. Topics vary from offering to offering. May be repeated for credit with change in content. Mr. Swank.

227. History of Libraries. (4) Three hours of lecture per week. The history of libraries from the viewpoint of the information sciences, including those techniques and machines that deal with information and information processing. Relevance of the conceptual and physical tools of the information sciences to information analysis, indexing, retrieval, and dissemination. Mr. Maron.

228. Principles of Information Retrieval: Formal Theoretical Approaches. (3) Three hours of lecture per week. Prerequisite: consent of instructor. Analysis of problems of information storage and retrieval. Stress on techniques of document and data retrieval that in principle can be programmed for a digital computer. Topics to be covered include: types of retrieval systems; au- tomatic indexing and classification; weighted indexes; associative searching. Mr. Cooper.

230. Automatic Data Retrieval and Question-An- swering. (3) Two hours of lecture per week. Pre- requisite: consent of instructor. A survey and analysis of current data retrieval and question-answering sys- tems. Examination of some of the major logical, linguistic, programming and file organization problems relating to automatic question-answering. Mr. Swank.

244. Principles of Information Retrieval: Founda- tional Concepts. (3) Two hours of lecture per week. Prerequisite: course 224 or consent of instructor. Analysis of fundamental concepts and problems of information retrieval including relevance, aboutness, topicality, utility, and concept association. Mr. Maron.

246. Evaluation of Information Systems and Serv- ices. (3) Three hours of lecture per week. The survey of principles and methodologies for evaluating libraries and other information systems. The meaning and methods of measuring, selecting, comparing and evaluating different measures. The concept of utility and techniques of cost-effectiveness analysis. Mr. Maron.

248. Design of Mechanized Information Retrieval Systems. (3) Three hours of lecture per week. Prerequisite: course 227 or equivalent, or consent of instructor. Survey of problems of development of mecha- nized information storage and retrieval systems. Topics include: query languages, telecommunications concepts, design of computer programs for in- formation retrieval, file organization, evaluation of sys- tems. Mr. Cooper.

250. Introduction to Bibliography. (3) Three hours of lecture and three hours of discussion per week. Stu- dents learn the role of bibliographic description, indexing and clas- sification, literature searches, computerized systems and on-line searching. Mr. Wilson, Mrs. Cooke.

251. Cataloging and Classification. (4) One hour of lecture and three hours of discussion per week. Stan- dards of bibliographic description, indexing and clas- sification, literature searches, computerized systems and on-line searching. Mr. Wilson.

252. Special Topics in Cataloging and Class-ification. (1-8) One to eight hours of lecture per week. Prerequisite: consent of instructor. Specific topics, hours, and credit vary from section to section and from year to year. May be repeated for credit, with change in content. Mr. Wilson, Mrs. Cooke.

255. Library Technical Services. (3) Three hours of lecture per week. Prerequisites: courses 254 and 256. Functions of development and problems, with emphasis on management aspects of acquisitions, cataloging, clas- sification, storage, and preservation of library ma- terials; personnel administration in technical services; applications of mechanized systems. Mr. Buckland.

256. 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 Bowers and Greg; literature of analytical bibli- ography. Mr. Swank.

260. Libraries and Information Agencies. (3) Three hours of lecture per week. The history, functions, and characteristics of libraries and information agencies; user requirements and socioeconomic factors influ- encing the design of such agencies; existing and pro- posed types of agencies; concepts of administration and systems analysis. Mr. Buckland.

262. 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. Mr. Swank.

265. Comparative and International Librarianship. (4) Three hours of lecture per week. Prerequisite: consent of instructor. A general introduction to comparative study in librarianship and to libraries in different societies and nations. Examination of the cultural, political, and economic factors influencing the design of all information systems. Mr. Swank (Sp).

267. Library Management. (4) Three hours of lecture per week. Basic management functions as they are encountered in a library setting; planning, administration, and staffing, and controlling. Readings, lectures, and small group analysis of case studies. Mr. Buckland, Mrs. Shosid.

271. Interlibrary Cooperation and Information Net- works. (3) Three hours of lecture per week. Need for, development, organization, and services of coop- erative information exchange systems. Potentials and problems of computer, tele- communications, and other technologies in network development. National network planning and operations, discussion, term projects. Mr. Swank.
273. 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. [M. Cooper]

275A. Data Processing for Librarians. (4) Three hours of lecture and two hours of laboratory per week. An introduction to the nature and capabilities of computer systems and their application to the library process. [M. Cooper]

275B. Computer Manipulation of Bibliographic Data. (4) Three hours of lecture per week. Prerequisite: Librarianship 275A or equivalent and consent of instructor. Librarianship 222, 248, 273, 277 recommended, but not required. Development of computer programs for manipulation of bibliographic records in accordance with the International Bibliographic Code and cataloging formats. Design and implementation of computer programs for selection, acquisition, cataloging, and serials processing subsystems. [M. Cooper]

276. 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. [M. Cooper (W)]

277. Models of Library Systems. (3) Formerly 274. Three hours of lecture per week. Prerequisite: consent of instructor. Analysis and evaluation of mathematical models of library functions (circulation, selection, acquisition, budget, etc.). [M. Cooper]

282A. Urban Public Libraries. (3) Three hours of lecture per week. Government, objectives, organization, and administration of municipal, county, and regional public libraries. Library service programs in relation to varying community patterns. Lectures, readings, reports, field trips. [Mrs. Blake]

282B. Public Library Collections and Services. (3) Three hours of lecture per week. Problems relating to the selection, acquisition, and maintenance of library collections and in the library's program of service. [M. Cooper]

283. Non-Print Media In Libraries. (4) Three hours of lecture per week. Problems relating to the handling and use of non-print media. The role of the librarian in a modern media center, evaluation of materials, the use of media in education, design of media centers, and some aspects of media technology. [Mrs. Blake]

284. School Libraries. (3) Three hours of lecture per week. Prerequisite: consent of instructor. A general survey of elementary and secondary school libraries. Emphasis on the function, administration, organization, services provided, and the planning and equipment of school libraries in relation to the modern school. Lectures, committee and individual reports, reading, class discussions, and a filmstrip. [M. Cooper]

286A. College and University Libraries. (3) Three hours of lecture per week. Prerequisite: course 270 or consent of instructor. A general introduction to the organization, administration of college and university libraries and the place in the institution of which they are a part. Problems and practices with respect to the library, its function, goals, organization, services, finances, and building are considered by means of written assignments, readings, and class discussion. [M. Cooper]

288B. Resource Development for College and Research Libraries. (4) Four hours of lecture, section, and seminar. The planning and administration of programs for developing library resources in a local, regional, and national context. Topics include: a) identification; b) analysis; c) opportunities; d) development; e) budget preparation; f) organization of selection responsibilities; g) acquisition methods; h) collection maintenance. [M. Cooper]

290. The Librarian and the Society. (4) Three hours of lecture per week. Professions and professional responsibilities: technical competence and professional judgment in information, documentation, and reference; social and human responsibility; library as a social and economic institution; library as a community service provider; libraries in society; the community service role of the librarian; the role of libraries, librarians, and public affairs in society. [M. Cooper]

296A-296B-296C. Seminar. (3-4-3; 4-3-4) To three hours of lecture per week. Topics in bibliographic, library, documentation, and information science, administration and management of libraries and information systems, history of printing and libraries, comparative librarianship, library education, and information processing. Specific topics vary from year to year. May be repeated for credit, with change of content. Some offerings may consist of one quarter (296A); others may consist of two or three quarters (296A-296B or 296A-296B-296C) in which case "in progress" grades may be assigned for the first (or first and second) quarter. [The Staff]

297. Field Study In Librarianship. (1-5) Individual or group project of study in problems in library and information service in the field. Individual and group meetings with faculty sponsor and reports required. [The Staff]

298. Directed Group Study. (1-4) The Staff

299. Individual Study. (1-8) The Staff

300. Practicum In Libraries or Information Centers. (1-8) Prerequisite: consent of instructor and agency supervisor required. Supervised participation in the operations of a campus or off-campus library or information center, in tasks at or near the beginning professional level. On-the-job activities, conferences, with agency supervisor and course instructor. Supplementary readings may be required. [Staff (F, W, Sp)]

384. Special Practicum In School Libraries. (3) Nine hours of practicum per week. Prerequisite: Librarianship 220, 228A, 250, 251, 284, of which 284 may be taken concurrently. Supervised participation in school libraries, elementary through secondary. Open to those who hold a standard teaching credential. Required for the School Library Services credential. [The Staff]

College of Natural Resources

Office of the Dean, 101 Giannini Hall
Dean: to be announced

Associate Deans: Academic Affairs — George M. Briggs, Ph.D.; Research — David E. Schlegel, Ph.D.; Student Affairs — to be announced.

The College of Natural Resources, formed on July 1, 1974, brings together in a single academic and professional College strongly complementary programs of teaching and research formerly offered at Berkeley in the College of Agricultural Sciences and the School of Forestry and Conservation. In its philosophical direction, the new College responds to many concerns among students and faculty in the society generally: Present among these concerns is the belief that, in meeting the accelerating rise in demand for food, fiber, timber, and wood products and for recreational use of open space, our renewable natural resources must be used in ways that are at once productive, conservative of those resources, and protective of environmental quality.

The College of Natural Resources offers a variety of academic programs which focus on renewable natural resources. These embrace most of the physical, biological, technical, and social processes that people use to produce and utilize the food, fiber, and other materials that they require. The undergraduate program provides students with particular emphasis on two aspects of natural resources: they seek out and develop understanding of the complex interactions involved in resource systems that have major environmental, economic, and social implications. They also examine the relationships between the natural environment and people, whether through their needs, desires, or their actions.

The College offers undergraduate programs which provide different approaches to the study of natural resources. Some of these programs serve the needs of students interested in the biological sciences and students in the premedical and other health-oriented fields. Majors in (1) the Biology of Natural Resources and (2) Food, Nutrition, and Dietetics stress those biological sciences and related disciplines that are basic to the formation, utilization, nutritional values, and conservation of renewable natural resources. Some of these majors may emphasize Biog enerics, Bioresources Sciences, Entomology, Genetics, Plant Pathology, Soil and Plant Resources, Food, Nutrition, and Dietetics.

Other majors, (3) Conservation of Natural Resources, and (4) Political Economy of Natural Resources, offer broadly based and flexible programs for students who are motivated and concerned by public issues in the fields of population, renewable natural resources, resource economics, and environment and who prefer an approach less specialized than the specific majors listed above.

Still other majors offer undergraduate preparation for professional careers that require extensive and specific academic qualifications as conditions for entry into the professional practice of renewable natural resource management. They include (5) Forestry, (6) Pest Management, (7) Soil Resource Management, (8) Wood Science and Technology, and (9) a professional program in Dietetics. A Pre- and undergraduate program offers basic training in preparation for subsequent work in a School of Veterinary Medicine.

Graduate programs with academic or professional emphasis are available in agricultural chemistry, agricultural and resource economics, biophysics, comparative biochemistry, entomology, food science, forestry, genetics, nutrition, parasitology, plant pathology, plant physiology, range management, soil science, wildlife resource science, and wood science and technology. In addition, an ad hoc interdisciplinary doctoral program is offered.

For further information concerning course requirements and areas of specialization, consult the Announcement of the College of Natural Resources, available free of charge from the Dean's Office, Student Affairs, 101 Giannini Hall.

Undergraduate Departments

Conservation and Resource Studies

Department Office, 112 Giannini Hall
Chairman: Paul L. Gersper


Associate Professors: Sisson, A. Sommers, Ph.D.; Ferry, W. Cobl, Jr., Ph.D.; Alain Chopin de Jammy, Ph.D.

Lecturers: Robert G. Mullen, Ph.D.

NOTE: For key to symbols, see page 15.
Plant Pathology
Department Office, 147 Hilgard Hall

Professors:
Bovisie E. Gey, Ph.D.
A. Herbert Gold, Ph.D.
Joseph G. Hancock, Jr., Ph.D.
John R. Parmenter, Jr., Ph.D.
Robert D. Kolesnik, Ph.D.
David E. Schlegel, Ph.D.
Milan H. Schouten, Ph.D.
Albert R. Weinhold, Ph.D.

Associate Professors:
Fields W. Cobb, Jr., Ph.D.
Monts Schneider, Ph.D.
T. Jack Morris, Ph.D.
Raymond W. Schneider, Ph.D.

Professor:
James B. Kendrick, Jr., Ph.D.

Lecturers:
Lee J. Ashworth, Jr., Ph.D.
Robert V. Bega, Ph.D.
James W. Boler, Ph.D.
James E. Duffy, Ph.D.
Donald C. Kiehlebrand, Ph.D.

Plant Physiology
Administered by an Interdepartmental Group Office, 108 Hilgard Hall

Professors:
Daniel I. Amom, Ph.D.
Kenttith L. Babcock, Ph.D.
Bob B. Buchanan, Ph.D.
Robert R. Collwell, Ph.D.
A. Herbert Gold, Ph.D.

Associate Professors:
Michael Freeling, Ph.D.
Oemes C. Hulseman, Ph.D.
Raymond W. Schneider, Ph.D.
John G. McColl, Ph.D.
T. Jack Morris, Ph.D.

Lecturer:
D. Emeron Willemsa, Ph.D.

Range Management
Administered by an Interdepartmental Group Office, 145 Mulford Hall

Professors:
Rudolf F. Graf, Ph.D.
Harold F. Head, Ph.D.
Louis Jacobson, Ph.D.

Associate Professor:
Joe R. McBride, Ph.D.

Assistant Professors:
Robert G. Lee, Ph.D.
John R. Mc يريد, Ph.D.

Lecturer:
Natalro W. Willen, Ph.D.

Soils and Plant Nutrition
Department Office, 108 Hilgard Hall

Professors:
Kenneth L. Babcock, Ph.D.
Paul R. Dav, Ph.D.
Louis Jacobson, Ph.D.
Geoffrey B. Bodman, Ph.D.
Theodore C. Broyer, B.S.

Associate Professors:
Douglas McLaren, Ph.D.
Rolf E. Storle, B.S. (Emeritus)

Lecturers:
Howard J. Stoddard, B.S. (Emeritus)

Wood Science and Technology
Administered by an Interdepartmental Group Office, 478 Richmond Field Station

Professors:
Edward C. Stone, Ph.D.
A. Herbert Gold, Ph.D.
Raymond W. Schneider, Ph.D.

Associate Professor:
John G. Collin, Ph.D.

Lecturers:
James Vlamis, Ph.D.
D. Emeron Williams, Ph.D.

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 to the Announcements of the College of Natural Resources, obtainable from the Office of the Dean, 101 Gillum Hall, University of California, Berkeley, CA 94720.

Undergraduate advisors 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 advisor will be prepared to discuss details of the requirements, planning of a program best suited to a student's individual needs and interests, and the careers available after graduation. The advisor should also be consulted concerning any special academic problems that may arise.

In addition, the Office of the Dean may be consulted on any such difficulties or on questions relating to records and regulations. It is open year-round, 8:15 am to 4:45 pm, weekdays, except during the noon hour and administrative holidays.

To expedite program planning, the adviser's approval is required prior to the Dean's final endorsement of the student's study list. Any changes in the program must be similarly approved.

Biology of Natural Resources

This major provides rigorous training in the broad, scientific aspects of the biology of natural resources. Study of basic sciences is emphasized in the first two years; in the junior and senior years, you will take a variety of science courses of both basic and applied nature with the opportunity to specialize. You may select a specialized field of emphasis, or you may pursue a general program including the broad and interdisciplinary aspects of the biology of renewable natural resources. In the latter case you would select the field of bioresource sciences. Specialized fields include animal resource sciences, bioenergetics, entomology, genetic resources, plant pathology, and soil...
and plant resources. You should consult your faculty adviser for information about the required courses in each of these fields.

With completion of this major, you will have obtained a broad education in science and humanities as well as a grasp of the interdisciplinary approach to the natural resources, their nature, utilization, and conservation. You will also have familiarity with the relationships between renewable natural resources and their environment and the impact of man's utilization of such resources on environmental quality. The major constitutes excellent preparation for graduate study in many fields of employment in private and public agencies. With proper selection of electives within the major, you will have a strong preparation for medical or veterinary school and related health fields. The major will also provide continuing opportunity for you to pursue the subject matter preparation provided by the previous major in agricultural sciences, though with additional flexibility.

The major requires: 30 units of humanities and social sciences (including English 1A-1B and more than 10 units of a foreign language); Chemistry 1A-1B, 8A-8B; Physics 6A-6B-6C; Mathematics 16A-16B; Computer Science and Statistics and Biology 1A-1B. In addition, 75 units relevant to Biological and Natural Resource Sciences are specified requirements in each field of emphasis, and 34 units of electives.

Conservation of Natural Resources

This major is an interdisciplinary program designed for students interested in environmental issues and areas of interaction among natural resources, population, technology, societal institutions, and cultural values. The major's orientation is toward flexibility and an individualized educational approach to understanding the structure and function of natural and artificial environmental systems within our society and biosphere.

The program encourages students to use the course offerings of the entire Berkeley campus and appropriate community resources in the development of individual programs of study. A growing number of courses and continuous innovation within the major provide the necessary flexibility to attempt to understand and resolve basic environmental issues. The major facilitates and encourages interaction among students, faculty, and community.

Breadth requirements include three quarter courses in each of four of the following five areas: physical sciences, biological sciences, social sciences, humanities, and mathematics and/or statistics. Three additional additional quarter courses are required in one of the four areas chosen, as well as two quarter courses in reading and composition. Other requirements include Interdepartmental Studies 10A-10B-10C, Conservation of Natural Resources 49 and 149, and a 10-course program in the area of interest that is selected by the student.

Food, Nutrition, and Dietetics

The Food, Nutrition, and Dietetics major gives students an excellent foundation in the biological and chemical sciences. In the professional 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 programs, or continuing 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; additional units in physical sciences and social sciences, 15 units; Mathematics (12 units) including calculus (4), statistics (4), and computer science or additional calculus or statistics (4); Physics, 8 units; psychology, 5 units; and 50 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) which may be selected from bacteriology, biology, botany, genetics, plant nutrition, physiology-anatomy, soil science, or zoology; additional units in physical sciences and mathematics (24 units); and follow the requirements (13 units) include: introduction to natural sciences laboratory, 3 units; food service organization and management, 3 units; nutrition laboratory, 3 units; and therapeutic nutrition, 7 units.

For admission with junior standing see the announcement of the College.

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 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 men and women to manage forests and relate wildlands to yield to their full capacity of wood, water, forage, wildlife habitat, recreational opportunities, and other environmental benefits desired by mankind.

More than one-fourth of the upper division program may be taken as free electives. This enables the student to acquire either a highly specialized or a broad spectrum of the basic skills needed of the field. In addition, 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 or specialized fields not offered by the College, or to broaden understanding of human affairs. Advanced undergraduate students may also wish to consider certain of the graduate courses in forestry offered by the Department of Resource Conservation and Conservation.

Licensing. Completion of the Bachelor of Science degree with a major in forestry provides four years of academic credit toward and 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 undergraduate range science courses (minimum of 18 quarter units), qualifies the graduate 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; plane surveying, 3 units; English, 8 units; geology, 3 units; calculus, 6 units; physics, 8 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 course 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 50 quarter units of work, consisting of a core of 41 units of courses required of all students in the major, a group of restricted electives totaling 20 to 25 units, and 24 to 29 units of free electives.

Each student in the major must select an option (Forest Management, Wildlife Management, Range Management) in the first quarter of their senior year following the Summer Field Program and satisfy the Restricted Electives Requirements established for that option.

Pest Management

The primary objective of the major is to provide the interdisciplinary training and knowledge necessary for 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 agents 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 artificial control methods. Plant disease, weed, and nematode situations and many other factors must be considered before the pest management specialist can make the important action decisions required. Properly trained pest management specialists shall be in short supply today, and the outstanding graduates will find opportunities in both private and public agencies.

Curriculum requirements in the first two years include: economics, 5 units; English, 6 units; other humanities and social sciences, 17 units; Chemistry 1A-1B, 8A-8B, biochemistry, 4 units; calculus, 4 units; and physics, 4 units. Additionally, 66 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 social institutions which affect and are affected by the management of natural resources and the environment. The framework of study combines the perspectives of economics, 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 human issues associated with resource-based social needs. The major requirements are structured to provide opportunity 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 schools, disciplinary 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 social 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.

Prevetinary

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 preveterinary 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. Preveterinary 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 and career opportunities 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 preveterinary 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, School 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; Chemistry 1A–1B; work in surveying, geology, and statistics; Mathematics 16A–16B; Biology 1A–1B; ecology, and political economy. Major work in the upper division stipulates 61 units in the fields of soil science and soil resource management.

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 inter- actions with 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.

Graduate Programs

Academic and professional graduate degree programs are available in agricultural chemistry, agricultural economics, agricultural education, animal biology, plant biology, entomology, food science, forestry, genetics, nutrition, parasitology, plant pathology, plant physiology, resource management, soil science, wildlife resource 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 resource and agricultural problems. For entry into the program, students should have completed 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. For entry into the program, students should have completed the equivalent of the bachelor's degree in chemistry from the University of California.

Biophysics

This program is administered by a campus-wide interdepartmental group which was organized to permit students interested in biophysics to obtain graduate training leading to an M.A. or a Ph.D. degree. Students interested in study and research in biophysics may work under the supervision of any faculty member belonging to the group without having to pursue other graduate programs offered by the department with which the faculty member is affiliated. In this College, members of the group in biophysics include individual faculty members of the departments of Cell Physiology, Entomological Sciences, Genetics, Nutritional Sciences, and Soils and Plant Nutrition.

Undergraduate students interested in pursuing graduate work in biophysics should acquire training in the basic physical and biological sciences, but individual deficiencies may be removed during the early stages of graduate study.

Comparative Biochemistry

This program is administered by an interdepartmental group which was organized to permit students interested in a biochemical approach to biological problems 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, Genetics, 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 this 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 NOTE: For key to symbols, see page 10.
general biology, including zoology and botany as well as cellular and organismal biology. Courses in genetics, physiology and invertebrate zoology, and statistics 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 ecologv, agricultural en- tomy, biological control, forest entomology, path managemenl, insect behavior, insect ecology, toxicol- ogy, insect morphology, insect namealogy, insect pathology, insect vectors, medical entomology, para viology, and insect physiology and biochemistry. Excellent available research facilities include an outstand- ing entomological museum, specialized laborato- ries, and an extensive library. Students also use in- dustrial buildings, growth chambers, and greenhouses at the Oxord Tract and growth chambers, bioclimatic chambers, and greenhouses at the Gill Tract.

**Food Science**

This program, leading to the M.S. degree, is adminis- tered by an interdepartmental group composed of repre- sentatives from the departments of Plant Nutrition and Soil Science, Chemical Engineering, and Public Health. A student may do research under the direction of a faculty member in any department represented in the graduate program. Facilities are available to include selected personnel from the Western Regional Research Labora- tory 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 preferably also physical chemistry; physics with labo- ratory; bacteriology with laboratory; and courses in nutrition and/or food science or technology. Ideally the undergraduate should have a comparable background in food, nutrition, and dietetics as offered on this campus.

Programs are designed to prepare students for indus- trial or teaching application of their education in such areas of emphasis as food chemistry, food production, food processing, and food technology. 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 profes- sional degree, granted through the Department of For- estry and Conservation, and represents completion of academic preparation for a professional career in for- estry. The M.F. is the only master's degree counting as a professional forester in the state of California. The program is designed to enable students, who have a B.S. degree in forestry or other appropriate undergraduate education, to develop further their grasp of the princi- ples of forestry and to relate these principles to specific professional problems.

The program includes the analysis and evaluation of a number of cases drawn from professional practice. This requires a combination of courses designed to strengthen the student's capacity for biological, quan- titative, and managerial analysis. In addition, the student is expected to organize an academic program so as to achieve technical specialization at an ad- vanced 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 are encouraged to work closely with professional forestland managers in public and private agencies and to become involved in analyzing land management problems currently faced by these agencies.

**Genetics**

Administered by an interdepartmental group, this pro- gram offers graduate studies at both the M.S. and Ph.D. levels. Genetics cuts across the conventional sub- divisions of the biological sciences, requiring some fa- miliarity with biochemistry, microbiology, biochem- istry, and physiology. In addition, genetics has im- portant applications in such diverse disciplines as an- thropology, medicine, forestry, nutrition, and molecular biology. In addition, the degree program leading to the Ph.D. degree may be supervised by faculty members from the various departments where work related to ge- netics is being done.

The interdepartmental group arrangement allows students of genetics to approach their field from sever- al points of view: some may study the more purely theoretical aspects of the subject; others may focus on its application in particular disciplines (in forestry or physiology, for example). Genetics is also viewed as a 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 re- search, many field stations of the University are avail- able for students interested in natural populations; and working relationships have been established with the San Francisco Medical Center, the U.C. Davis Genetics group, the Institute of Forest Genetics at Placerville, the State School of Public Health laboratories, the Bio- logical group at San Diego State College, and the Orga- nization for Tropical Studies in Costa Rica.

**Nutrition**

Graduate study is supervised by an interdepartmental group representing the various departments at Berke- ley interested in nutrition: Nutritional Sciences, Bio- chemistry, 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 the nutritional sciences cur- ricula or related fields, such as biochemistry, chem- istry, 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 nutri- tion. Fields of emphasis include biochemical, bio- physical, and genetic aspects of nutrition; experi- mental nutrition; human nutrition; international nutri- tion; physiological phenomena; and therapeutic nutri- tion.

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, including Botany, Cell Physiology, For- estry 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 develop- ment, hereditary potentialities, effects of envi- ronmental conditions, and other aspects of plant physiol- ogy. The program emphasizes fundamental training. Appli- cants should have prior preparation in the basic phys- ical and biological sciences, although deficiencies can be removed during the early stages of graduate study.

General subject requirements for admission to the M.S. or Ph.D. degree programs are similar.

In addition to conventional chemical laboratories, spe- cialized equipment and facilities include controlled en- vironmental growth chambers and glasshouse space as well as field, forest, and laboratory culture areas. Equipment for the analysis of mineral and physi- ological processes and their biochemical or bio- optical aspects includes computers, electron micro- scopes, 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 De-partment of Forestry and Conservation and related de- partments 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 students with advanced professional interests as well as those wishing to specialize in a basic aspect of range management, such as grass or brushland ecology, forage in relation to livestock or wildlife management, or range 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.

**Soil Science**

Graduate study in soil science is supervised by the Department of Soils and Plant Nutrition and other departments in the University who have special qualifications and interest supervising research in soil science. Both M.S. and Ph.D. programs are available. For admission the student must have a bachelor's degree in soil science or its equivalent in the biological and physical sciences. Previous completion of courses in mathematics, statistics, physics, chemistry, biochemistry, and several fields of biology will enhance admission opportunities and reduce the time required to complete graduate programs in this field.

Graduate study in soil science offers opportunities to study problems of increasing food and fiber production and maintaining these at high levels without adverse effects on the soil and plant ecosystem. The principal lines of study are soil chemistry, soil microbiology and biochemistry, soil morphology, soil physics, and soil-plant relationships.

Research facilities include greenhouses with filtered air, pot culture areas, environmental growth chambers, and modern laboratories for diversified plant and soil studies. In addition to general laboratory equipment, there are instruments for x-ray diffraction, atomic absorption spectroscopy, a beta spectrometer, and other spectroscopy, and gas chromatography, radiochemistry, electron microscopy, and soil rheology studies.

**Wildland Resource Science**

This program is administered by the Department of Forestry and Natural Resources, 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 wildland areas, 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 biogeography, 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 wildland properties where students may center 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 directed 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 utilization of wood for man's benefit. Specialization through additional study and thesis research is possible under the program in such areas as wood structure; wood physics, including wood moisture and wood heat relations; timber mechanics 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 treatment; and product pathology.

The facilities of the Forest Products Laboratory are available for both thesis and special research projects.

**Graduate Advisers**

At the request of the Dean of the Graduate Division, every department or group nominates a graduate adviser 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 adviser in the chosen field. Names of advisers for the various graduate departments in the College are given in the graduate course section of this catalog.

**Ad Hoc Interdisciplinary Doctoral Program**

This program is administered directly by the Dean of the Graduate Division. There is no parallel master's program. New applicants for admission to the Doctoral program are restricted to students who have completed one year of graduate study in fields related to the topics of specialization through additional study and thesis research. To be considered for admission, the student must have completed one year of graduate study in a field related to the topics of specialization.

Before applying for admission to this program, the student arranges with three professors to constitute the sponsoring committee. After the student is accepted, this committee acts as the "department" up to final completion 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.

**Undergraduate Courses**

**Bioenergetics (Bioe.)**

Department Office (Cell Physiology), 251 Hilgard Hall

Undergraduate Adviser: Bob Buchanan.

**UPPER DIVISION COURSES**

**Bioe. 101. Flow of Energy and Matter in the Living World.** (3) Three 1-hour lectures per week. Prerequisites: Chemistry 1A, 1B, 1C or 8A; Biology 1A or 1B. Nature and types of energy; energy conversion through photosynthesis, fermentation, and respiration; energy utilization in biological work at the molecular, cellular, and organismal levels; evolutionary development of biological energy production. Mr. Melkin (W)

**Bioe. 107. Light and the Biosphere.** (3) Three 1-hour lectures per week. Prerequisites: Chemistry 1A, 1B, 1C or 8A; Biology 1B. The interaction of light and living systems.

NOTE: For key to symbols, see page 15.
systems; the physical nature of electromagnetic radia-
tion; mechanisms of light generation and detection; 
light energy and its utilization of light energy to drive biological processes.

Mr. Etchanin (Sp)

**Bloe. 128. Laboratory in Bioenergetics. (3) One 
hour of lecture and 6 hours of laboratory per week.
Prerequisites: Chemistry 5; Chemistry 5B; Bio-
energetics 101 or a course in biochemistry; and con-
sent of instructor. The laboratory provides the student with 
practical experience in bioenergetics, including fermention, respiration, photo-
synthesis, and certain aspects of photobiology.

Mr. Buchanan (W)

Bloe. 196. Directed Group Study or Investigation.
(1-5) Prerequisite: consent of the instructor.

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

Bloe. 199. Supervised Independent Study and Re-
search. (1-5) Prerequisite: Enrollment is restricted by 
regulations listed on page 36. Must be taken on a Passed/Not Passed basis.

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

(For graduate courses in Bioenergetics see Cell Physi-
ology.)

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**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 1-hour weekend trips. Lecture and dis-

cussion 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, aca-
demic objectives and plan will be required. To be taken 
P/NP. Intended primarily for lower division students in 
the CNR major.

A. S. Miller (F, Sp)

CNR 99. Supervised Independent Study and Re-
search. (1-5) Prerequisite: lower division standing, 
consent of instructor. Supervised independent study or
research on topics relevant to Conservation of Natural 
Resources that are not covered in depth by other courses.
Must be taken on a passed/not passed basis.

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

UPPER DIVISION COURSES

CNR 109. Junior Seminar in Conservation of Natu-
ral Resources. (3) Three hours of discussion per 
week. Prerequisites: Junior standing or consent of 
Instructor. A group project, seminar and discussion will 
provide students with experience group process in en-
vironmental problem solving and assist in crystallizing 
the students’ interests and educational goals. An oral 
presentation, a written academic plan and written con-
tributions 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 Thesis in Conservation of Natu-
ral Resources. (4) Two 2-hour discussion groups per 
week. Prerequisite: senior standing and consent of in-
structor. The informal seminar will provide an oppor-
tunity for the students to synthesize their knowledge, 
skills and interests into a holistic perspective. Students 
will be encouraged to approach environmental issues in an interdisciplinary manner. A 1-hour oral presenta-
tion and a major written thesis are required. To be taken 
P/NP. Intended primarily for graduating sen-
iors in the CNR major.

The Staff (F, W, Sp)

CNR 187. Field Study in Conservation of Natural 
Resources. (1-5) Three field trips and one half 
hour of discussion per week. Prerequisite: consent of 
Instructor. Supervised experience in off-campus organizations rel-

evant to specific aspects of Conservation of Natural 
Resources. Students will enroll with faculty sponsor 
and written reports required.

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

CNR 188. Directed Group Studies for Advanced 
Undergraduates. (1-5) Prerequisite: consent of in-
structor. The Staff (Mr. Gersper in charge) (F, W, Sp)

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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. Norgaard in charge.

LOWER DIVISION COURSES

CRS 23. World Resources for Food and Agricul-
ture. (3) Three hours of lecture per week. Survey of 
man’s nutrition and agricultural production, processing, 
distributing and utilization of food. Principles of 
agriculture including physical, biological, social, and 
institutional aspects. Place of agriculture in domestic 
and world affairs. The outlook for world food supplies.

Mr. Day, Mr. Weldon, Mr. Stokstad (W)

CRS 40. Environmental Chemistry. (3-4) Three 
hours of lecture and 1 1/2 hour discussion section per week. Prerequisites: high school chemistry and 
consent of instructor. Lectures will provide an un-
derstanding of the physical and chemical properties of 
the environment, especially how they relate to pollution 
and environmental degradation. Students may choose 
backgrounds in chemistry or a breadth in the envi-
ronmental sciences. Mr. Doner, Mr. Hulsmann, 
Mr. Holmstead (W, Sp)

CRS 40L. Environmental Chemistry Laboratory. 
(2) One hour of lecture and 3 hours of laboratory per 
week. Prerequisite: Concurrent enrollment in course 
CRS 40 and consent of instructor. Applications and 
problems of various techniques for chemical analysis 
as applied to environmental chemistry.

The Staff (W, Sp)

UPPER DIVISION COURSES

CRS 101. Urban Garden Ecosystems. (5) Three 
hours of lecture and four hours of discussion and dem-
onstration per week. Study of urban garden and recre-
ation ecosystems, with emphasis on basic ecological concepts and techniques for managing plant and ani-
mal systems. Mr. Williams (F), Mr. Vladim (W); 
Mr. Raabe (Sp)

**CRS 110. Ecosystemology. (4) Three hours of lec-
ture and one hour of discussion per week. Prerequisites: any ecology course, or one quarter of interdepartmental Studies 10, or consent of in-
suctor. The complex interrelationship of ecosystems in which man is a component, planning agent, indig-
ent observer: how to deal with complexity; the systems approach to problem solving, determining systems boundaries; ecological concepts; ecosystem management. Mr. Schultz (W)

CRS 115. Environmental Philosophy and Ethics.
(3) Three hours of lecture per week. Prerequisite: con-
sent of instructor. A critical analysis of human envi-
ronments as physical, socio-economic and tech-
cultural. An introduction to the role of ideologies, beliefs, attitudes and behavior. An examination of contemporary environmental literature and the philosophies embodied therein.

Mr. Petulla (F)

CRS 116. Linear Models of Natural Resource Prob-
loms. (3) Three hours of lecture per week. Pre-
requisites: Math 16A and 16B and Statistics 2; or 
permission of instructor. An introduction to linear 
statistical and stochastic models in the analysis of natu-
ral resource problems. Methods include linear pro-
gramming, input-output analysis, and simulation.

Mr. Just (F)

CRS 130. Resource Development Law and Admin-
istration. (4) Three hours of lecture and one and one-
half hours of laboratory per week. Prerequisites: course 131 or Con-
version of Natural Resources 191F or equivalent and 
consent of instructor. Overview of the economic and po-
cetal factors, federal transfer of resources to states and 
individuals, water and transportation development, and 
resource use conflicts, and the development of natural resource goals in the establishment of the Forest 
Service, Park Service, and other agencies.

Ms. Wisdes (Sp)

CRS 131. Environmental Law, Planning, and Ad-
ministration. (4) Three hours of lecture and one and one-
half hours of laboratory per week. Prerequisite: upper division standing and consent of instructor. Review of 
environmental quality laws, environmental planning 
and administration, with emphasis on the federal and 
California environmental impact processes. Legis-
lation, procedures of agencies, court decisions, of 
consultants and citizens, relationship to development 
and the economy.

Ms. Wisdes (W)

CRS 132. Environmental Impact Assessment. (4) 
Three hours of lecture and one and one-half hours of 
laboratory per week. Prerequisites: course 131 or Con-
version of Natural Resources 191F or equivalent and 
consent of instructor. Overview of the process of de-
termining the impact of environmental projects on in-
dividual and group interests.

Mr. Ooner, Mr. Huisman, 
Mr. Buchanan (W)

CRS 133. Environmental Impact Reporting. (4) 
Three hours of lecture and one and one-half hours of 
laboratory per week. Prerequisites: course 131 or Con-
version of Natural Resources 191F or equivalent and 
consent of instructor. Overview of the process of de-
termining the impact of environmental projects on in-
dividual and group interests.

Mr. Buchanan (W, Sp)

CRS 140. Economics of Land Use, (4) Three hours 
of lecture and one hour of discussion per week. 
Prerequisites: PENR 100A or ECON 100A, and MATH 1A 
or 1B, and consent of instructor. The classical theory of rent. Location and site rents. Land markets, 
Extermait of land use: crowding, wildlife habitat, etc. 
Publicly supplied goods that influence land use: trans-
portation and water. The urban-rural fringe problem. 
The taking issue in preservation and the Coase theo-
rem. Mr. Petulla (Sp)

CRS 150. History of Resource Use in the United 
States from Colonial Times to Present. (4) Three 
hours of lecture and one hour of discussion per week. 
Prerequisites: consent of instructor. This course will provide an understanding of the history of the exploitation and conservation of natural resources—land, water, agriculture, timber, minerals, fish, wildlife, in the United States. The place of 
geography and the history of technology as well as 
political, economic, and social history are included.

Mr. Petulla (W)

CRS 151. Economic and Political History of Re-
sources in Twentieth Century United States. (4) Three 
hours of lecture and one hour of discussion per week. 
Prerequisites: consent of instructor. The develop-
ment of U. S. capitalism with respect to their impact 
on resources and environment. Examination of the 
emergence and evolution of traditional agriculture 
and excessive resource exploitation and environmental 
deregulation from the Progressive Era, New Deal, the 
Great Society to the present. Mr. LeVeen (Sp)

CRS 152. Economic Analysis of World Agricultural 
Development. (4) Three hours of lecture and one hour of 
discussion per week. Prerequisites: consent of instructor. 
An examination of the role of agriculture in development and the Impact of develop-
mental problems. Mr. Joy (F)

CRS 161. Agriculture in Economic Development. 
(4) Three hours of lecture and one hour of discussion 
per week. Prerequisites: Economics 140A or 140B, or 
PENR 100A, or equivalent. Socioeconomic factors 
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in the organization and operation of world agriculture, with special emphasis on the problem of world hunger. Interactions between socioeconomic systems with population growth, resource scarcity, technology, international trade, economic development.

Mr. Sarris (Sp)

CRS 170A–170B. Sociology of Rural Development. (4–4) Three hours of lecture per week. Prerequisite: consent of instructor. Social organization and institutions in their relation to rural development; values and goals of development; social consequences of resource development in the rural environment; social reform movements affecting ownership and control of farming lands and other natural resources.

Mr. McEntire (W, Sp)

CRS 180. Internship in Conservation and Resource Studies. (12 or 18) Thirty-two or forty hours per week at placement location. Prerequisite: junior or senior standing; consent of adviser, faculty sponsor, and department. Intern placements relevant to the student's academic area of interest and career objective with specific application to the problem of wildlife management, focus on the specific aspects of interest both nationally and internationally. Students will be responsible for substantial written analysis of the experience as well as assigned readings.

Mr. Miller (in charge) (F, W, Sp)

CRS 191B. Environmental Biology. (4) Three hours of lecture per week. Prerequisites: one course in introductory college level general education in the biological or chemical sciences; and Knowledge of the biological sciences. Emphasis on the relationship of the environment and its enabling features to ecolife. Ecological principles; emphasis on the role of the environment in the interpretation of life and its dependence on the environment. Exploration of the alteration of environments. One hour of lecture per week. Prerequisite: consent of instructor. For pre-advanced credit, students will be given opportunities in the areas of research and education. One hour of lecture per week. Prerequisite: consent of instructor. See interdepartmental studies for complete description of this course.

Mr. Alper (Sp)


IDS 10L–10M–10N. Introduction to Environmental Issues—Special Projects. (2–2–2) See Interdepartmental Studies for complete description of this course.

IDS 120. Environmental Education and Design. (5) See Interdepartmental Studies for complete description of this course.

**Entomology (Ent.)**

Department Office, 137 Giannini Hall

Undergraduate Adviser: John T. Doyen

**LOWER DIVISION COURSES**


PM 20. Introduction to the Philosophy, Ecology, and Economics of Pest Management. (4) Lectures, 4 hours per week. Introduction to the systems approach in pest control, including the philosophy, goals, ecological basis, strategy and tactics of integrated control. Consideration will be given to crop systems, ecology, natural, and artificial controls, and system interactions. Mr. Smith, Mr. Day, Mr. Wilhelm (W)

**UPPER DIVISION COURSES**

Ent. 100. General Entomology. (3) Three hours of lecture and six hours of laboratory per week. Prerequisite: introductory course in a biological science. Biology of insects, including classification of orders, morphology, physiology, behavior, and ecology. Mr. Dally, Mr. Frankel (Sp)

Ent. 101. Insect Classification. (4) Two hours of lecture and six hours of laboratory per week. Prerequisite: course 100. Classification of insects to the family level with emphasis on identification. Mr. Doyen (F)

Ent. 102. Functional Insect Anatomy. (2) Two hours of lectures per week. Prerequisite: course 100 or consent of instructor. An introduction to the anatomy and physiology of insects. Mr. Pipa (F)

Ent. 102L. Laboratory in Functional Insect Anatomy. (2) Six hours of laboratory per week. Prerequisite: course 102 (may be taken concurrently). Comparative studies of the principal organ systems of insects.

Mr. Pipa (F)

Ent. 103. Environmental Physiology of Insects. (2) Two hours of lecture per week. Prerequisite: general biology, environmental science, or equivalent. Recommended: course 102 and Biochemistry 102. Physiological and comparative aspects of insect adaptations to the environment. Mr. Heinrich (W)

Ent. 103L. Laboratory in Insect Physiology. (2) Six hours of laboratory per week. Prerequisite: course 103 (may be taken concurrently) or consent of instructor. Examination of insects in relation to their environment. Laboratory: Methods of handling and identifying insects, their physiology, adaptation, and behavior, and certain functions of sensory, nervous, and motor systems of diverse insect species. Mr. Heinrich, Mr. Dadd, Mr. Gordon, Mr. Mittler, Mr. Pipe (W)

Ent. 104. Systematic Entomology. (4) Two hours of lecture and six hours of laboratory per week. Prerequisite: courses 100, 101. Principles and practices in the systematic classification of both the generic and specific levels, nomenclature, and bibliographic methods. Mr. Powell (W)

Ent. 105. Insect Ecology. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: upper division standing in one of the biological sciences. Emphasis on the insects: their habitats, insect behavior; analysis of the insect environment; population dynamics. Mr. Dahlytien (F)

Ent. 106. Field Entomology. (5) One hour of lecture and three hours of laboratory per week; field trip to be arranged. Prerequisite: course 100 and 101. Emphasis on the relation of insects to habitats and life zones through comparative studies of insect families. Collection of insects, identification of plant and animal groups, and population in local or ecological data. Specimens will be coded and preserved for ecological purposes. Mr. Schilling, Mr. Powell (Sp)

Ent. 108. Aquatic Entomology. (3) Three hours of lecture and three hours of laboratory per week. Prerequisite: Ent. 100, Ent. 101 or permission of instructor. Aquatic insects: emphasizing collecting techniques, identification, ecological requirements, morphology and evolutionary adaptations. Use of aquatic insects as indicators of environmental quality and as predictive agents of environmental stress.

Mr. Rosh (Sp)

Ent. 110. Destructive and Beneficial Arthropods. (5) Three hours of lecture and six hours of laboratory per week. Life histories and habits of destructive and beneficial insects, millipede and ticks; identification of adult stages of representative species; recognition of characteristic damage. Principles involved in manipulating populations.

Mr. Middlekauff (Sp)

Ent. 117. Pesticide Chemistry and Toxicology. (4) Lecture, 4 hours per week. Prerequisites: Chemistry BA-88 or equivalent) and Biology (one college level course). Chemical composition of pesticides and related compounds used for crop, livestock, and urban environmental protection; their mode of action; resistance mechanisms; and methods of evaluating their safety and activity. 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. Prerequisites: Ent. 117 (may be taken concurrently) and consent of the instructor. Exercises and demonstrations on chemistry, metabolism, and various biological effect of selected pesticides and related chemicals. To be given in odd-numbered years. Enrollment limited. Mr. Casida, Mr. Holmstead (Sp)

Ent. 130. Biological Control of Insect Pests and Weeds. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: course 100 and 101. Theoretical and practical biological control: population phenomena; and the biology of entomophagous insects. Mr. van de Bosch, Mr. Caltagirone, Mr. Hagen (F)

Ent. 140. Insect Pathology. (8) Four hours of lecture and three hours of laboratory per week. Prerequisite: course 100 and at least one course in microbiology. Principles of insect pathology and insect microbiology: infectious and noninfectious diseases of insects: diagnosis, therapy, and microbiology of insect pathogens. Mr. Cantralo (W)

Ent. 150. Medical and Veterinary Helminthology. (3) Two 1/2-hour lectures per week. helmithic infections of man and domestic animals. Biology, host-parasite interactions, pathogenesis, therapy, and control. Mr. Weinmann (F)

Ent. 150L. Helminthology Laboratory. (3) Six hours of laboratory per week. Prerequisites: Ent. 150 (may be taken concurrently). Methods of handling and identifying helminths, host-parasite interactions, laboratory and field techniques, experimental manipulation of helminths.

Mr. Weinmann (F)

Ent. 153. Medical and Veterinary Entomology. (3) Three 4–1/2-hour lectures per week. Prerequisites: Ent. 100, Ent. 101 or permission of instructor. See interdepartmental studies for complete description of this course.

Mr. Furman, Mr. Anderson (W)

Ent. 153L. Medical and Veterinary Entomology Laboratory. (2) Six hours of laboratory per week. Prerequisites: course 153. For graduate courses in entomology. See Interdepartmental Studies for complete description of this course.

Mr. Furman, Mr. Anderson (W)

Ent. 172. Principles and Methods of Entomological Research. (4) Four hours of lecture per week. Techniques and purposes of the scientific method in entomology with emphasis on problem selection and the collection, evaluation, and presentation of data.

Mr. Sylvester (F)

Ent. 197A. Field Studies in Entomology. (1–5) Prerequisite: Ent. 100, Ent. 101 or permission of instructor. See Interdepartmental Studies for a complete description of this course.

Ent. 198. Directed Group Studies for Advanced Undergraduates. (1–5) The Staff (Mr. Schilling in charge) (F, W, Sp)

Ent. 198. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations listed on page 36. Must be taken on a pass/not pass basis.

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

IDS 138. 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.**

**Forestry (For.)**

Department Office, 145 Mulford Hall

Undergraduate Major Advisers: R. H. Barrett, Don C. Erman (in charge), John A. Ahl, Robert Lee, Joe R. McBride, Dennis Teeguarden, Paul Zinke, John A. Zinnkska

**LOWER DIVISION COURSE**

For. 10A–10B–10C. Field Study of Forest and Wildland Resources. (5–5–5) Field study of forest and wildland resources. See Interdepartmental Studies for complete description of this course. Principles of use and management of forests and other wildlands in relation to the needs of society for wood, water, and recreation; forest conservation policies and programs.

Mr. Zinke (F)

**UPPER DIVISION COURSES**

For. 100A–100B–100C. Field Study of Forest and Wildland Resources. (4–4–4) 403 hours of field instruction. Prerequisite: 12 units of biological sciences and 3 units of plane surveying. Ten-week summer field program offered only at C. Forestry Camp, Meadow Valley, Plumas County. Required of all students majoring in forestry.

Mr. Zinke (F)
For. 117. Sociology of Natural Resources. (4) Three one-hour lectures and one two-hour topical laboratory per week. Prerequisite: consent of instructor. Sociological and psychological relationships between sociological and ecological systems; social definition of natural resources; identification of publics; social organization of resource use and management; environmental communications; decision-making by social groups; public involvement; and social impact analysis. Mr. Lee (F)

For. 120. Soils in the Forest Environment. (3) Two one-hour lectures and one two-hour laboratory per week. The interaction of soils and forests; soil 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 associated woody species, including their identification, taxonomy, aecology, and silvicultural characteristics and a review of the literature of the fields. Mr. Zinke (SP)

For. 122. Forest Influences. (4) Three one-hour lectures and one three-hour laboratory per week. Prerequisite: 5 units of biology or social science. Unit processes of the energy balance, hydrologic cycle, and the cycling of chemical elements as influenced by forest systems and watershed management, climate control, soil fertility maintenance, and environmental impact analyses. Mr. Zinke (SP)

For. 123A-123B-123C-123D. Ecology of Renewable Natural Resources. (4-3-3-4) 123A: Three one-hour lectures per week and 40 hours of laboratory including one weekend field trip per quarter; 123B: two-and-one-half-hour lectures per week and one 3-hour laboratory per week; 123C: three lectures per week and two weekend field trips per quarter; 123D: five 1-hour lectures per week and 40 hours of laboratory or field trips per quarter, 123C: three lectures per week and two weekend field trips per quarter. Prerequisite: 8 units of biology. 123A is prerequisite for 123B and 123C and 123D is prerequisite for 123C; or consent of instructor. Evaluation of ecological principles common to maintainable and non-maintainable ecosystems, emphasizing ecosystem processes and oriented to man's role as a manipulator of ecosystems. Mr. Zinke (SP)

For. 123A. Ecosystem Processes and Models. (4 formerly 1230). Study of whole system models and of ecosystems properties not pertaining to the subsystems; survey of six major biomes: rain forest, desert, grassland, deciduous forest, western coniferous forest and tundra. The Staff (Mr. Schulz in charge) (F)

For. 123B. Physiological Plant Ecology. (3) The basic concepts of plant physiology examined; their application to an understanding of distribution, competition, and successional positions of wildland species. The Staff (Mr. McGinn in charge) (SP)

For. 123C. Wildland Animal Dynamics. (3) Review of the ecological principles useful in predicting the distribution, abundance, and productivity of animals in forest / rangeland ecosystems, with emphasis on the role of man in these systems. The Staff (Mr. Barnett in charge) (W)

123D. Vegetation Dynamics. (5 formerly 123A) Vegetation change is dealt with at different levels of resolution and the models needed for predicting change are developed. These models are employed in evaluating various manipulative inputs, such as fire, that can be employed to achieve specific management objectives. The Staff (Mr. Stone in charge) (SP)

For. 125. Principles of Silviculture. (5) Four one-hour lectures and one 4-hour laboratory period per week. Prerequisite: course 123A or equivalent preparation in community ecology. Principles and concepts of the biological aspects of establishment, growth, composition, and quality of forest trees and stands. The evaluation of forest management and silvicultural systems to maximize the usefulness of forests to man. Mr. Helms (F)

For. 141. Principles of Range Management. (4) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: 6 units of biology. Management and improvement of rangelands; emphasis on interrelationships of plants, animals, 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. Menke (F)

For. 142. Range Plants. (4) Two hours of lecture and three 1-hour laboratories per week. Prerequisite: 5 units of biology and upper division standing. Basic physiological, chemical and ecological factors important to life in lakes and streams, interactions between aquatic organisms and their environment, pollution, thermal and oxygenic effects, salmonid spawning, exotic species and reservoir problems. Mr. Erman (SP)

For. 143. Range Animal Nutrition and Management. (3) Two 1 1/2 hour lectures per week. Principles and practices with particular reference to ruminants on wide ranges. Mr. Hoady (SP)

For. 144. Range Ecology. (4) Three 1-hour lectures and one 1-hour discussion session per week. Prerequisite: a course in plant community ecology. Composition, structure, vegetation changes, and grazing problems in representative range plant communities. Mr. Hoady (SP)

For. 145. Range Ecosystems Measurements and Analyses. (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 resource. Estimation of potential for grazing capacity, range condition, and range trend. Mr. Menke (W)

For. 146. Range Ecosystem Planting. (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 seasonal supplies of forage and wildlife population requirements. Plans will be developed for particular range ecosystems using linear programming techniques. Mr. Menke (W)

Wildlife Science

For. 170. Wildlife Biology and Management. (3) Two 1-hour lectures and one 3-hour laboratory per week. Prerequisite: intermediate standing in or equivalent to upper division standing. Ecological mechanisms that regulate populations of wild animals. Survey of most important orders and families of wildlife in North America and principles of conservation. Mr. Bartolome (Sp)

*For. 173. Field Course In Wildlife and Fisheries. (8) Prerequisite: consent of instructor. Full-time study for first five weeks of summer session. Includes lectures, laboratory, and field exercises. Emphasis on research methods and field surveys. Offered at Sagehen Creek Field Station near Truckee, California. Limited to ten students. Mr. Erman, Mr. White (Summer Session)

For. 175. Wildlife Population Ecology. (4) Two 1 hour lectures and one hour of discussion per week. Prerequisite: course 177 or equivalent to 170 or equivalent. Ecology and dynamics of wildlife populations. Factors and mechanisms affecting natality, mortality, density, and proportional change. Mr. Reif (F)

For. 177. Case Histories in Wildlife Management. (4) Two 2-hour lecture and discussion periods per week. Prerequisite: course 175 or equivalent. Analysis of biological, political, and economic factors that influence decision-making process in governmental programs of wildlife conservation and management. Mr. Leopold (SP)

For. 178. Freshwater Ecology. (4) One hour of lecture, one and one-half hours of discussion, and three hours of laboratory per week. Prerequisite: 8 units of biology and upper division standing. Basic physical-chemical factors important to life in lakes and streams, interactions between aquatic organisms and their environment, pollution, thermal and oxygenic effects, salmonid spawning, exotic species and reservoir problems. Mr. Erman (SP)

For. 191A. Resource Sciences Literature. (3) Two 2-hour lecture periods per week; emphasizing information, conducting literature searches, and preparing bibliographies and abstracts, with emphasis on disciplines in the College of Natural Resources curriculum. Provides a background for computer searches. Stresses a clear style in technical writing. To be offered: 1977-78 only. Mr. Evans (SP)

For. 199. Supervised Independent Study and Research. (1-5) Enrollment is restricted by regulations listed on page 36. Must be taken...
Genetics (Gen.)

Department Office, 345 Mulford Hall
Undergraduate Adviser: 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–B. The fundamentals of genetics at the molecular, organismal, and population levels. May be suitable as a terminal course for non-majors. Mr. Spieth (F); Mr. Spreckels (Sp).

Gen. 100L. Genetics Laboratory. (4) Two hours of lectures 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 (F); Mr. Libby (Sp).

Gen. 101. Topics in Genetics. (2) Two hours of lecture and one hour of discussion per week. Prerequisites: course 100 or 150. Primarily for majors. Selected topics in专题 include: genes in higher plants; maternal inheritance; antihomologous; and variation from species to species. Dr. St. Lawrence (W).

Gen. 110. Resource Genetics. (5) Three hours of lecture and 2 hours of discussion per week. Prerequisites: Biology 1 or equivalent. Covers molecular, Mendelian, development, and population genetics; genetic cytogenetics, and evolution. Differs from 100 by less detail of molecular and more quantitative genetics and methodology. Topics include: genecosystem, genetic vulnerability, development of resistance, breeding, genetic engineering concepts. Mr. Libby (Sp).

Gen. 120. Population Genetics. (4) Four hours of lecture per week. Prerequisite: course 100 or 150, Elementary probability or consent of instructor. A theoretical foundation in population genetics. Emphasis will be placed on the use of one or two locus models for developing the mathematical theory of the behavior of gene frequencies in a changing population. Mr. Spreckels (Sp).

Gen. 131. Organic Evolution. (5) Four hours of lecture and one hour of discussion per week. Prerequisite: course 100 or 150. A general introduction to the multidisciplinary contributions to the field with emphasis on fundamental genetic and ecological processes. Given in alternate years. 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 man) and changes in chromosome number are discussed in regard to their stability, segregation, transmission, and effect on gene action. Evolutionary implications and unusual chromosome systems are also discussed. Mr. Brown (W).

Gen. 150. General Human Genetics. (5) Lectures, 4 hours of laboratory per week, and one hour of discussion per week. Prerequisite: Biology 1A–B or consent of instructor. Principles of genetics in man and other mammalian systems are discussed in regard to the stability, segregation, transmission, and effect on gene action. Evolutionary implications and unusual chromosome systems are also discussed. Mr. Brown (W).

Gen. 150L. Human Genetics Laboratory. (5) Three hours of lecture and one hour of discussion per week. Prerequisite: consent of instructor (knowledge of basic genetics required). A detailed study of the genetics process in man. Emphasis on chromosomal structure and function, human biochemical genetics and genomics, the mutation process, and behavioral studies. Includes functions as well as clinical dysfunctions. Ms. Palmer (Sp).

Gen. 165L. Human Genetics Laboratory. (3) One hour of lecture and six hours of laboratory per week. Prerequisites: consent of instructor (knowledge of basic genetics required). An introduction to research and clinical laboratory techniques in human genetics. Contemporary methodology in karyotyping, enzyme assay and cell culture will be emphasized; recent advances in prenatal and heterozygote carrier diagnosis will be included. Ms. Palmour (Sp).

Gen. H160. Junior Seminar for Honors Program. (2) Recitation 2 hours per week. Prerequisites: consent of Honors Adviser (based upon eligibility for honors program). Introductory to honors program. Assigned topics, drawn from genetic research, are prepared and presented by individual students for discussion and discussion by the class. Graded pass/not pass. Mr. Kelly (Sp).

Gen. H185. Research for Honors Thesis. (2–5) Variable hours of individual study. Prerequisites: course H160 or consent of Honors Adviser. Individual research of literature, or laboratory work, as arranged with Honors Adviser 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 (F, W, Sp, Su).

Gen. H187. Honors Thesis Writing and Seminar. (2) Recitation 1 1/2 hours per week. Prerequisites: two or more terms of course H185. Final term of honors program. Provides opportunity to write and submit honors theses. Each student is required to present orally his thesis research for discussion and criticism by fellow honors students. Graded pass/not pass. Mr. Kelly (Sp).

**Gen. 191. Experimental Courses in Genetics.** (5) Four hours of lecture, 2 hours of discussion, and 2 hours of laboratory per week. Prerequisite: consent of instructor. Recent developments in genetics of special interest to the student are assigned as topics for independent study. May be repeated for credit.

The Staff (F, W, Sp).

Gen. 196. Lectures in Advanced Genetics. (4) Four hours of lecture per week. Prerequisite: consent of instructor. Selected topics in advanced genetics. May be repeated for credit.

The Staff (W).


Gen. 198. Supervised Independent Study and Research. (1–5) Enrollment is restricted by regulations listed on page 38. Must be taken on a passed/not passed basis.

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

Gen. 475. Supervised Field Work and Counseling in Human Genetics. (9–15) Variable meetings. Prerequisite: course 159, and consent of instructor. An introduction to research and supervised field work for one quarter in a birth defects center. Primarily designed for Genetic Advising students but open to qualified graduate students. To be given on a satisfactory/unsatisfactory basis.

Ms. St. Lawrence in charge (F, W, Sp).

Nutritional Sciences (NS)

(Natural Resources (Undergrad.); Nutritional Sciences / 225)

In Human Genetics. (9-15) Variable meetings. Prerequisite: consent of instructor. Half or full-time training in Human Genetics. This program provides opportunity to write and submit honors theses. Each student is required to present orally his thesis research for discussion and criticism by fellow honors students. Graded pass/not pass.

Mr. Kelly (Sp).

Gen. 103L. Introductory Nutritional Sciences Laboratory. (2) One hour of lecture and one hour of discussion per week. Prerequisite: course 103 at be taken concurrently; Chemistry 8B. For majors. Laboratory experiments to test quantitatively chemical techniques used in nutrition and food analysis and with principles of biological assay procedures. Mr. Chang (F).

Gen. 106. Food Chemistry. (3) Two hours of lecture and 1 hour of discussion per week. Prerequisite: Biochemistry 102. Chemistry of food proteins, carbohydrates, fats, and other constituents of foods. Mr. Chang (F).

Gen. 107. Principles of Food Preservation and Processing. (6) Four hours of lecture and one hour of discussion per week. Prerequisite: course 106 and a course in Bacteriology, Control and utilization of microorganisms and enzymes in commercial preparation and preservation of food products. Nature and control of nonenzymic chemical deterioration of processed foods. Development and present status of various reining, manufacuring, and processing operations. Mr. Burr (W).

Gen. 110. Food Toxicology. (3) Three hours of lecture per week. Prerequisite: course 106 and a course in physiology Principles and problems in evaluating the wholesomeness and safety of food components, additives, and contaminants. Selective toxicology, detoxication mechanisms, basic concepts and techniques of safety evaluation, and interpretation of biological data. Mr. Bjeldeanes (Sp).

Gen. 111. Experimental Study of Food Properties. (3) Three hours of lecture and six hours of laboratory per week. Prerequisite: course 106. Study of selected chemical and physical properties of class representative foods in relation to preparatory procedures, effects on preparation and storage on sensory and nutritive attributes of foods. Mr. Kennedy (W).

Gen. 112. Food Chemistry and Toxicology Laboratory. (6) Two hours of lecture and nine hours of laboratory per week. Prerequisite: course 106. Study of food chemistry and toxicology laboratory experiments to test quantitatively chemical techniques used in food processing and storage. Mr. Bjeldeanes (Sp).

Gen. 135. Institutional Food Production, Service and Organization. (2) One hour of lecture and four hours of laboratory per week. Prerequisite: course 135 (may be taken concurrently). Experimental work dealing with the chemistry and toxicity of food products. The laboratory contains equipment which shows the changes these substances undergo during processing and storage. Mr. Bjeldeanes (Sp).

Gen. 135L. Institutional Food Production, Service and Organization. (3) Three hours of lecture per week. Prerequisite: course 111; Business Administration 150 or equivalent. Primarily for majors. Management principles as applied to institutional food systems; quantity food purchasing, production and service; menu planning; survey of equipment. Mr. Williams (Sp).

Gen. 136. Experimental Nutrition. (5) Four hours of lecture and one hour of section meeting per week. Prerequisite: course 103, Biochemistry 102, and a course in health science. Biochemical and physiological interactions among the vitamins, carbohydrates, proteins, and fats and their relation to mammalian nutrition.

Ms. Ostwald (F).

Gen. 138. Foods of Economy and Nutrition. (3) Three hours of lecture per week and six hours of laboratory per week. Prerequisite: course 106. Study of the relationship between the metabolic and nutritional needs of normal individuals throughout the life cycle. Methods of nutritional assessment and the nutritional status will be demonstrated.

Ms. King (W).


Gen. 161L. Therapeutic Nutrition Laboratory. (2) NOTE: For key to symbols, see page 10.
Two hours of lecture per week. Prerequisite: course 161 (majors), and consent of instructor. PRIMARY for majors. Dietary methods of therapeutic treatment and evaluation of various conditions and diseases of man. The Staff (Sp)

NS 162. Applied Human Nutrition. (2-4) Lecture, one hour of discussion per week and thirty-two hours of field work per 4 weeks. Prerequisite: Course 150 or 160 (may be taken concurrently); Biochemistry 102L. Basic principles and techniques used in research in human and animal nutrition. The Staff (W)

NS 163. Applied Therapeutic Nutrition. (2) One hour of lecture and three hours of laboratory per week. Prerequisites: Course 226 or 160, and 162 or grades of C or better. Field experiences illustrating nutritional status evaluation and therapeutic nutrition education techniques. Ms. Oace (Sp)

NS 170. Experimental Nutrition Laboratory. (5) Two hours of lecture and nine hours of laboratory per week. Prerequisite: course 226 or 160 (may be taken concurrently); Biochemistry 102L. Basic principles and techniques used in research in human and animal nutrition. The Staff (W)

NS 190. Introduction to Research in Nutritional Sciences. (2) Two hours of lecture per week. Prerequisite: course 103, and 103L or Chemistry 5. Prospective in current research. Ms. Little (F, W, Sp)

NS 197. Field Study in Food and Nutritional Sciences. (1-5) May be repeated for credit. Supervised study of a food and nutrition organization related to specific aspects of foods and nutritional sciences. Regular individual meetings with faculty sponsor and written report required. The Staff (F, W, Sp)

NS 198. Directed Group Study. (1-5) Prerequisite: consent of instructor. The Staff (F, W, Sp)

NS 199. Supervised Independent Study and Research. (1-6) Enrollment is restricted by regulations listed on page 36. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

NS 400. The Profession of Dietetics. (1) Thirty hours of orientation and field work and four hours of discussion per quarter. Prerequisite: open only to juniors in the dietetics curriculum. One week orientation and four meetings during the quarter relating to roles of dietetic specialists, professional goals, and to health care facilities. To be taken on a passed/not passed basis. The Staff (Ms. D. Williams in charge) (F)

NS 401. Professional Methods and Practicum in Outpatient Dietetic Therapy. (2-6) Per quarter: 2 hours discussion, 24 hours field work per unit. Prerequisite: Consent of instructor. For dietetics majors. Conferences, observation, and supervised practice in outpatient nutritional care in various clinical settings. To be taken on a passed/not passed basis. Ms. Oace (W, Sp)

NS 402. Professional Methods and Practicum in Inpatient Dietetic Therapy. (2-6) Per quarter: 2 hours discussion, 24 hours field work per unit. Prerequisite: NS 163 with grade of C or better. Primarily for dietetics majors. Conferences, observation, and supervised practice in nutritional care of hospitalized patients. Ms. Oace (W, Sp)

NS 403. Professional Methods and Practicum in Dietetic Management of Metabolic Research. (2) Two hours of discussion per week and twenty-four hours of field work per week for 2 weeks. Prerequisite: courses 103L and 162 with grades of C or better. Primarily for dietetics majors. Conferences, observation, and supervised practice in design and administration of research diets. To be taken on a passed/not passed basis. Ms. Calloway, Mr. Margen (F, W, Sp)

NS 404. Professional Methods and Practicum in Institutional Food Service Management. (3) Two hours of discussion per week and twenty-four hours of field work per week for 3 weeks. Prerequisite: courses 135 or 135L, and 162 with grades of C or Better. Primarily for dietetics majors. Conferences, observation, and supervised practice in management of institutional food service units. To be taken on a passed/not passed basis. Ms. D. Williams (F, W, Sp)

NS 405. Professional Methods and Practicum in Maternal and Child Care Nutrition. (3) Two hours of discussion per week and twenty-four hours of field work per week for 4 weeks. Prerequisites: NS 163 with grade of C or Better for majors. Conferences, observation, and supervised practice in nutritional care of pregnant women, infants, and preschool children. To be taken on a passed/not passed basis. Ms. King (W, Sp)

NS 406. Professional Methods and Practicum in Nutritional Care of the Handicapped. (3) Two hours of discussion per week and twenty-four hours of field work per 4 weeks. Prerequisites: Courses 163 with grade of C or Better. Primarily for dietetics majors. Conferences, observation, and supervised practice in nutritional care of mentally and physically handicapped persons. To be taken on a passed/not passed basis. Ms. D. Williams (W, Sp)

NS 407. Professional Methods and Practicum in Nutrition Education. (4) Two hours of discussion per week and twenty-four hours of field work per week for 4 weeks. Prerequisites: course 162 with grade of C or Better 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. Ms. D. Williams (Sp)

(For graduate courses in Nutritional Sciences, see Index.)

Pest Management (PM)

Department Office, 145 Mullford Hall
Undergraduate Adviser: Louis A. Falcon

LOWER DIVISION COURSE

PM 20. Introduction to the Philosophy, Ecology, and Economics of Pest Management; formerly Entomology 20. Four hours of lecture per week. Introduction to the systems approach to pest control, including the biological, chemical, and cultural practices. Ms. King (F, W), Mr. Day, Mr. Wilken (W)

UPPER DIVISION COURSES

PM 151. Weeds. (3) Two hours of lecture per week and field trips on alternate Saturdays. Prerequisite: Botany 44 or consent of instructor. Nature, function and management of weeds of economic importance in agricultural, forest, range, aquatic, urban, and industrial environments. Ms. Day (Sp)

PM 152. Insect Pest Management. (6) Lectures, 60 hours total; laboratory and field trips, 100 hours total. Prerequisites: course 20; 153A-153B, 154A-154B, or consent of instructor. Consideration will be given to the system approach to pest management, including biological, chemical, and cultural methods. Mr. Summers (Extramural)

PM 153A–153B. Pathobiology. (2-3) Prerequisite: Biology 1A-1B, RS 23 or consent of instructor. Nature and causes of plant and animal diseases, with comparative data illustrating diseases of plants and insects and vertebrate animals; the rationale of disease management. PM 153A. Ecoloy, Pathology, and Symptomatology. (2) One hour of lecture and three hours of laboratory per week. An introduction to pathogenesis and to methods of determining the economic importance of pest insects. Ms. Keigh, Mr. Rice, Mr. Summers (Extramural)

PM 153B. Vector Relationships. (3) Three 1-hour lectures per week. Biological relationships of the pathogens of plants, invertebrates, and vertebrates to the etiology and control of these vectors. Mr. Pinnock (Sp)

PM 153B. Vector Relationships. (3) Three 1-hour lectures per week. Biological relationships of the pathogens of plants, invertebrates, and vertebrates to the etiology and control of these vectors. Mr. Pinnock (Sp)

PM 154A-154B. Control Methods in Pest Management. (3-3-3) Three 1-hour lectures per week. Courses need not be taken in sequence. Mr. Parmeter, Mr. Wood, Mr. Helms (Sp)

PM 154A. Chemicals and Their Environmental Impact. (2) Discussion of the advantages and limitations of chemical control methods. Mr. Falcon, Mr. Schroth (W)

PM 154C. Cultural and Behavioral Methods. (3) Prerequisite: course 20; Entomology 100; Biology 150; Chemistry 8A-8B; or consent of instructor. Description and utilization of materials and techniques for control of pests by agronomic modification and utilization of pest behavior; advantages and limitations of chemical control methods. Mr. Falcon, Mr. Schroth (W)

PM 155A, 155B. Applied Human Nutrition. (2-4) Prerequisite: course 20; Entomology 100, and 101 or 110, or equivalent courses. An analysis of arthropods of medical and veterinary importance. (4) Three hours of lecture and three hours of laboratory or field trip per week. Prerequisite: course 20; Entomology 100, and 101 or 110, or equivalent courses. Ms. Mr. Parmeter, Mr. Wood, Mr. Helms (Sp)

PM 155C. Agricultural Pest Management. (4) Three hours of lecture and three hours of laboratory per week. Prerequisites: course 20, 153A-153B, 154A-154B, or consent of Instructor. Discussion of pest management in representative crops and crop systems. 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 (F, W, Sp)

PM 199. Supervised Independent Study and Research for Undergraduates. (1-6) Enrollment is restricted by regulations listed on page 36. Must be taken on a passed/not passed basis. The Staff (Ms. Gram in charge) (F, W, Sp)

Plant Nutrition (PN)

Department Office, 108 Hilgard Hall
Undergraduate Adviser: Noman Terry

UPPER DIVISION COURSES

PN 116. The Nutrition of Green Plants. (3) Three hours of lecture per week. Prerequisite: Biology 1A-1B. Evolution of modern concepts of plant nutrition, including functional aspects of inorganic nutrients, photosynthesis, nitrogen metabolism. Mr. Terry (W)

PN 117. The Nutrition of Green Plants Laboratory. (3) Three 3-hour laboratory hours per week. Prerequisite: course 20, 153A-153B, or consent of instructor. Laboratory and greenhouse experiments in plant nutrition. Mr. Jacobson (F)

PN 120. Introductory Plant Biochemistry. (3) Three hours of lecture per week. Prerequisite: Biology 1A-1B. Introduction to the biochemistry of plant processes. Mr. Terry (W)

PN 188. Directed Group Study. (1-5) Selected topics in plant nutrition for advanced undergraduates. The Staff (F, W, Sp)

PN 190. Supervised Independent Study and Research. (1-6) Enrollment is restricted by regulations listed on page 38. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

(For graduate courses in Plant Nutrition, see Index.)
**Political Economy of Natural Resources (PENR)**

Department Office, 112 Gianni Hall  
Undergraduate Advisers: Richard B. Norgaard (in charge).

**UPPER DIVISION COURSES**

PENN 100A--100B--100C. Political Economy of Natural Resources.  (4-4-4) Three hours of lecture and one hour of discussion per week. Introduction to theories of economic, political, and administrative systems affecting environmental quality and natural resource allocation over time.

Mr. Norgaard (F)

**LOWER DIVISION COURSE**

PENN 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. Norgaard (F)

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**Resource Sciences (RS)**

Department Office, 101 Gianni Hall  
Undergraduate Major Advisers: Biology of Natural Resources, (to be appointed); Bioenergetics Emphasis: Mr. Freeling (W); Biological Sciences Emphasis: Mr. Gersper (Sp); Entomology Emphasis: Mr. Arkley (Sp)

**UPPER DIVISION COURSES**

RS 12. Natural History of the Insects. (4) Three hours of lecture, one hour of discussion per week, and optional field trips. Prerequisite: not intended for students majoring in zoology. An outline of the main facts and principles of biology as illustrated by insects with special emphasis on their significance in relation to plants and animals, including man.

Mr. Franky (F)

RS 14. Heredity, Evolution and Sociology. (8) Three hours of lecture and two 1-hour section meetings per week. Prerequisite: primarily for nonmajors. Broad aspects of genetics and evolution.

Mr. Terry; Food, Nutrition, and Dietetics: Mr. P. R. Day; Entomology: Mr. Arkley (Sp)

RS 18. The Soil and Its Significance to Man. (3) Three hours of lecture per week. Prerequisite: Chemistry 9B or equivalent for PENR 100A; Biology 1A or equivalent for PENR 100B; PENR 100C is prerequisite to PENR 100D; PENR 100B is prerequisite to PENR 100C; or consent of instructor. Economic models and explanations of natural resource and environmental management issues and their resolution; social and environmental implications of existing and alternative legal, political, and social frameworks in which they are developed. 

Mr. Gersper (Sp)

RS 18L. The Soil and Its Significance to Man—Laboratory. (1) One 3-hour meeting: laboratory, demonstrations, and problem sets. Prerequisite: course 18 (may be taken concurrently)

Mr. Williams (Sp)

RS 23. Introduction to Microbiology of Natural Resources. (3) Three hours of lecture per week. Prerequisite: a course in Biology, Chemistry 68, or consent of instructor. General principles of classification and function 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.

Mr. Thomson (in charge) (W)

RS 23L. Introduction to Microbiology of Natural Resources—Laboratory. (2) Six hours of laboratory per week. Prerequisite: course 23 (may be taken concurrently), and consent of instructor. Designed to acquaint students with techniques for handling microorganisms, bacteria, fungi, algae, viruses, and protozoa, and effects of these microorganisms on foods, fiber, and human health. 

Mr. Gersper (Sp)

**LOWER DIVISION COURSES**

RS 18. The Soil and Its Significance to Man. (3) See Resource Sciences for a complete description of this course.

Mr. Gersper (Sp)

RS 19L. The Soil and Its Significance to Man. (1) See Resource Sciences for a complete description of this course.

Mr. Williams (Sp)

**NOTE:** For key to symbols, see page 16.
UPPER DIVISION COURSES

SS 100. Soil Characteristics. (4) Three hours of lecture and three hours of laboratory per week, and one field trip per term. Prerequisite: Chemistry 1A–1B. Introduction to physical, chemical, and biological properties of soil. Mr. Day (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, geography, topography, and time as factors in development and chemistry of great world soil groups. Mr. Gersper (Sp)

SS 101F. Development and Morphology of Soils. (1) Field trips. Prerequisite: SS 101 should be taken concurrently. Saturday excursions in connection with SS 101. Mr. Arkley (Sp)

SS 102. Soil Physics. (5) 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 soil physical properties affecting them. 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. Mr. Arbanbright (Sp). Field trips to be arranged. Prerequisite: Geology 5A or 10; Chemistry 1A. Characterization and geography of agricultural, grazing, and forest soils of the western United States. Emphasis on soils of arid regions; their identification, classification, and use rating. Mr. Arkley (W)

SS 105. Summer Field Course. (8) Six weeks of daily field study and two hours of laboratory per week. Prerequisite: course 100 and consent of instructor. Field study of soils, with emphasis on their characteristics, morphology, and genesis. Field exercises in classifying and mapping soils, and preparation of soil survey reports. Prerequisite: SS 101 Laboratory. Mr. Begg ( Extrassession)

SS 110. The Soil as a Medium for Plant Growth. (6) Five hours of lecture per week. Prerequisite: Chemistry 1A–1B, 102, Geology 10, consent of instructor. A study of the influence of physical and chemical properties of the soil, and their activities in relation to the growth of plants. Mr. Berck (W)

SS 111. Soil Microbiology. (2) Two hours of lecture per week. Prerequisite: Biology 1A–1B or Biology 11A–11B. An introduction to soil microorganisms: their diversity, their activities in relation to soil organic matter, soil properties, the microbe, and biogeochemical cycling. Mr. Schneider (Sp)

SS 111L. Soil Microbiology Laboratory. (2) Six hours of laboratory per week. Prerequisite: concurrent enrollment in course 111. Laboratory work to acquaint the student with soil microorganisms, their isolation and handling and the measurement of their activities in soil. Planned to accompany lectures in course 111. Mr. Schneider (Sp)

SS 112. Soil Chemistry. (3) Two 1 1/2-hour lectures per week. Prerequisite: course 110. Physical-chemical properties influencing the availability of elements in soils to plants. Mr. Doner (W)

SS 113. Soil Chemistry Laboratory. (3) Three 3-hour laboratories per week. Prerequisite: course 112. Liquid, solid, and gaseous phases of soils; cation exchange, solubility, buffering, salinity, reactions; chemistry of macronutrients and micronutrients. Mr. Doner (W)

SS 198. Directed Group Study. (1–5) Selected topics in soil science for advanced undergraduates. The Staff (F, W, Sp)

SS 199. Supervised Independent Study and Research. (1–6) Enrollment is restricted by regulations listed on page 38. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

LOWER DIVISION COURSE

WST 10. Wood as a Renewable Natural Resource: Concepts and Conflicts. (4) Three hours of lecture per week. An introduction to the role of wood as a renewable, biodegradable resource in meeting needs of society for shelter and consumer products. Comparative review of renewable and non-renewable resource systems, and properties and uses of wood relative to ecological and environmental considerations. Mr. Wilcox, Mr. Arnbright (W)

UPPER DIVISION COURSES

WST 131. Anatomy and Physical Characteristics of Wood. (4) Two 1 1/2-hour lectures and one 3-hour laboratory per week. Prerequisite: upper division & graduate students from other departments may be admitted with consent of instructor. Identification of certain important commercial woods; relation of principal physical and mechanical properties to conditions of timber growth. (F)

WST 132. Mechanical Processing of Wood. (3) Two 1 1/2-hour lectures and one 3-hour laboratory per week. Prerequisites: upper division & graduate students from other departments may be admitted with consent of instructor. Field exercises in classification and mapping of soils, and preparation of soil survey reports. Prerequisite: SS 101 Laboratory. Mr. Kuznetz (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 woods, as influenced by such factors as wood characteristics and moisture content; thermal, electrical, and acoustical properties of wood. Mr. Arganbright (F)

WST 134. Mechanics of Wood. (4) Three 1-hour lectures and one 3-hour laboratory per week. Prerequisite: course 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, and design of wood structures. Mr. Schlievert (W)

WST 135. Chemical Processing of Wood. (3) Two 1-hour lectures per week; one 3-hour laboratory per week. Prerequisites: course 131 and 4 units of organic chemistry; upper division or graduate students from other departments may be admitted with consent of instructor. The technology and associated chemistry of processing of wood to produce pulp, paper, fiberboard and sliicelaminates; chemical treatments of wood. Mr. Brink (Sp)

WST 137. Adhesion and Bonding of Wood. (4) Three hours of lecture and 3 hours of laboratory per week. Prerequisite: course 132. Introduction to nature of adhesion; structure, properties, application and uses 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: course 131; 4 units of organic chemistry; upper division or graduate students from other departments accepted with consent of instructor. Chemical nature of wood and bark and the analysis and important reactions of their constituents, including cellulose, hemicelluloses, lignin, and associated materials. Mr. Arkley (F, Sp)

WST 198. Directed Group Study. (1–5) Meetings to be arranged. Prerequisite: consent of instructor. Group study or investigation of special problems. The Staff (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 38. Must be taken on a passed/not passed basis. The Staff (F, W, Sp)

IDS 136. Biological Deterioration of Wood. (3) See IDS 166. The staff with wood microorganisms, their isolation and handling and the measurement of their activities in soil. Planned to accompany lectures in course 111. Mr. Schneider (Sp)

UPPER DIVISION COURSES

WST 260A-260B-260C. General Departmental Seminar. (1–1–1) One hour of lecture per week. May be repeated for credit. Must be taken on a satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

210. Quantitative Methods in Economics. (4) Four hours of lecture per week. Prerequisite: Statistics 131, 132. Introduction to simultaneous equation models and statistical estimation; mathematical programming models and optimization procedures. Mr. Boles (Sp)

211. Applied Econometrics. (4) Four hours of lecture per week. Prerequisite: course 210. Determinants and stochastic programming. Optimal control and related problems. Estimation of equation systems. Mr. Just (F)

220. Economics of Resource Allocation. (4) Four and one-half hours of lecture per week. Prerequisite: Economics 201A and 201B or consent of instructor. Efficient allocation of resources, including efficient allocation of capital over time, market failure, consumption and production externalities, second-best theory. Mr. Lee (F)

221. Economics of Trade and Location. (4) Four hours of lecture per week. Prerequisite: Economics 201A and 201B or consent of instructor. Economic theory of international and interregional trade and location of economic activity in the context of regional and national development. Mr. Schmitz (F)

230A–230B. Marketing and Trade. (3–3) Three hours of lecture per week. Development of analytical models for the study of economic and policy issues in international and interregional trade and in the location of specific producing and processing industries; market performance in relation to natural resource allocation and utilization. Mr. Schmitz, Mr. Schmitz (W, Sp)

240A–240B. Domestic Rural Development. (3–5) Three hours of lecture per week. Concepts of development of the rural economy and society of the U. S. economic, sociological, and political approaches. Values and goals. Transformation of selected institutions of rural America. Critical analysis of past and potential government policies. Mr. LeVeen, Mr. LeVeen (W, Sp)

250A–250B. Agriculture in Economic Development. (3–3) Three hours of lecture per week. Origins and nature of underdevelopment in agriculture. The place and role of agriculture in economic development. Rural development under alternative farming systems. Policy issues in agricultural development. Sectoral models of growth and development. Agricultural and regional planning. Mr. de Janvry, Mr. de Janvry (W, Sp)

260A–260B. Natural Resource Economics. (3–3) Three hours of lecture per week. Theory, methods of analysis and current literature in natural resource economics and policy. Mr. Hsi, Mr. Hsi (W, Sp)
290. Special Topics in Resource, Development, and Trade Economics. (1-3) One to three hours of lecture per week. Prerequisite: consent of instructor. Topics to be announced annually. May be repeated for credit. The Staff (F, W, Sp)

298. Special Study for Graduate Students. (1-6) All properly qualified graduate students who wish to pursue a special field of study may do so if their proposed program of study is acceptable to the member hereof of the staff with whom they work. The Staff (Mr. Choppin de Janvry in charge)

299. Individual Research. (1–9) The Staff (Mr. Choppin de Janvry in charge) (W, F, Sp)

601. Individual Study for Master’s Students. (1–8) Individual study in consultation with the major field advisor for qualified students to prepare for the various examinations required for the M.S. degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (Mr. Choppin de Janvry in charge) (W, F)

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 the Ph.D. degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (Mr. Choppin de Janvry in charge) (W, F)

__Cell Physiology__

Department Office, 251 Hilgard Hall
Chairman: Daniel I. Arnon
Graduate Advisor: Mr. Arnon

*222. Unifying Concepts of Photosynthesis. (3) Two 1.5/2-hour lectures per week. Prerequisite: consent of instructor. A reexamination of all aspects of photosynthesis and cellular systems. Mr. Buchanen, Mr. Amon, Mr. Malkoff (F)

299. Individual Research. (1–9) The Staff (Mr. Choppin de Janvry in charge) (W, F, Sp)

__Entomological Sciences__

Department Office, 137 Glimnall Hall
Chairman: Evert I. Schlinger
Graduate Advisors: Entomology: Mr. Dahlsten, Mr. Oster, Mr. Pimmon, Mr. Purcell; Parapsitology: Mr. Weiman; Medical Entomology: Mr. Anderson

204. Principles of Systematic Entomology. (3–3–3) Lectures, 3 hours per week. Theory, philosophy, and methodology of systematic entomology. Each offering may be taken separately for credit and in any sequence.

204A. Special Topics in Insects. (3) Three hours of lecture per week. Prerequisite: Entomology 104 and an upper division course in genetics. Theory, philosophy, and methodology of systematic entomology. Mr. Daly, Mr. Powell (F)

*204B. Contemporary Techniques in Systematic Entomology. (3) Three hours of lecture per week. Prerequisite: Entomology 104 and course in elementary statistics. Theory, philosophy, and methodology of contemporary techniques in systematic entomology. Mr. Powell, Mr. Doyen (F)

*204C. Theory and Principles of Classification and Nomenclature. (3) Three hours of lecture per week. Prerequisite: Entomology 104 or consent of instructor. Theory, philosophy, and methodology of the principles of systematic entomology. Mr. Powell, Mr. Schlinger (F).

205. Population Ecology. (3) Three hours of lecture per week. Prerequisite: Entomology 105. To be offered in even-numbered years. Dynamics, regulation, and mensuration, theory of natural control. Mr. Hufaker (F)

210. Principles and Problems in Agricultural Entomology. (3) Three hours of lecture per week. Prerequisite: Entomology 100 or 110. Bionomics of important insects and mites on agricultural crops; their relationships to crop production; and special problems of control. Mr. Allen (Sp)

211. Insect-Crop Relationships. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: Entomology 100 or 110. Economics of important insects and mites on agricultural crops; their relationships to crop production; and special problems of control. Mr. Allen (Sp)

214. Concepts and Research in Forest Entomology. (3) Three hours of guided discussions per week and two 2-day field trips. Prerequisite: Entomology 102. Discussions of concepts and practices in forest entomology and the past and current research from which they are derived. Mr. Wood, Mr. Dahlsten (F)

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 102. Selected 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: upper division course in animal physiology. Locomotion, orientation, feeding-behavior, migration, rhythms, communication, hormones, and behavior. Mr. Loher (Sp)

219L. Laboratory in Physiological Mechanisms in Insect Behavior. (1) Three hours of laboratory per week. Prerequisite: consent of instructor. Recommended: Biochemistry 102. Selected topics. May be taken for credit. Mr. Casida, Mr. Gordon (W)

230. Biology of Parasitoids. (4) Two hours of lecture and six hours of laboratory per week. Prerequisite: Entomology 120 or consent of instructor. The ecology, behavior, and control of parasitoids. Emphasis is given to field and laboratory analysis of host-parasitoid relationships and the evolution of these specializations in a wide range of taxonomic groups. Mr. Callagrine (F)

240. Advanced Insect Pathology. (3) Two hours of lecture and three hours of laboratory per week. Prerequisite: Entomology 102, 103, 140. To be offered in even-numbered years. Advanced consideration of infectious and noninfectious diseases of insects, diagnosis, symptomatology, morphology, physiology, epizoology, and microbial control. Mr. Tanada (Sp)

253. Advanced Medical and Veterinary Entomology. (2) Two hours of lecture per week. Prerequisite: Entomology 153, Public Health 180A–180B. To be given in even-numbered years. The genesis of anthropon-borne diseases. Mr. Furman, Mr. Anderson (Sp)

260. General Entomology. (3) Three hours of lecture per week. Prerequisite: consent of instructor. Taxonomy, morphology, development, biomics and host associations, parasites, soil and plant nematodes. Special topics include invertebrates as vectors of disease-producing agents, nutrition, host resistance, and chemical and biological control of nematodes. Mr. Poinar (W)

260L. General Entomology. (1) Three hours of laboratory per week. Prerequisite: consent of instructor. May be taken concurrently with course 260. Involves a laboratory or field project dealing with some aspect of entomology. Designed to give the student an opportunity to individually investigate some aspect of entomology in detail. Mr. Poinar (W)

283. Acarology. (4) Two hours of lecture and six hours of laboratory per week. Prerequisite: Entomology 100, 101. Ecology, biology, and classification of mites and ticks, with emphasis on the phyllophagous and free-living forms. Mr. Sylvester, Mr. Seth (Sp)

285. 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. The role of insects in the transmission and causation of plant diseases; the relationships of the pathogens to their vectors and the approaches to control. Mr. Seybold (Sp)

*288. History of Entomology. (4) Three hours of lecture per week. Prerequisite: Entomology 100. Development of influential ideas and principles in biology with special reference to those which have contributed to the evolution of scientific methods. Mr. Hagen (W)

275. Immature Insects. (4) One hour of lecture and nine hours of laboratory per week. Prerequisite: Entomology 100, 101. To be given in even-numbered years. The biology and classification of immature insects with emphasis on acclastic and holometabolous forms. Mr. Anderson, Mr. Davy, Mr. Powell (Sp)

277. Seminar in Insect Physiology. (2) Two hours of lecture per week. May be repeated for credit. To be taken on a satisfactory/unsatisfactory basis. Mr. Heinrich, Mr. Loher, Mr. Mittler, Mr. Pipa (F, Sp)

280. Seminar in Parasitology. (2) May be repeated for credit. Mr. Allen, Mr. Dom, Mr. Weimann (W)

289. Seminar in Entomological Sciences. (2) May be repeated for credit. Mr. Allen, Mr. Middlekauff (F, W)

292. Seminar in Insect Biochemistry and Toxicology. (2) May be repeated for credit. Mr. Casida, Mr. Gordon (W, Sp)

293. Seminar in Insect Pathology. (2) May be repeated for credit. Mr. Falcon, Mr. Pimmon, Mr. Poinar, Mr. Tanada (F, Sp)

294. Seminar in Systematic Entomology. (2) May be repeated for credit. Mr. Allen, Mr. Dahsten, Mr. Powell, Mr. Schlinger (W, Sp)

295. Seminar in Insect Ecology and Biological Control. (2) May be repeated for credit. Mr. Dahsten, Mr. Hufaker, Mr. van den Bosch (F, Sp)

296. Seminar in Forest Entomology. (2) May be repeated for credit. Mr. Dahsten, Mr. Wood (F)

298. Directed Group Studies. (1–6) Advanced study of specific topics which may vary from quarter to quarter. The Staff (Mr. Schlinger 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. Schlinger 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 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 (Mr. Schlinger in charge) (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 the Ph.D. degree. May not be used for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. The Staff (Mr. Schlinger in charge) (F, W, Sp)

Staff Seminar in Entomology. (No credit) Biweekly meeting for presentation of special topics. The Staff (Mr. Schlinger in charge) (F, W, Sp)

Note: For key to symbols, see page 10.
Forestry and Conservation

Department Office, 145 Mulford Hall
Chairman: Rudolf F. Grah

Graduate Advisers: Forestry and Wildland Resource Science: Mr. Wensei; Range Management: Mr. Heady; Wood Science and Technology: Mr. Dickinson

Forest Science

201. Advanced Forest Measurement. (3) Two 1/2-hour lecture/discussion meetings per week. Prerequisite: General biology or equivalent. Advanced topics in forest mensuration and forest inventory methods. Mr. Wensei (W)

202. Advanced Geographic Interpretation. (3) Two 1-hour lectures and one 2-hour discussion period per week. Prerequisite: a basic course in photo interpretation in photogrammetry. A survey of current developments in forest photo interpretation and related fields. An analysis of the practical forestry applications of multiband, true colour, and image translation. Practice in the interpretation of aerial photography and other imagery of forested areas. Mr. Colwell (Sp)

205. Seminar on Fire as an Ecological Factor. (3) Three hours of lecture per week. Mr. Wakimoto (W)

209. Seminar in Research Methods. (3) Two 1/2-hour seminars per week. Prerequisite: Identification and statement of research problems; formation of hypotheses; analytical methods applicable to forestry problems. Mr. Wensei (W)

211. Seminar in Analysis of the Forest Economy. (3) One 3-hour seminar per week. Prerequisite: 12 units of economic theory, resource economics, or for forestry economics. Mr. McKillop (F)

212. Seminar in Economics of Forestry Enterprises. (3) One 3-hour seminar per week. Prerequisite: 12 units of economics, agricultural economics, or for forest economics. Mr. Teeguarden (W)

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 harvest scheduling and related forest management issues. Mr. McKillop (F)

214. Case Studies in Wildland Resource Management. (4) Two 1/2-hour meetings per week. Prerequisite: Forestry 110A-110B, 114 or equivalent. Case studies involving inventory, evaluation, decision making, and planning for wildland resource management. Mr. Zivnuska (F, W)

215. Seminar in Wildland Resource Policy. (3) One 2-hour seminar per week. Prerequisite: Forestry 115 or equivalent. Mr. Zivnuska (Sp)

217. Seminar in Sociology of Natural Resources. (3) Two 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. Mr. Libby (F)

221. Genetics of Forest Trees. (3) Two 1/2-hour meetings per week; occasional field trip locally, and one day-long trip to Institute of Forest Genetics. Open to senior and graduate students who have completed For. 100A-100B-100C. Includes both genetic theory and practice of forestry. Mr. Zinke (F)

222. Seminar in Forest Influences and Watered Management. (3) One 3-hour seminar per week. Open to qualified graduate students from other departments. Mr. Zinke (F)

224. Natural Resource Ecosystems. (3) Two-and-one-half hours of lecture per week. Derivation of ecosystem concept from ecological and philosophical backgrounds; definition of ecosystem study to the natural and social sciences; general systems analysis and synthesis; man's role as dependent factor and independent planning agent; the ecosystem as a conceptual tool in resource management. Mr. Schultz (Sp)

Wildlife Science

270. Seminar in Wildlife Biology and Management. (3) Three hours of lecture per week. Prerequisite: For. 125. Graduate level. A broad introduction to wildlife, management, and current issues in the field. Mr. Helms (F)

Wood Science

230. Advanced Silviculture. (3) Two 1/2-hour lectures per week. Prerequisite: Forestry 125. Mr. Heady (Sp)

231. Advanced Wood Anatomy. (3) One 3-hour lecture/discussion per week. Prerequisite: Wood Science and Technology 131 or equivalent. Mr. Fristrom (Sp)

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. Shrinkage and swelling in water, aqueous solutions, and nonaqueous liquids. Fluid flow including permeability and diffusion. Thermal properties with modus of heat transfer important in wood processing and usage. Mr. Arganbright (W)

233. Advanced Wood Mechanics. (3) Two 1/2-hour lectures per week. Prerequisite: Wood Science and Technology 134, Civil Engineering 130 or equivalent. Definition of wood, mechanics of the cell wall, current topics from the literature. Mr. Schneidwein (Sp)

235. Chemistry of Poly saccharides, Lignin, and Extractives. (4) Four hours of lecture per week. Prerequisite: Wood Science and Technology 135 (may be taken concurrently) or equivalent. Qualitative and quantitative methods of analysis. Aspects of nomenclature, structures, biosynthesis, reactions, and distribution of terpenoids, flavenoids, tannins, tig nans, lignins, monosaccharides, and oligosaccharides, and related materials occurring in plant material with emphasis on woody plant structures. Mr. Brink (Sp), Mr. Zavarin (Sp)

238A. Wood Anatomy. Mr. Cockrell, Mr. Wilcox (F, W, Sp)

238B. Wood Chemistry. Mr. Zavarin (F, W, Sp)

238C. Chemical Processing of Wood. Mr. Brink (F, W, Sp)

238D. Wood Mechanics. Mr. Schneidwein (F, W, Sp)

238E. Wood Physics. Mr. Arganbright (F, W, Sp)

238F. Mechanical Processing of Wood. Mr. Klamacki (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. (1-4) Hours to be arranged. Prerequisites: Open to properly qualified graduate students. Advanced study in wood science and technology, primarily for advanced graduate students. Course, including each of its subdivisions, may be repeated. The Staff.

290A-290B-290C-290D-290E. Graduate Seminar in Genetics. (1-4; 1-4; 1-4; 1-4; 1-4) One and one half hours of seminar per week. Prerequisite: consent of instructor. Open to qualified graduate students from other departments. Current student research and reports in wood science and technology. Course may be repeated. Satisfactory/Unsatisfactory basis. Mr. Menke (W), Mr. Libby (F, W)

291. Experimental Courses in Genetics. (2-5) Prerequisite: consent of instructor. Recent developments in genetics.

Genetics

Department Office, 345 Mulford Hall
Chairman: Seymour Fogel

Graduate Advisers: Mr. Freeing, Ms. St Lawrence

210. Developmental Genetics. (2) Two hours of lecture per week. Prerequisite: Genetics 159 and consent of instructor. The clinical delineation of human genetic diseases, including chromosomal abnormalities and polygenic disorders. Seminar." Mr. Menke (W)

230A. Advanced Population Genetics. (3) Two hours of lecture and three hours of laboratory per week. Prerequisite: Genetics 159 and consent of instructor. Mr. Fristrom (Sp)

230B. Developmental Genetics. (3) One 1-hour lecture per week. Prerequisite: open to qualified graduate students from other departments. Current student research and reports in wood science and technology. Course may be repeated. Satisfactory/Unsatisfactory basis. Mr. Menke (W, Sp)

235A-235B. Clinical Aspects of Human Genetics. (3-3) Three hours of lecture per week. Prerequisite: Genetics 159 and consent of instructor. The clinical delineation of human genetic diseases, including chromosomal abnormalities and polygenic disorders. Seminar. Mr. Menke (W)

237F. Genetics of Gene Regulation in Higher Organisms. (3) Two hours of lecture and one hour of discussion per week. Prerequisite: consent of instructor. The use of specific biochemically-accessable gene systems—especially of maize, Drosophila and mice—to better understand rules of development and evolution. Extensive reading and criticism of primary experimental and theoretical sources. Mr. Freeing (W)

280A-280B-280C-280D. Graduates Seminar in Genetics. (1-4; 1-4; 1-4; 1-4; 1-4) One and one half hours of lecture per week. Prerequisite: Molecular or cellular genetics; 280A, Developmental genetics; 280C, Cytogenetics; 280D, Population or evolution genetics; 280E, Human genetics. The Staff (F, W, Sp)

290F. Origin Problems in Genetics. (1) One hour of seminar per week. Prerequisite: consent of instructor. Emphasis on rules rather than mechanisms underlying evolutionary, development, and genetic phenomena. Topics vary with student interest (e.g., origins of life, the role of biologically gene circuits), but the features common to all origin problems are stressed. May be repeated. To be given on a satisfactory/unsatisfactory basis. Mr. Freeing (W, Sp)

291. Experimental Courses in Genetics. (2-5) Prerequisite: consent of instructor. Recent developments...
NATURAL RESOURCES (Grad.): Plant Pathology / 231

Graduate Advisers: Mr. Briggs, Ms. Os- 
twald; Food Science: Mr. Bjeladnes, Ms. Calloway

201A–201B–201C. Seminar in Nutrition. (1–1–1) 
One hour of lecture per week. Primarily intended for first-year graduate students. Introduction to literature research in food and nutritional sciences. 
The Staff, 201A (F); 201B (W); 201C (Sp)

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. Emphasis on dietary and hormonal controls of metabolic pathways. 
Mr. Abraham (W)

(3) Two hours of lecture per week. Prerequisite: Biochemistry 10A–10B–10C, or consent of instructor. Nutrition of proteins relative to their structure and function. 
Mr. Gold (Sp)

206. Innovations in Food Processi ng. (2) Two hours of lecture per week. Prerequisite: Nutritional Sciences 106 and 107. Current and new methods of food processing. 
Emphasis on practical and economic problems in nutritional science. Students may select special problems of their interest. 
Mr. Gross (F)

211. Research Methods in Nutritional Sciences, Instrumentation. (5) One hour of lecture and twelve hours of laboratory per week. Prerequisite: graduate standing and consent of instructor. Methods of instrumentation and the application of chromatography, radiolabeled, ultracentrifugation, and other techniques in nutritional sciences. Research students may select special problems of their interest. 
Mr. Morgan (Sp)

212. Research Methods in Nutritional Sciences, Biological. (5) One hour of lecture and twelve hours of laboratory per week. Prerequisite: graduate standing and consent of instructor. Effects of nutrition on biochemical and physiological responses of various biological systems. Advanced techniques for metabolite analysis and their application to individual problems in nutritional sciences. 
Mr. Campbell (Sp)

290. Advanced Human Nutrition. (3) Three hours of lecture per week. Prerequisite: Nutritional Sciences 160 or equivalent. An advanced course in human nutrition. Emphasis is on the nutrition of normal individuals. 
The Staff (W)

290. Advanced Seminars In Nutritional Sciences. (1–2) One hour of lecture per week for each unit. Prerequisite: open to qualified graduate students. May be repeated for credit. 
Emphasis is on the nutrition of normal individuals. 
The Staff (W)

296. Directed Group Study. (1–6) Prerequisite: consent 
of instructor. 
The Staff (Mr. Weinhold in charge) (F, W, Sp)

298. Research in Human Nutrition. (1–12) 
The Staff (F, W, Sp)

301. Professional Preparation: Supervised Teaching in Food Science. (2–3) One hour of lecture and three to five hours of laboratory per week. Prerequisite: graduate standing in food science, nutrition, or closely related field, or consent of instructor. Practical supervised experience in teaching nutrition and food science classes at the college and university level. 
Mr. Morgenstern (F)

302. Professional Preparation: Supervised Teaching in Nutritional Sciences. (2–6) One hour of lecture and three to five hours of laboratory per week. Prerequisite: graduate standing in nutrition, food science, biology, nutrition, or closely related field, or consent of instructor. Practical supervised experience in teaching nutrition and food science classes at the college and university level; course content, planning and evaluation; preparation and presentation of instructional units. 
Mr. Morgenstern (F)

602. Individual Study for Doctoral Students. (1–6) 
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. May not be taken for unit or residence requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis. 
The Staff (F, W, Sp)

Staff Seminar in Nutritional Sciences. (No credit) 
The Staff (F, W, Sp)

Plant Pathology

Department Office, 147 Hilgard Hall
Chairman: A. R. Weinhold
Graduate Advisers: Mr. Sherman V. Thomson, Mr. T. Jack Morris

201. Seminar in Plant Pathology. (1) One hour of lecture per week. Must be taken on a satisfactory/unsatisfactory basis. 
The Staff (F, W, Sp)

202. Biology of Plant Pathogenetic Fungi. (4) Three hours of lecture and three hours of laboratory per week. Prerequisite: course 120 and 208, and a course in introductory mycology. Introduction to the biology of plant pathogenic fungi with emphasis on problems in collection, cultivation and identification. 
Mr. Hancock (W)

204. Interdepartmental Studies

IDS 205A–205B–205C. Clinical Correlates: Hu-
man Growth, Development and Aging. (1–1–1) 
One 1 1/2-hour session per week. Prerequisite: consent of instructor. Various stages of the life span illustrated by clinical cases. Prerequisite: content of instructor. 
Mr. Morgan (in charge) (F, W, Sp)

IDS 205D–205E–205F. Clinical Correlates: In-
truction to Clinical Medicine. (2–2–2) Two 1 1/2-
hour sessions per week. Prerequisite: content of instructor. Patho-physiological correlates of medicine. Introduction to specific aspects of medicine (gynecology, obstetrics, pediatrics, internal medicine, surgery, psychiatry). Lectures and presentations of clinical cases. 
Mr. Picchi (in charge) (F, W, Sp)

IDS 206A–206B–206C. Clinical Correlates: Medi-
cine and Physical Diagnosis. (2–2–2) Two 1 1/2-
hour sessions per week. Prerequisite: content of in-
structor. Correlates of normal and developmental anomalies 
and genetic and clinical material. Principles of physical diagnosis and 
history taking. 
Mr. Eisenberg (in charge) (F, W, Sp)

IDS 206D–206E–206F. Clinical Correlates: Phys-
tical Diagnosis and History Taking. (2–2–2) One 
4-hour session per week. Prerequisite: consent of in-
structor. Correlates of normal and developmental anomalies 
and genetic and clinical material. Principles of physical diagnosis and 
history taking. 
Mr. Picchi (in charge) (F, W, Sp)

IDS 240. Nutrition of Population Groups. (3) 
Lec-
tures, 3 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. 
Ms. Huenemara, Mr. Morgenstern, Ma. Mural (Sp)
Institutions 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. Weinhold in charge) (F, W, Sp)

SOILS AND PLANT NUTRITION

Department Office, 108 Hilgard Hall
Chairman: Louis Jacobson
Graduate Advisers: Soil Science: Mr. McColl; Plant Physiology: Mr. Gold

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. Store, Mr. Williams (W, Sp)

208. Special Study for Graduate Students. (1-6) The Staff (F, W, Sp)

209. Research in Plant Nutrition. (1-12) Prerequisite: graduate standing and consent of instructor. The Staff (F, W, Sp)

212. Advanced Soil Chemistry. (4) Two 1-hour lectures and two 1-hour laboratory per week. Prerequisite: Soil Science 111 or equivalent. Offered in the fall and spring quarters. Mr. Barshad (Spring)

110. Soil Science 110; Chemistry 109. Applications of thermodynamics to soil systems. Mr. Babcock (W)

211. Advanced Soil Biochemistry and Soil Biology. (3) Two 1-hour lectures and discussions per week. Prerequisite: Soil Science 111 or equivalent. Offered in even-numbered years. Microbial activity at surfaces and in soils, general nutrition of soil microorganisms and the fate of agricultural chemicals in soil. Origin, nature, and properties of soil organic matter. Mr. Schneider (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. Barshad (W)

213. Podochemistry and Mineralogy of Soils. (3) Three 1-hour lectures per week. Prerequisite: graduate standing in soil science or consent of instructor. Crystal structure and colored chemistry of soil clay minerals; application of principles of mineralogy and chemistry to a quantitative evaluation of soil formation. Mr. Barshad (W)

213L. Podochemistry and Mineralogy of Soils. (2-8) Six to fifteen hours of laboratory per week. Prerequisite: courses 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. (4) Three hours of lecture and two hours of group discussion per week. Prerequisite: course 102; Mathematics 1A–1B–1C. 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. Day (Sp)

235. Seminar. (2) One 1/2-hour meeting per week. Prerequisite: graduate standing in soil science, plant physiology, and related subjects. The Staff (F)

236. Seminar in Soils and Plant Nutrition. (1-12) Prerequisite: graduate standing and consent of instructor. The Staff (F, W, Sp)

501. 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 (Mr. Jacobson in charge) (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 (Mr. McColl in charge) (F, W, Sp)

503. Retrospect in Soils and Plant Nutrition. (1-12) Prerequisite: graduate standing and consent of instructor. The Staff (F, W, Sp)

601. 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 (Mr. McColl in charge) (F, W, Sp)

506. Seminar in Soil Science. (2) One 1/2-hour meeting per week. Prerequisite: graduate standing in soil science, plant physiology, and related subjects. The Staff (F)

509. Special Study for Graduate Students. (1-6) The Staff (F, W, Sp)

519. Research in Soil Science. (1-12) Prerequisite: graduate standing and consent of instructor. The Staff (F, W, Sp)

600. 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 (Mr. Jacobson in charge) (F, W, Sp)

603. 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 (Mr. McColl in charge) (F, W, Sp)

School of Optometry

School of Optometry Office, 107 Minor Hall

Professors:

Irving Fatt, Ph.D.
Morton C. Fies, O.D., Ph.D.
Monroe J. Free, O.D., Ph.D.
Robert B. Madsall, O.D., Ph.D.

Graduate Advisers:

Mr. McColl (F)
Mr. Hirsch (F)

Associate Professors:

Anthony J. Adams, O.D., Ph.D.
Theodore Cohn, Ph.D.

Assistant Professors:

J. L. Biler, M.B.
J. R. Hobson, B.S., (Emeritus)
J. J. O. Jones, O.D., Ph.D.

Associate Clinical Professors:

Marshall B. Skimson, M.D.
Roy H. Brandt, M.D.
Allan S. Fend, O.D.
Michael J. Jackerou, O.D., M.S.
Frank V. Johnson, Jr., O.D.

Assistant Clinical Professors:

Harvey Arnold, O.D.
John C. Andrews, M.D.
Jennifer M. Chastin, M.Phil., Ph.D.
Bernard H. Pitblad, O.D.
John D. Grahum, O.D.
Anastasia Guteser, O.D.
William L. Harris, O.D.
Ronald L. Harris, O.D.
Craig K. Hilske, M.D.
Leslie D. Kincaid, M.D.
William Levin, M.D.

Lecturers:

Daniel B. Carter, O.D., Ph.D.
Michael G. Harris, O.D., M.S.
Kenneth K. Kees, O.D., M.D.
Edward Tamler, M.D.

Clinical Instructors:

Gary L. Lember, O.D., Ph.D.
Julie T. Eiberg, O.D.
Jenny V. Gong, O.D.
Dottie Hoppomon-Ponton, O.D.
Robert D. Jones, O.D.
Roderick Keener, O.D.
Mark D. McClean, O.D.
Justin R. Sheehan, O.D.
Timothy L. Sengus, O.D.
Barry C. Whelan, O.D.
Wayne W. Zimmerman, O.D.

The School of Optometry provides training in the practice of optometry, drawing upon the principles of anatomy, physiology, computer, and psychology, and includes the study of both environmental and personal factors influencing visual performance.

The four-year program leads to the degree of Doctor of Optometry, which qualifies one to take the state board examinations in all states. The first year is devoted to more advanced study of basic sciences which form the background for optometry; the second and third years are devoted to the science of optometry and the acquisition of technical skills; the fourth year is devoted to the practice of optometry and the detailed study of specialized areas.

The School of Optometry also offers an undergraduate program in physiological optics leading to the B.S. degree. The primary purpose of this curriculum is to prepare students for the graduate program in physiological optics.

The graduate program in physiological optics leads to the Master of Science degree and the Doctor of Philosophy degree. Offered in cooperation with other departments of the University, this program is designed to prepare students for a career in teaching and research in the sciences of vision.

For further information consult the Announcement of the School of Optometry, available at 107 Minor Hall.

PHYSIOLOGICAL OPTICS

An undergraduate program in physiological optics is offered which leads to the B.S. degree. The primary purpose of this program is to prepare students for the graduate program in physiological optics rather than the practice of optometry.

The graduate program in physiological optics is a field of study leading to the M.S. and Ph.D. degrees. The program is administered by the Group in Physiological Optics, representing faculty from the School of Optometry.

Those interested in this graduate program should familiarize themselves with the regulations of the Graduate Division and, in addition, should contact the adviser of the Group in Physiological Optics as early as possible. Admission to this program requires a bachelor's degree in physics, physiology, physiological 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.

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.

Mr. Hirsh (F)

104. Optical Mists. (2) Three 1-hour lectures and one 3-hour laboratory per week. Prerequisite: Physics 108A. 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, edging, beveling, drilling, mounting, polishing, and frame-fitting and adjusting.

Mr. Kors (Sp)

105. Optometric Practice. (2) Three 1-hour lectures and one 3-hour laboratory per week. Prerequisite: course 104. Continuation of Optometry 104. Mr. Kors (F)
OPTOMETRY / 233

109A—109B—109C. Introduction to Optometric Patient Care. (2—2—2) One hour of seminar and four hours of clinic per week. Prerequisite: registered student 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. Grisham, and Clinic Faculty (F, W, Sp).

127. Refraction of the Eye. (5) Three 1-hour lectures, two 2-hour laboratories per week. Prerequisite: Physiological Optics. 102. Optical and biological variables determining the refractive state of the eye. Lectures in laboratory assignments on subjective and objective techniques of measurement and methods of correcting refractive anomalies: skiatmy, keratometry, ophthalmoscopy, visual acuity, subjective refraction, amplitude of accommodation. Mr. Harris (F).


130. Optometric Analysis. (5) Three 1-hour lectures and two 2-hour laboratories per week. Prerequisite: course 127. Routine examination and case analysis; interpretation of laboratory and clinical findings. Mr. Stamper, Mr. Metz, Mr. Cavender (Sp).

133. Anomalies of Binocular Vision. (8) Four 1-hour lectures and one 2-hour laboratory. Prerequisites: courses 127, 130. Detection, measurement, classification, etiology, symptoms, signs, and prognosis of the latent and manifest disorders of binocular fixation; binocular vision; noncomitant; orthoptics and visual training. Clinical observations. Mr. Flom (Sp).

139. Ocular Disease Instrumentation. (3) Two hours of lecture and one 1-hour laboratory per week. Prerequisite: course 140A. Clinical examination procedures for the detection and diagnosis of ocular disease. Examination of the eye with the slit lamp, microscope, ophthalmoscope, contact lens, and visual field testing. Mr. Poise and Staff (Sp).

140A. Principles of Pharmacology: General and Ocular Disease. (4) Four 1-hour lectures and 1 hour of laboratory per week. Prerequisite: course 128. Introduction to basic principles of drug action. Pharmacodynamics, mechanisms of action, structure. Emphasis on those agents used in clinical optometry and principles governing their use. Ms. Jose (W).

140B. Optometric Pharmacology. (3) Formerly 131A. One and one-half hours of lecture and 2 hours of laboratory per week. Prerequisite: course 140A. Actions, uses, contraindications of ophthalmic preparations with emphasis on diagnostic drugs used in clinical practice. Ms. Jose (Sp).

150A. Ocular Disease. (4) Four hours of lecture or recitation and one 1 1/2-hour practicum per week. Prerequisite: Optometry 131A, 131B, and 139. The role of the optometrist in detection of ocular and systemic disease. The nature of ocular disease—etiology, diagnosis, detection, and referral criteria and management. Topical drugs used in ocular examination. Diseases of the lids, sclera, conjunctiva, and cornea. The glasses, contact lenses, and ocular surface. Mr. Carter, Mr. Tamler (W).

150B. Ocular Disease. (4) Four hours of lecture or recitation and one 1 1/2-hour practicum per week. Prerequisite: Optometry 150A. Continuation of 150A. Diseases of the crystalline lens, iris, ciliary body, chorioid and retina, and optic nerve. Mr. Carter, Mr. Tamler (W).

150C. Ocular Disease. (4) Four hours of lecture or recitation and one 1 1/2-hour practicum per week. Prerequisite: Optometry 150B. Continuation of 150B. Neurological disorders affecting vision. Ocular aspects of systemic disease. Headaches. Psychological factors in the causation of visual symptoms. Interrelationships among optometrists, ophthalmologists, and other physicians in the detection, evaluation and management of ocular and systemic diseases. Mr. Carter, Mr. Tamler (Sp).

153. Advanced Geometric Optics. (8) One 2-hour and one 1 1/2-hour lectures. Prerequisite: Physics 106A. Gaussian optics. Aberration and dispersion, oblique astigmatism, "corrective curve" lenses, design and characteristics of ophthalmic instruments. Mr. Mandell (F).

158A—158B. Vision Rehabilitation. (4—4) Three 1-hour lectures and one 2-hour laboratory per week. Prerequisite: courses 127 and 453. Aniseikonia, low vision and pediatric optometry. Orthoptics, pleoptics and pediadioptometry. Sequence Beginning (W), Mr. Mandell (W), Mr. Grisham (Sp).

161. Contact Lenses. (5) Three 1-hour lectures and two 3-hour laboratories per week. Prerequisites: courses 105 and 454. Historical development, physical and optical properties of contact lenses and their adaptation to 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 in industry, schools and vehicle operations; eye safety programs; food, housing, vision care by means of government assistance, in the armed forces, in health clinics and hospitals, group practices and prepaid insurance programs. Mr. Neumaler (W).

178. Applied Psychology for Optometrists. (2) Two 1-hour lectures per week. Prerequisite: senior standing in Optometry. Patient management and communication, oral and written; suggestion and hypnosis. Mr. Harris (Sp).

185. Practice Management. (4) Three 1-hour lectures per week and two field trips per quarter. Prerequisite: senior standing in Optometry. Laws governing the practice of optometry. The establishment and management of an optometric practice; economics, taxes, insurance, accounting methods, office design, mode of practice, practice administration, and patient relations; professional organizations and societies. Mr. Sarver (F).

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: fourth year standing in optometry. Fundamentals of scientific inquiry; problems in vision research; laboratory and clinical tools and techniques; experimental 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. Cohe, and Staff (W, Sp).

190D. Optometric Internship. (5—5—5) Fifteen to twenty hours of clinic per week. Prerequisite: completion of research results; completion of a project. To be offered on a passed/not passed basis. Mr. Poise and Staff (F, W, Sp).

190E. Optometric Internship. (5—5—5) Sequence beginning F.

190F. Optometric Internship. (5—5—5) Sequence beginning F.

190G. Optometric Internship. (5—5—5) Sequence beginning F.

190H. Optometric Internship. (5—5—5) Sequence beginning F.

190I. Optometric Internship. (5—5—5) Sequence beginning F.

190J. Optometric Internship. (5—5—5) Sequence beginning F.

190K. Optometric Internship. (5—5—5) Sequence beginning F.

190L. Optometric Internship. (5—5—5) Sequence beginning F.

190M. Optometric Internship. (5—5—5) Sequence beginning F.

190N. Optometric Internship. (5—5—5) Sequence beginning F.

190O. Optometric Internship. (5—5—5) Sequence beginning F.

190P. Optometric Internship. (5—5—5) Sequence beginning F.

190Q. Optometric Internship. (5—5—5) Sequence beginning F.

190R. Optometric Internship. (5—5—5) Sequence beginning F.

190S. Optometric Internship. (5—5—5) Sequence beginning F.

190T. Optometric Internship. (5—5—5) Sequence beginning F.

190U. Optometric Internship. (5—5—5) Sequence beginning F.

190V. Optometric Internship. (5—5—5) Sequence beginning F.

190W. Optometric Internship. (5—5—5) Sequence beginning F.

190X. Optometric Internship. (5—5—5) Sequence beginning F.

190Y. Optometric Internship. (5—5—5) Sequence beginning F.

190Z. Optometric Internship. (5—5—5) Sequence beginning F.

Advanced Summer Clinic. (3 or 6) One hour of seminar and eight hours of clinic or two hours of seminar and sixteen hours of clinic. Prerequisite: consent of instructor and completion of 455. Optometric exam.
inaction of patients in the clinic performed independently by the student clinicians under supervision of the clinic staff (up to 6 units of 489 may be substituted for course 480 toward the O.D. degree). Must be taken on a passed/not passed basis.

Mr. Polase and Staff (Su)

488. Group Studies, Seminars or Group Research. (1–8) One to eight hours of work per week. Prerequisite: varies with topic, to be specified by the instructor for each group. Group studies of selected topics. Mr. Freeman, Mr. Cohn (F, W, Sp)

499. Special Study. (1–8) One 1-hour class per week. Prerequisite: senior standing in Optometry. Independent study in Optometry. Mr. Cohn (F, W, Sp)

**Physiological Optics**

**UPPER DIVISION COURSES**

101. Anatomy of Eye and Orbit. (5) Three 1 1/2-hour lectures and one 2-hour laboratory per week. Prerequisite: Anatomy 102. The macroscopic and microscopic anatomy of the orbit, its content and adjacent structures. The cranial nerves associated with vision and their orbit. The blood supply to the eye and orbit. The embryology of the eye. Mr. Cohn (W)

102. Diptics of the Eye. (8) Four 1-hour lectures and one 1/2-hour laboratory per week. Prerequisite: Physics 106A. The eye as an optical instrument: imaging properties, optical defects, and image quality; dimensions; optical constants, schematic eyes, cardinal points, magnification, accommodation, retinal image size, blur circles, diffraction, aberrations, scatter, and absorption. Mr. Freeman (Sp)

125. Vegetative Functions of the Eye. (3) Three 1-hour lectures per week. Prerequisite: course 102. Consideration of the physiology of the cornea and lids; formation and function of lacrimal fluid; formation, function, and course of the aqueous humor; IOP, trabecular pressure; metabolism and circulation in the eye; physiology and biochemistry of the lens; and pupil. Accommodation; photochemistry. Mr. Fatt (F)

125L. Laboratory in Vegetative Functions of the Eye. (2) One hour of laboratory lecture and one 3-hour laboratory per week. Prerequisite: course 102 and 125 (may be concurrent). Laboratory experiments in vegetative functions of the eye. Mr. Fatt (F)

129. Motility of the Eye. (5) Three 1 1/2-hour lectures and one 2-hour laboratory per week. Prerequisite: course 102. Detailed consideration of ocular movements: specification of direction of movement, size, time, and synchronous movements; saccadic and pursuit, versions, vergences; accommodation; accommodative-convergence; convergence accommodation. Mr. Stark (W)

132. Visual Stimuli. (5) Three 1 1/2-hour lectures and one 2-hour laboratory per week. Prerequisite: consent of instructor. Study of visual stimuli, their nature and specification, methods of measurement, colorimetry; color vision; illumination; light sources; atmospheric scatter; effects of radiation. Color vision. Mr. Adams (Sp)

161. Monocular Sensory Processes of Vision. (5) Three 1 1/2-hour lectures and one 2-hour laboratory per week. Prerequisite: consent of instructor. Action of visible light on the retina, visual pigments and electrical phenomena; visual receptors; photometry; colorimetry; luminosity; contrast; effects of stimulation; single and periodic, critical frequency of flicker, light and dark adaptation, after-images, spatial and temporal induction. Form sense: visual acuity. Perception of motion. Mr. Fatt (F)

160. Binocular Vision and Space Perception. (5) Three 1 1/2-hour lectures and one 2-hour laboratory per week. Prerequisite: consent of instructor. Binocular integration; horopter, correspondence, figure-ground relations, depth perception; shape, distance, size, form, motion, time, and complex patterns; information theory. Mr. Flom (W)

176. Recent Advances in Physiological Optics. (1) One 1-hour lecture per week. Prerequisite: consent of instructor. Recent advances in physiological optics and optometry. Mr. Marg (Sp)

188. Group Studies for Advanced Undergraduates. (1–5) Group studies of selected topics. Mr. Freeman, Mr. Cohn (F, W, Sp)

199. Supervised Independent Study and Research. (1–6) Enrollment is restricted by regulations listed on page 36. Additional limitation: Optometry students with a grade-point average of at least 3.0, or a grade of B or better in two or more physiological optics, and intentions of graduate study in physiological optics should take this course instead of Optometry 489. Must be taken on a passed/not passed basis. Mr. Freeman (In charge) (F, W, Sp)

**GRADUATE COURSES**

201A. Seminar in Physiological Optics. (2) Two 2-hour seminars per week. Prerequisite: consent of instructor. Can be repeated for credit. Graduate seminar in physiological optics. Mr. Van Sluyters (F)

201B. Seminar in Physiological Optics. (2) One 2-hour seminar per week. Prerequisite: consent of instructor. Can be repeated for credit. Graduate seminar in physiological optics. Mr. Miller (W)

201C. Seminar in Physiological Optics. (2) One 2-hour seminar per week. Prerequisite: consent of instructor. Can be repeated for credit. Graduate seminar in physiological optics. Mr. Polase, Mr. Fatt (Sp)

202. Applied Human Physiological Optics. (4) Four hours of lecture or recitation per week. Prerequisites: graduate standing in physiological optics, third or fourth year standing in optometry and Physiological Optics 491, or consent of the instructor. Basic and technical problems and implications of applications of human physiological optics, including electro-retinography, electro-oculography, TV pupillometry and photophysics, visual and evoked potentials computer interactive visual testing, and phosphene visual prostheses. Mr. Marg (W)

204. Optical Image Formation in the Eye. (2) Two 1-hour lectures and one 2-hour laboratory per week. Prerequisite: graduate standing in physiological optics. Lectures and laboratory demonstrations. Measurement of optical properties of simple and compound eyes. Image quality and resolution. Optometric instrumentation. Mr. Van Sluyters (F)

206. The Oculomotor System. (4) Two 1-hour lectures and two 2-hour laboratory periods per week. Prerequisite: consent of instructor. Lectures and laboratory demonstrations on mechanical, physiological, saccade and behavioral aspects of pupil, accommodation, and monocular and binocular movement responses. Mr. Stark (Sp)

207. Simulation of Visual Systems. (4) Two hours of lecture and six hours of laboratory per week. Prerequisite: graduate standing and a course in calculus. Detailed analysis of the vegetative functions of the eye. Mass and heat transfer in the cornea, sclera, lens, and vitreous body, and the formation of intracocular humor and the relation of intracocular pressure to the rates of formation and drainage. Mr. Fatt (Sp)

208. Neurophysiological Physiology of Vision. (4) Two 1-hour lectures and two 2-hour laboratory periods per week. Prerequisite: consent of instructor. Lecture and laboratory demonstrations on the neural mechanisms underlying the sensory and central processes of visual perception. Mr. Marg (Sp)

209. Neurophysiological Physiology of Vision. (4) Four hours of lecture per week. Prerequisite: graduate standing and a course in calculus. Detailed analysis of the vegetative functions of the eye. Mass and heat transfer in the cornea, sclera, lens, and vitreous body, and the formation of intracocular humor and the relation of intracocular pressure to the rates of formation and drainage. Mr. Fatt (Sp)

286. Group Studies, Seminars or Group Research. (1–8) One to eight hours of work per week. Prerequisite: varies with topic, to be specified by the instructor for each group. Group studies of selected topics. Mr. Adams (F, W, Sp)

289. Research in Physiological Optics. (2–6) Varies. Prerequisite: consent of instructor. Research in physiological optics. Mr. Adams (F, W, Sp)

300A–300B–300C. Teaching Methods in Physiological Optics. (2–2–2) Two hours of class per week. Prerequisite: consent of instructor. Recap of course material or research groups studying speech problems, group participation in experimental problems and analysis. Mr. Adams (F, W, Sp)

401. Applications of Electronics and Computers in Physiological Optics and Optometry. (3) Formerly numbered 491. Two hours of lecture and two hours of laboratory per week. Prerequisite: graduate standing in physiological optics and optometry, student, or consent of instructor. The study of vision requires the application of electronic and computer techniques. Topics will cover the recording of biologic phenomena, computer transducers, signal averaging and other computer processing and displays, and computer interactive systems used in physiological optics and optometry. Mr. Marg (F, Sp)

601. Individual Study for Master's Students. (1–8) Prerequisite: consent of instructor. Individual study for the master's degree. Course requirements in consultation with the adviser in physiological optics. Units may not be used to meet either unit or residency 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. (1–8) 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 residency requirements. Must be taken on a satisfactory/unsatisfactory basis. Mr. Adams (F, W, Sp)

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**School of Public Health**

Office of the Dean, 19 Earl Warren Hall
Dean: Warren R. Winkelstein, Jr., M.D., M.P.H.
Associate Deans: Nicholas Petroff, 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.

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 areas of social and administrative health sciences, including family health, public health education, health behavior, and health nutrition. Particular attention also may be given to special areas of concern such as population, environmental pollution, disease 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.
- Microbiology, M.A., Ph.D.
- Nutrition, Ph.D.
- Environmental Health, M.S.
- Parasitology, M.S.
- Public Health 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 contact 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 Chang, Ph.D.
- Robert C. Cooper, Ph.D.
- Shadi S. Elsburg, Ph.D., L.H.D., h.c.
- Jeffrey M. Hardy, Ph.D.
- Stewart H. Madin, D.V.M., M.P.H.
- William J. Oswald, Ph.D.
- William C. Reves, Ph.D., M.D.
- S. Leonard Syme, Ph.D.
- Constantine H. Tempelis, M.D.
- Navid A. Vedros, Ph.D.

Associate Professors:
- Richard J. Brand, Ph.D.
- Robert C. Spear, Ph.D.
- Stephen M. Rappaport, M.P.H.
- Mary-Claire King, Ph.D.
- Ralph S. Paffenbarger, Jr., M.D., M.P.H.
- Michael E. Tarter, Ph.D.
- Neylan A. Vedros, Ph.D.

Lecturers:
- Washington Bums, M.D.
- Stephen Hulley, M.D., M.P.H.
- Edwin H. Lennette, M.D.
- Leonard J. Duhl, M.D.
- Don Cahalan, Ph.D.
- Henrik L. Blum, M.D., M.P.H.
- Carol D'Onofrfo, M.P.H.
- Jessie M. Bierman, M.D.
- Richard M. Bailey, D.B.A.
- Marc Phisuk, Ph.D.
- William Griffiths, Ph.D.
- Albert Chang, M.D., M.P.H.
- Andrew A. Rsher, Sc.D.
- Octavio I. Romano-V., Ph.D.
- A. Harry Bliss, M.S., M.P.H.
- Philip J. Vogt, M.D., M.P.H.
- George S. Lozowic, M.D.
- Ronald R. Roberto, M.D., M.P.H.
- David T. Taylor, Ph.B., M.B.A. (Emeritus)
- Catherine T. Jessup, M.D.
- Verita R. Thompson, M.D., M.P.H.
- John G. Kohn, Ph.B., M.D., M.P.H.
- Sheldon Morgan, M.D.
- Dr. P.H. (Emeritus)
- William A. Peck, Dr.P.H.
- Mary C. King, Ph.D.
- Robert E. Ditlevson, M.B.A.
- Catherine T. Jessup, M.D.
- John A. Thorndike, M.D., M.P.H.
- Ora M. Main, M.A.
- George A. McKray, L.L.M., M.P.H.
- Robert A. Detzon, M.B.A.
- Dorothy Whiseil-Buechy, M.P.H.
- M.D., M.P.H.
- Howard J. Weddle, M.S., M.P.H.
- Octavio I. Romano-V., Ph.D.
- Ruth H. Simpson, M.N.A.
- Robert L. Johnson, M.S.
- David B. Starkweather, M.S.
- Dr.P.H.
- Robert L. Johnson, M.S.
- Dr.P.H.

Lecturers:
- Laura Anderson, M.P.H.
- Russell G. Anderson, D.W., M.P.H.
- Stephen R. Blum, Ph.D.
- Joseph V. Bratzke, M.D., M.P.H.
- Richard C. Brown, M.D.
- Anne H. Cohn, Ph.D.
- Robert A. Derzon, M.B.A.
- James S. Enmich, M.P.H.
- Michael Fuchs, Ph.D.
- Jean G. Kohn, Ph.B., M.D., M.P.H.
- Donald M. Park, M.A.
- Leon Shapire, Dr.P.H.
- Katharine B. Tassan, M.P.H.
- M.D., M.P.H.
- Thomas E. Wynn, M.D.
- Frank J. Waddell, M.S.
- David Witzke-Buechy, M.D.
- M.P.H.

Associate Field Program Supervisors:
- Constance Fraser, M.A., M.P.H.
- Robert J. Cawson, J.C., M.P.H.
- Suzanne Keyer, M.S.
- Sally R. Brophy, M.P.H.
- Elizabeth Pesalco, M.P.H.
- Annette Puller, M.S.W.
- Frances Saunders, M.P.H.

Schoolwide Public Health Science Courses

The following interdisciplinary courses involve faculty from both Departments of the School of Public Health.

5A—5B—5C. Individual and Community Health. (3—3—1) Two 1/2-hour lectures on 1 and five 1/2-hour section per week, for 5A; one 1-hour session per week, for 5B; one 3-hour discussion per week, for SC. Prerequisite: course 5A for 5B and 5A for 5C. Course 5C given on a pass/11ot pass basis. Pre-enrollment required for 5A and 5B. A survey of the field of health including field observations and a consideration of the evolution of disease prevention and control; the social, medical, and economic aspects of sickness, disability, and death. Credits, 5A, 5B, 5C.

195. Integrating Seminar for Public Health Undergraduates. (1-3) Two hours of seminar per week for one unit; four hours for two units. Prerequisite: Limited to upper division students in the School of Public Health. Provides students with the opportunity to participate in a perspective of the content of course work and to consider current health issues. The Staff (F, W, Sp).

209A. Area of Concern Seminar: Environmental Health. (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 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. The Staff (F, W, Sp).

249C. 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 not be offered each quarter. Enrollment limited. The Staff (F, W, Sp).

2500. Area of Concern Seminar: Organization of Medical and Health Care Delivery. (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 such as the development and testing of alternate coping strategies for health care delivery, etc. May not be offered each quarter. Enrollment limited. The Staff (F, W, Sp).

2600. 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 be offered each quarter. Enrollment limited. The Staff (F, W, Sp).

The Department of Biomedical and Environmental Health Sciences in the School of Public Health is concerned with the impact of environmental forces 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, toxicologic 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 society in order that effective prevention programs can be developed. Since these problem areas require interdisciplinary approaches, students are encouraged to 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.

149. Introduction to Occupational Health and Industrial Hygiene. (3) Through discussion and case presentation, survey of concepts involved in the recognition, evaluation, and control of occupational health hazards. Discussion of industrial hygiene with the context of occupational health. Prerequisite: Mr. Rappaport, Mr. Popendorf (F).

150. Environmental Health Sciences. (3) Three 1-hour lectures per week. The elements of public health sanitation and of sanitary control of the environment. Survey of water, air, food, and other factors affecting man's environment. Prerequisite: Mr. Cooper (F).

151. Introductory Forensic Science: Laboratory. (5) Two 1-hour lectures and two 3-hour laboratories per week. An inquiry into the nature of proof as it applies to the analysis and interpretation of physical evidence. Prerequisite: Mr. Thompson (W).

152. Trace Microanalysis. (5) Two 1-hour lectures and two 3-hour laboratories per week. Prerequisite: upper division standing in a natural or physical science. Course involves the microanalysis of materials using chemical and physical techniques. Emphasis is on materials of forensic and environmental significance. Prerequisite: Mr. Thompson (Sp).

153. Instrumentation and Trace Analysis. (6) Two 1-hour lectures, one 1-hour lecture-discussion, and two 3-hour laboratories per week. Prerequisite: chemistry 1A-4B-C, 5A-4, or equivalents. Instrumental analysis as applied to the identification and characterization of materials. Emphasis is on materials of forensic and environmental significance. Prerequisite: Mr. Sensabaugh (F).

154. Forensic Toxicology. (2) Two 1-hour lectures per week. Prerequisite: upper division standing in a natural or physical science. Detection and estimation of toxic substances in the human organs by chemical and physical means. Systematic analysis as scientific study of normal and abnormal constituents to determine presence or absence of toxic substances in relation to legal standards of proof. Prerequisite: Mr. Shulgin (Sp).

154L. Forensic Toxicology Laboratory. (3) One 1-hour lecture-discussion and two 3-hour laboratories per week. Prerequisite: upper division standing in a natural or physical science. Course 154L may be taken concurrently. Laboratory in detection and estimation of toxic substances in the human organs by chemical and physical means. Prerequisite: Mr. Shulgin (Sp).

156. Microbiology of Water and Waste Water. (3) Two 1-hour lectures and one 1-hour discussion per week. Prerequisite: consent of instructor. Principles, microbial ecology, and chemistry of microbiology applicable to the aquatic environment and to waste water. Prerequisite: Mr. Cooper (W).

156L. Water and Waste Water Microbiology Laboratory...
160A. Introduction to Probability and Statistics in Biology and Public Health. (4) Three 2-hour laboratories per week. Prerequisite: course 156 (may be taken concurrently). A laboratory course in water microbiology with emphasis on the effect of microorganisms on water quality. Mr. R. M. Verderos (W)

160B. Introduction to Probability and Statistics in Biology and Public Health. (4) Three 2-hour laboratories per week. Prerequisite: student must be a biology major or minor or with credit for course 160A. A laboratory course in the use of statistical techniques for data analysis in biology and public health. Mr. Morin (W)

161. Microbiology of Health Care and Disease. (4) Two 1 1/2-hour lectures and one 1 1/2-hour discussion per week. Prerequisite: 156 or consent of instructor. Stochastic and deterministic models of host-parasite interactions in medicine and epidemiology. Emphasis on the use of computer simulation. Mr. Popendorf (F)

162. Introduction to Public Health Statistics. (3) Three 2-hour laboratories per week. Prerequisite: course 160 (may be taken concurrently). Descriptive statistics, probability distributions, comparison of two groups, and regression analysis. Mr. Verderos (W)

163. Principles of Optics and Microscopy. (3) Two 1-hour lectures and one 2-hour laboratory per week. Prerequisite: course 156 or consent of instructor. Principles of general optics as applied to microscopy, including the use of microscopes and microscopy. Mr. S. J. Wei (Sp)

164. Introduction to Multivariate Public Health Statistics. (3) Four 2-hour laboratories per week. Prerequisite: course 160 (may be taken concurrently). Multivariate statistics: multiple regression, discriminant analysis, factor analysis, cluster analysis. Mr. S. J. Wei (Sp)

165. Principles of Evaluation in Medicine and Public Health. (3) Three 2-hour lectures per week. Prerequisite: course 156 or consent of instructor. Evaluation designs, indices and measures, sample sizes, and overview of the section. Mr. S. J. Wei (Sp)

166. Introduction to Epidemiology. (2-3) One 2-hour lecture per week for 2 units; 3 units with a laboratory section. Prerequisites: prior background in mathematical sciences and a course in biostatistics desirable. Section 1 for students specializing in medical toxicology; section 2 for those specializing in occupational health and safety; section 3 for epidemiology and biostatistics graduate students; section 4 for all others. Mr. Winkelman, Mr. Reeves, Mr. Syms (F, W)

168. Physical Chemistry in Medicine and Public Health. (3-4) Two 2-hour laboratories per week. Prerequisite: course 88A or 88B or 124A or 124B; Biology 1A-1B; Chemistry 112A or 112B. Introduction to the physical chemistry of the body. An introduction to the course designed for majors in microbiology and closely related biological sciences. Basic principles of the molecular properties of the cell and the participants in the chemistry of disease in man. Mrs. Buehring, Mr. Verderos (W, Sp)

190L. Medical Microbiology Laboratory. (2) Three 2-hour laboratories per week. Prerequisite: course 150A (may be taken concurrently). Mr. Verderos, Mrs. Buehring (W)

190M. Medical Microbiology Laboratory. (2) Three 2-hour laboratories per week. Prerequisite: course 150B (may be taken concurrently). Mr. Verderos, Mrs. Buehring (Sp)

300. Medical Microbiology Laboratory. (2) Three 2-hour laboratories per week. Prerequisite: course 150 (may be taken concurrently). Mr. Verderos, Mrs. Buehring (W)

191. Epidemiology of Health Care and Disease. (3) Three 1-hour lectures and one 1-hour discussion per week. Prerequisite: 156 or consent of instructor. Epidemiologic principles and methods of investigation and control of diseases. Mr. Popendorf (Sp)

192. Introduction to Medical Virology. (3) Three 1-hour lectures per week. Prerequisite: elementary courses in biology and chemistry, including biochemistry, or consent of instructor. Basic principles of the replication, pathogenesis and immunity in viral infections of man and animals. Mr. Hardy (F)

192L. Laboratory in Medical Virology. (3) Three 2-hour laboratories and one 2-hour discussion per week. Prerequisite: course 156 (may be taken concurrently). A basic laboratory course in animal virology with emphasis on studies of the multiplication of animal viruses. Mrs. Main, Miss Schmidt (F)

193. 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 processes: microbial, allergic, and tumor diseases. Mr. Madin (Sp)

194. Principles of Optics and Microscopy. (3) Two 1-hour lectures and two 2-hour laboratories per week. Prerequisite: consent of instructor. Theories, principles and recent developments in optical physics with applications to problems in toxicology, microbiology, and environmental science. Mr. S. J. Wei (F)

195. Principles of Optics and Microscopy. (3) Two 1-hour lectures and one 2-hour laboratory per week. Principles of optics as applied to problems of image generation, the use of microscopy and optical techniques for the investigation of the structure of materials. Mr. S. J. Wei (Sp)

196. Introduction to Hematology. (4) One 1-hour lecture-discussion and two 2-hour laboratory periods per week. Prerequisite: consent of instructor. Theories, principles and recent developments in blood coagulation, hematologic mechanisms and methods in laboratory and clinical practice. Mr. Sensabaugh (W)

197. Field Study in Public Health. (1-5) Supervised field study in public health. May be taken 1 to 5 units; must include both the seminar and laboratory. Individual regular meetings with faculty sponsor and written reports required. Mr. B. K. Measures (F)

200. Introduction to Probability and Statistics in Biology and Public Health. (3) Three 2-hour lectures per week. Prerequisite: course 148A or 149B, or consent of instructor. Statistical methods for the treatment of human data. Use of life tables, survival analysis, and study of mortality. Mrs. McNeely (W)

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250. Environmental Health Sciences. (3) Three 1-hour lectures per week. Prerequisites: students who have taken 251A and 251B must also take 251C for credit. A survey of the impact of biological, chemical, and physical agents in the environment on human health including means of measurement and control. Mr. Cooper, Mr. Weil (Sp)

251. Environmental Health Sciences: Biological Determinants of Health. (3) Two 1 1/2-hour lectures plus one 2-hour laboratory per week. Prerequisites: consent of instructor. A survey of biologic hazards in the environment which affect man's health, including means of measurement, monitoring and control. Mr. Cooper, Mr. Weil (Sp)

252. Mathematical Models in Environmental Health. (3) Two 1 1/2-hour lectures per week. Prerequisite: Mathematics 16A and 16B or equivalent. Use and development 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. Spear (Sp)

253. Environmental Toxicology. (4) Two 2-hour lectures per week. Prerequisite: consent of instructor. Principles of toxicity applied to the evaluation and control of chemical hazards in air, water and food. Biological mechanisms of toxicity will also be discussed. Mr. Weil (F)

254. Noise in the Occupational Environment. (2) Two 1 1/2-hour lectures per week. Prerequisite: consent of instructor. Noise as an occupational hazard. Review of acoustics; discussion of auditory mechanism; noise measurements, noise controls, and damage-risk criteria. Mr. Popendorf (W)

255. Industrial Safety. (2) One 2-hour lecture-discussion and one 2-hour laboratory per week. Prerequisites: graduate standing and consent of instructor. Occupational accident research and its implications for accident prevention programs in industry and government. Mr. Popendorf (W)

256. Air Pollution and Human Disease. (Formerly 191J). One 2-hour lecture per week. Prerequisite: course 253 and Engineering 160, the latter of which may be taken concurrently. Analytic study and research of the relationship between human disease and air pollution. Mr. Weil (F)

257. Industrial Toxicology Laboratory. (2) Two hours of lecture and one 4-hour laboratory per week. Prerequisite: course 253 and graduate standing or consent of instructor. Experimental methods and techniques used in the study of the toxic effects of chemicals. Emphasis on chemicals of industrial importance. Mr. Weil (Sp)

260. Applied Algology. (3) One 2-hour lecture and one 1-hour lecture-discussion per week. Prerequisite: course 256. Introduction to the study of algae. Mr. Weil (Sp)
Health with background in Botany and Biochemistry. Lectures and laboratory applications are designed to control the environment. The fundamental aspects and public health significance in designs for application in the new cost- and weight-reduction systems and production of food, feed, fertilizer, and fermentable substrates.

Mr. Oswald (Sp)

**260A. Stochastic Processes in Biology and Health.** (4) Three 1-hour lectures per week. Prerequisite: courses 250B or consent of instructor. Topics in stochastic processes and their applications in fields of biology and health. Prerequisite: completion of basic analysis, probability, and statistics. Mr. Loquvam (F)

273. Epidemiology of Mental Disorders. (3) For- merly 291B. One 3-hour lecture per week. Prerequisite: completion of basic analysis. Mr. Madin, Mr. Loquvam, Mr. Loquvam (Sp)

274. Epidemiology and Control of Infectious Diseases. (3) Three 3-hour lecture-discussions per week. Prerequisite: completion of basic analysis. Mr. Reaves, Mr. Reeves, Mr. Reeves (Sp)

**275A. Advanced Epidemiology.** (3) One 2-hour lecture and one 2-hour laboratory per week. Prerequisite: prior doctoral degree in biomedcal science and consent of instructor. Mr. Reeves, Mr. Reeves (Sp)

277. Epidemiology of Arthropod-Borne Diseases. (3) One 3-hour lecture-discussion per week. Prerequisite: course 161C and 160C or equivalent. Mr. Reeves, Mr. Reeves (Sp)

**279. Genetics and Epidemiology.** (3) Two 1 1/2-hour lecture-discussions per week. Prerequisite: prior doctoral degree or courses in biomedlcal sciences, and one of the following: genetics, population genetics, evolutionary genetics, or medical genetics. Mr. Syme, Mr. Winkelstein (W)

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Mr. Tempelis (Sp)

**2880A. Pathobiology.** (4) One 1-hour lecture and one 2-hour laboratory per week. Prerequisite: courses 250A or 250B or consent of instructor. Mr. Troxel, Mr. Vogt (Sp)

271. Forensic Pathology. (2) One 2-hour lecture per week. Prerequisite: attendance at two post-mortem

during quarter; senior or graduate standing. Lectures discuss various aspects of medicolegal death, topics include sudden and unexpected natural death, time of death, characterization of injuries, the post-mortem examination, the medical examiner system, etc. Mr. Loquvam (Sp)

281. Public Health Immunology. (3) Three 1-hour lectures per week. Prerequisite: courses 180A–180B or equivalent. Immunologic bases underlying diagnostic procedures, active and passive immunization, and treatment of vaccine disease and auto-immune disorders. Mr. Tempelis (Sp)

**282. Advanced Medical Virology.** (3) Two 2-hour lecture-discussions per week. Prerequisite: course 182 or consent of instructor. Analysis of viral and host factors that contribute to the production and recovery from viral diseases of medical importance.

Mr. Hardy, Miss Schmidt, Miss Cremer, Miss Smith (W)

283. Medical Mycology. (3) Two 1-hour lectures and one 3-hour laboratory per week. Prerequisite: courses 180A–180B, 160L–160M or equivalent and consent of instructor. Basic mycology and host interactions of pathogenic fungi; pathogenesis of fungal diseases including immunity and treatment.

Mr. Tarter, Mr. Tarter (Sp)

**284. Advanced Methods in Medical Microbiology.** (3) One 1-hour lecture and three 3-hour laboratories per week. Prerequisite: courses 180A–180B, 160L–160M or equivalent and consent of instructor. Theory and practice of current methods and techniques applicable to medical microbiology. Experimental procedures in clinical laboratory techniques, preparative and analytical centrifugation, disc electrophoresis and immuneelectrophoresis.

Mr. Winkelstein, Mr. Winkelstein (Sp)

**285A. Advanced Forensic Science: Criminalistics.** (4) One 2-hour lecture-discussion and three 2-hour laboratories per week. Prerequisite: courses 151, 152, 154 and 156 or equivalent. A detailed analysis of advanced procedural and interpretational problems in forensic science.

Mr. Tarter, Mr. Tarter (Sp)

288. Group Study. (1-8) The Staff (F, W, Sp)

299. Seminars. (1-4) The Staff (F, W, Sp)

299. Special Study. (1-8) Designed to permit any qualified graduate student to pursue special study under the guidance of a faculty member. 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 requirements for the doctoral degree. Must be taken on a satisfactory/unsatisfactory basis.

Mr. Tarter, Mr. Tarter (Sp)

**2820. Pathobiology.** (4) Two 1-hour lectures and three 3-hour laboratories per week. Prerequisite: courses 180A, 180B–180L, 180M, 182L, or equivalent, Bacteriology 202A–202B, or consent of instructor. Limited to 10 students. Studies of the pathological processes of infectious diseases.

Mr. Madin (F)

2820A. Pathobiology. (4) Two 1-hour lectures and three 3-hour laboratories per week. Prerequisite: courses 180A, 180B–180L, 180M, 182L, or equivalent, Bacteriology 202A–202B, and consent of instructor. Limited to 10 students. Studies of the pathological processes of infectious diseases.

Mr. Madin (F)

**2820. Pathobiology.** (4) Two 1-hour lectures and three 3-hour laboratories per week. Prerequisite: courses 180A, 180B–180L, 180M, 182L, or equivalent, Bacteriology 202A–202B, and consent of instructor. Limited to 10 students. Studies of the pathological processes of infectious diseases.

Mr. Madin (F)

**2820A. Pathobiology.** (4) Two 1-hour lectures and three 3-hour laboratories per week. Prerequisite: courses 180A, 180B–180L, 180M, 182L, or equivalent, Bacteriology 202A–202B, and consent of instructor. Limited to 10 students. Studies of the pathological processes of infectious diseases.

Mr. Madin (F)

501. Individual Study for Master's Students. (1-9) Includes the study and research necessary for the completion of an honors thesis or dissertation or in preparation 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.

Mr. Tarter, Mr. Tarter (Sp)

**2820A. Pathobiology.** (4) Two 1-hour lectures and three 3-hour laboratories per week. Prerequisite: courses 180A, 180B–180L, 180M, 182L, or equivalent, Bacteriology 202A–202B, or consent of instructor. Limited to 10 students. Studies of the pathological processes of infectious diseases.

Mr. Madin (F)

2820A. Pathobiology. (4) Two 1-hour lectures and three 3-hour laboratories per week. Prerequisite: courses 180A, 180B–180L, 180M, 182L, or equivalent, Bacteriology 202A–202B, and consent of instructor. Limited to 10 students. Studies of the pathological processes of infectious diseases.

Mr. Madin (F)

501. Individual Study for Doctoral Students. (1-9) Individual study and research necessary for the completion of the major field of study.

Mr. Tarter, Mr. Tarter (Sp)

Note: The following sections have been established for courses 197, 198, 199, 295 through 299, 601 and 802. 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. Biomedical Laboratory Sciences

IDS 238. Environmental Design, Study

Note: For key to symbols, see page 16.
Health. (3) 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 the forces by which the delivery of effective health programs is shaped. The scope of faculty and student interests in health research and practice is broad. Numerous aspects of health problems and their legal, social, behavioral, and economic dimensions are offered in the following courses.

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 emergencies, public or private 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 four 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, public health, law, economics, urban studies, political sciences, psychology, public policy and social welfare. Opportunities for supervised field experience are offered in health agencies in nearby communities, the state and the nation. For physicians, certain training 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 Agencies. (3-4) Two 2-hour lectures and one 2-hour discussion-laboratory session per week. Introduction to health administration, focusing on organizational structure, function, personnel, administrative behavior and processes, innovation, and interorganizational relationships. Use of cases, games, and simulations. Four units may be earned by submitting a term paper. (W)

107. Introduction to Medical Care Administration. (W) Two 1-hour lectures per week. Principles of human growth and development; consumer behavior; need and supply; manpower and facilities; organization; financing, and evaluation. Mr. Hayes-Bautista (F)

108. Medical Care Problems and Programs. (2) One 2-hour lecture-discussion per week. Review of current issues in organizing and financing medical care in the United States. Not designed for students in the medical care or public health administration programs in the School of Public Health. (F)

110. The Hospital In Contemporary Society. (4) Two 2-hour lectures per week. Open to upper division and graduate students from any department. The hospital as a social institution, its role and functions in modern society, its relationship to other community agencies and health services. The hospital as a modern complex organization. Mrs. Stimson (W)

125A. Maternal Health. (2) One 2-hour lecture per week. Public health aspects of care before, during, and after pregnancy. Programs for maternity care. Mr. Thompson (W)

142. Principles of Maternal and Child Health. (2) One 2-hour lecture per week. Health and social problems of mothers and children. Mr. Brazie (Sp)

127. Health Programs for the School Age Child. (2) One 2-hour lecture-discussion per week. Organization of health services programs for preschool and school age children. Mr. Chang (W)

128. Health Problems of Adolescence. (2) One 2-hour lecture-discussion per week. Consent of instructor. Issues and problems in the physical and mental health of adolescents, and a critical study of current problems for this age group. Mr. Brown (W)

130A-130B. Selected Topics In Health Education. (2-2) One 2-hour lecture per week; field observations with scheduled conferences. Topics and laboratory demonstrations in field of health education, one per year to year. Mr. D’Onofrio, Mr. Grifiths, Mrs. Passen (F), The Staff (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. Not open to majors in health education. Mr. Weddle (F, Sp).

132. Planning Health Experiences for the School Age Child. (3) One 2-hour seminar and one 2-hour discussion per week. Exploration of health education as it pertains to programs and problems related to the school-age child. Mr. Weddle (W, Sp)

133. Introduction to Group Process. (2) One 1-hour lecture, one 2-hour laboratory per week. Prerequisite: consent of instructor. Not open to majors in health education. Mr. Weddle (F, Sp).

134. Community Health Education. (2) One 2-hour lecture per week. Prerequisite: consent of instructor. Special emphasis on the dimensions of poverty and its relationship to health status. Includes analysis of social, political, economic, and organizational factors affecting the delivery of health care services, especially for the low income populations. Mr. Weddle (W)

138A. Alcohol and Other Drugs: Behavioral Problems. (2) One 2-hour lecture-discussion per week. Prerequisite: consent of instructor. Exploration of the dimensions of poverty and its relationship to health status. Special emphasis on the dimensions of poverty and its relationship to health status. Includes analysis of social, political, economic, and organizational factors affecting the delivery of health care services, especially for the low income populations. Mr. Weddle (W)

138B. Alcohol and Other Drugs: Treatment Approaches. (2) One 2-hour lecture-discussion per week. Prerequisite: consent of instructor. Special emphasis on the dimensions of poverty and its relationship to health status. Includes analysis of social, political, economic, and organizational factors affecting the delivery of health care services, especially for the low income populations. Mr. Weddle (W)

139A. Research Methods In the Behavioral Sciences. (3) Formerly 111. One 3-hour lecture-discussion per week. Prerequisite: consent of instructor. Special emphasis on the dimensions of poverty and its relationship to health status. Includes analysis of social, political, economic, and organizational factors affecting the delivery of health care services, especially for the low income populations. Mr. Weddle (W)

139B. Research Methods in the Behavioral Sciences. (3) One 2-hour lecture-discussion per week. Prerequisite: consent of instructor. Special emphasis on the dimensions of poverty and its relationship to health status. Includes analysis of social, political, economic, and organizational factors affecting the delivery of health care services, especially for the low income populations. Mr. Weddle (W)

141A. Research Methods and Assessment in the Behavioral Sciences. (3) Two 2-hour lectures and group discussions per week. Prerequisite: consent of instructor. Special emphasis on the dimensions of poverty and its relationship to health status. Includes analysis of social, political, economic, and organizational factors affecting the delivery of health care services, especially for the low income populations. Mr. Weddle (W)

140. Research in Community Nutrition. (2) One 2-hour lecture per week. Principles of human growth and development in public health programs. Mr. Brudov (W)

142A. Alcohol and Other Drugs: Prevention and Social Policy Issues. (3) One 2-hour lecture per week. Prerequisite: consent of instructor. Special emphasis on the dimensions of poverty and its relationship to health status. Includes analysis of social, political, economic, and organizational factors affecting the delivery of health care services, especially for the low income populations. Mr. Weddle (W)

142B. Alcohol and Other Drugs: Treatment Approaches. (2) One 2-hour lecture-discussion per week. Prerequisite: consent of instructor. Special emphasis on the dimensions of poverty and its relationship to health status. Includes analysis of social, political, economic, and organizational factors affecting the delivery of health care services, especially for the low income populations. Mr. Weddle (W)

143A. Research Methods in the Behavioral Sciences. (2) One 2-hour lecture-discussion per week. Prerequisite: consent of instructor. Special emphasis on the dimensions of poverty and its relationship to health status. Includes analysis of social, political, economic, and organizational factors affecting the delivery of health care services, especially for the low income populations. Mr. Weddle (W)

143B. Research Methods in the Behavioral Sciences. (2) One 2-hour lecture-discussion per week. Prerequisite: consent of instructor. Special emphasis on the dimensions of poverty and its relationship to health status. Includes analysis of social, political, economic, and organizational factors affecting the delivery of health care services, especially for the low income populations. Mr. Weddle (W)

144. Nutrition for the Individual and the Community. (2) Two 1/2-hour lecture-discussions per week. Prerequisite: consent of instructor. Basic nutrition concepts and their implications for the delivery of health care services. Mr. Missuri (W)

151A. Survey of Mental Disorders and Community Mental Health. (4) One 2-hour lecture-discussion per week. Prerequisite: consent of instructor. Basic nutrition concepts and their implications for the delivery of health care services. Mr. Missuri (W)

14W. Introduction to Voluntary Health Agencies. (3) One 2-hour lecture-discussion per week and field visits to voluntary health agencies. Survey of voluntary health agencies to determine their nature, extent, philosophy, and functions. Specific review and study of ongoing voluntary health agency program activities. Mr. Missuri (W, Sp)

157. 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 writing assignments required. The Staff (F, W, Sp)

198. Directed Group Study. (1-5) The Staff (F, W, Sp)

199. Supervised Independent Study and Research. (1-5) Enrollment is restricted by regulations listed in the catalog. Must be taken on a passed-not-passed basis. The Staff (F, W, Sp)

GRADUATE COURSES

200A. The Analysis of Economic Aspects of the Health Services Systems. (3) Two 2-hour lectures and one 2-hour laboratory per week. Prerequisite: consent of instructor. An introduction to the dimensions of the health system in its socioeconomic and political context, using an ecologic systems approach. Mr. S. Blum (F)

200B. New Frontiers In Community Health. (2) One 2-hour lecture-discussion per week. Prerequisite: consent of instructor. Special emphasis on the dimensions of poverty and its relationship to health status. Includes analysis of social, political, economic, and organizational factors affecting the delivery of health care services, especially for the low income populations. Mr. Weddle (W)

202A. Research Methods and Assessment in the Behavioral Sciences. (3) Two 2-hour lectures and group discussions per week. Prerequisite: consent of instructor. Special emphasis on the dimensions of poverty and its relationship to health status. Includes analysis of social, political, economic, and organizational factors affecting the delivery of health care services, especially for the low income populations. Mr. Weddle (W)

203A. Legal Basis for Health Administration. (3) One 3-hour lecture-discussion per week. Statutes, codes, and readings in the legal basis for public health and medical care administration. Mr. S. Bailey (W)

203B. Legal Aspects of Hospital Administration. (3) Formerly 111. One 3-hour lecture-discussion per week. Prerequisite: legal basis for health administration. Study of current approaches to the theories of administration and complex organization as they relate to hospital administration. Mr. S. Bailey (W)

205. Economics of the Health Services Industry. (3) Formerly 111. One 2-hour lecture-discussion per week. Prerequisite: legal basis for health administration. Study of current approaches to the theories of administration and complex organization as they relate to hospital administration. Mr. S. Bailey (W)

206. Economics of the Health Services Industry. (3) Formerly 111. One 2-hour lecture-discussion per week. Prerequisite: legal basis for health administration. Study of current approaches to the theories of administration and complex organization as they relate to hospital administration. Mr. S. Bailey (W)

207A. Advanced Medical Care Administration. (2) One 2-hour lecture-discussion per week. Prerequisite: consent of instructor. Special emphasis on the dimensions of poverty and its relationship to health status. Includes analysis of social, political, economic, and organizational factors affecting the delivery of health care services, especially for the low income populations. Mr. Weddle (W)

207B. Advanced Medical Care Administration. (2) One 2-hour lecture-discussion per week. Prerequisite: consent of instructor. Special emphasis on the dimensions of poverty and its relationship to health status. Includes analysis of social, political, economic, and organizational factors affecting the delivery of health care services, especially for the low income populations. Mr. Weddle (W)
Three 2-hour lecture-discussions per week. Prerequisite: course 207 or consent of instructor. Presenta-
tion of current issues and problems in the admin-
istration and management of health and social services.

208A. Health Planning Laboratory. (4) One 3-hour
lecture-discussion per week. Study of critical aspects
of health planning. Analysis of the role of planning.

208B. Health Planning Laboratory. (4) Two 2-hour
lecture-discussions per week. Planning of the public,
application of technical planning tools to health issues.
Miss A. Cohn (F), Mr. H. Blum (W)

209. Health Services and Facilities Planning. (3)
Two 2-hour lecture-discussions per week. Prerequisite:
major in hospital administration and planning,
or consent of instructor. Community and institutional
planning for personal health services, technical process and philosophy of planning.

210. Hospital Programs and Trends. (2) Two 2-
hour lecture-discussions per week. An introduction to
current operations of hospital and health care facilities.
Mr. Starkweather (Sp)

211. Advanced Study in Hospital Administration. (2)
One-hour lecture-discussion and two 1/2-hour group
conference per week. Prerequisite: major in hospital administration or consent of instructor. Special study on hospital-related topics for students whose experience requires
study beyond second-year level. May be repeated for credit.
Mr. Apte (F), Mr. Derzon (W), Mrs. Stimson (F)

212. The Hospital as a Social Institution. (4) Two
2-hour lecture-discussions per week. Prerequisite: ma-
ajor 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 hospitalization, including social services, social work, professional relationships in the hospital setting.
Mrs. D'Onofrio (W)

216A. Financial Management of Health Care
Institutions. (4) Two 2-hour lecture-discussions per
week. Financial analysis and management of health care
institutions, including financial statements, budgeting, cash flow, costing, capital decision-making, sources of capital and operating funds.
Mr. Emrich (Sp)

216B. Advanced Financial Management of Health Care
Institutions. (3) One 1-hour lecture-discussion and one
2-hour laboratory per week. Prerequisite: major in
hospital administration or consent of instructor. Analysis of selected topics in financial manage-
mint of health care institutions, emphasizing the rela-
tionship between institutional financial policy and na-
tional health policy with regard to reimbursement, in-
cardiovascular systems, public regulation, and control of health care costs.
Mr. Millott (W)

217. Applied Theory of Maternal and Child Health. (2-
6) One 2-hour seminar and 4-28 hours of field work
per week. Prerequisite: Soe Adm 225A-225B or
225C or equivalent. Prerequisites: practice in delivery of health
to mothers and children, with special emphasis on
children with developmental disabilities and popula-
tions at risk for special needs or special health problems. Miss Kohn, Miss Fraser (F, W, Sp)

218. Review of Maternal Health. (2) One 2-hour
lecture per week. Prerequisite: limited to graduate
students in public health. Examination of the major areas
relating to maternal health, outcome of pregnancy, and
to the development of concepts of family health and total maternal and child health. Mr. Minkler (F)

219. Social Welfare and Public Health. (3) Formerly 29IT.
One 2-hour lecture and one 1-hour laboratory per week. Prerequisite: major in public health education or
consent of instructor. Description and analysis of health problems and programs, and issues as related to public health problems, programs, and issues.
Mrs. D'Onofrio (W), Miss Minkler (F), Mrs. D'Onofrio (W)

220. Contemporary Social Analysis for Commu-
nity Planning. (3-5) One 3-hour laboratory per week.
Prerequisite: consent of instructor. Methods of social intervention applied to current field projects in community mental health planning. Includes practice skills in community organization, consultation, training methods. Spring quarter on program evaluation, grant
manship, legislative lobbying.
Mr. Pilisuk (W, Sp)

221A—221B—221C. Methods in Community Mental
Health Intervention. (3—3—3) One 3-hour lecture-
discussion plus concurrent field work per week. Prereq-
usites: 221A; major in public health education or consent of instructor. Methods of social intervention applied to current field projects in community mental health. Includes practice skills in community organization, consultation, training methods. Spring quarter on program evaluation, grant
manship, legislative lobbying.
Mrs. Fuller (W, Sp)

222. Community Mental Health: The Nexus Be-
twixt Public Health and Mental Health. (2) One
2-hour lecture-discussion per week. Prerequisite: major in
mental health or consent of instructor. Introduction to the
development of concepts of family health and total
community mental health, evaluate state of knowledge of epidemiologic factors affecting mental health, appraise public health contribution to field and body several intervention models.
Mr. Apte (F)

225A—225B—225C. Problems and Programs in
Mental and Child Health. (2—2—2) Two 2-hour semi-
inars per quarter; one 2-hour seminar per quarter. Prerequisites: previous training in pediatrics or obstetrics, or equiv-
ant experience. Consent of instructor required for other
than first-quarter section. 225A to 225B to 225C. Health and social needs of mothers and
children. Programs for meeting these needs.
Mr. Apte (F, 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 ad-
vances with their application to public health programs.
Mrs. Whissell-Bucy, Mr. Breeze (Sp)

227. International Maternal and Child Health. (2)
One 2-hour lecture per week. Prerequisite: graduate
standing in public health or consent of instructor. Ma-
ternational and child health programs outside of the
United States. May be repeated for credit.

228. Evaluation of Programs of Health Care for
Mothers and Children. (3) Formerly 291T. One 3-
hour lecture-discussion per week. Prerequisite: gradu-
ate standing in the School of Public Health, consent of
instructor. Review of principles and practice of eval-
uation of programs and projects in the public and pri-
vate sectors designed to provide health care for mothers
and children.

229. Programs and Services for Handicapped
Children and Youth. (2) One 2-hour lecture per week. Organization, scope, funding, implementation and evaluation of programs and services for handicapped children and youth and their families at national, state, and local levels. Programs and services for physical and mental handicaps and development programs. Mr. Blum, Mrs. Stimson (Sp)

230. Community Organization and Concepts Bas-
to the Change Process. (3) One 3-hour seminar per week. Prerequisite: major in public health education
or consent of instructor. Examination of social psychological concepts and theories basic to the prac-
tice of public health education, including analysis of community organization techniques, research and re-
sources. Mrs. D'Onofrio (W), Miss Minkler (F, Sp)

231. 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. Planning of educational approaches to public health problems with emphasis on the formulation of objectives, methodolo-
y, and evaluation in public health education.
Mr. Flaher (W, Sp)

234A. Public Health Education: Programs, Plan-
ning and Evaluation. (2) Two 1-hour seminar per week. Prerequisite: major in public health education or consent of instructor. Introduction to evaluation of
health problems, current programs in public health education.
Mr. Griffiths (W, Sp)

234B. Public Health Education: Programs, Plan-
ning, and Evaluation. (2) One 2-hour seminar per week. Prerequisite: major in public health education or consent of instructor. Planning of educational approaches to public health problems. May be repeated for credit.
Mr. Flaher (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. Major special educational approaches in selected areas of public health.
Miss Minkler (F), Mrs. D'Onofrio (W, Sp)

237. Legislation and Organization for Health and
Social Services. (3) One 2-hour lecture-discussion per
week. Prerequisite: graduate standing in the School of
Public Health, consent of instructor. Description and analy-
sis of legal, organizational, and institutional aspects of transla-
tion of legislation into organizational policy and
implications for planning service delivery systems.
Directed toward the health care of mothers and children.
Miss Wallace (F)

238. Advanced Study in Behavioral Sciences in
Public Health. (3) Two 1-hour seminar per week and tutorial. Prerequisite: doctoral candidates in public health or related discipline, or consent of instructor. Advanced study of theory, logic, design, methods and techniques of behavioral science research. Special reference to public health.
Mr. Knutson, Mr. Brudolf, Mr. Selten, Mr. Romano-V, Mr. Tordoir, Mr. Draper (W, Sp)

239A—239B. Proseminar in Behavioral Sciences in
Public Health. (3—3) One 3-hour seminar per week.
Either A or B may be taken independently. Current
discussion of the problems and implications they relate to the solution of public health problems.
Mr. Romano-V, Mr. Selten, 239A (W); 239B (Sp)

241. Current Developments in Public Health Nutri-
tion. (3) The Staff. One 2-hour seminar per week. Prerequisite: previous course in advanced nutrition or consent of instructor. Critical evaluation of cur-
rent literature related to public health nutrition prob-
lems and implications for new programs and research.
W

242. Biochemical and Metabolic Aspects of Cur-
rent Nutrition Problems. (3) One 2-hour lecture per week.

NOTE: For key to symbols, see page 10.
week. Prerequisite: previous course work in biochemistry and nutrition. Course focuses on problems of current concern to the public and health professionals. Miss Shapiro W.

243A-243B-243C. Public Health Nutrition. (3-4-4) Two 2-hour lectures per week; 243B and 243C: 4 hours of individual field work per week. Prerequisite: admission by public health committee and consent of instructor. Assessing problems and planning and evaluating programs in public health nutrition. Miss Miss Shapiro (W, Sp).

244. Public Health Nutrition for Physicians. (2) One 2-hour lecture-discussion per week. Prerequisite: a medical degree. A review of current nutrition findings and their implications. Mr. Chang (W).

245. Biochemical Evaluation of Nutritional Status. (2) Two 1-hour lectures per week. Prerequisite: Nutritional Sciences 160 and Biochemistry 102 and 102L, or equivalent, or consent of instructor. Evaluation of the biochemical methods presently used to assess the nutritional adequacy of vitamins and other nutrients in humans, including accuracy of methods, specificity, ease of use, apparatus required, and applicability to nutrition surveys. (W).

291A. Introduction to the Principles, Process and Methods of Public Health Evaluation. (3) Two 1-1/2-hour lectures per week. An introduction to the principles, process and methods of evaluation in a public health setting. Course covers models of evaluation, design, and evaluation. To be offered 1977/78 only. The Staff (W).

291B. Indian Health Care—Past, Present and Future. (3) One 2-hour lecture and one 1-hour discussion per week. Prerequisite: entrance exam in School of Public Health or consent of instructor. In depth examination of Indian health care with emphasis on policy, legislation and policy studies in the Indian context. Course will focus on historical background of federal policy towards Indians, with progression to present Indian health policy. To be offered 1977/78 only. Mr. Fuchs (W).

291C. Physical Disability from the Public Health Perspective. (3) One 3-hour lecture per week. Presentations of historical perspectives toward physical disability were physical disability. Topics include: Variations within the disabled population; family stress; impact of environmental barriers; legal rights; utilization of disabled human services and utilization of health manpower are related to health teams. The process of team functioning and its relationship to the health professionals and their function in health agencies, community boards, financial sources, and health legislation. Mr. Minkler (Sp).

294A. Interdisciplinary Study of Current Health Problems. (3) Two 1-hour lecture per week plus conference period and individual and group study outside class (minimally 2 hours per week). Enrollment limited to 25 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 health problems with concurrent analysis of studies 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: in course 294A. Enrollment limited to 25 graduate students under 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. Prerequisite: enrollment in course 294A. Enrollment limited to 25 graduate students who have completed 294A. The course examines the roles and education of various health professionals and their function on health team functioning and the implications of using teams for the delivery of health services and utilization of health manpower are analyzed. Miss Miss Peck, Mess Miss Peck, Mr. Chang.

294V. Health Behavior: Individual and Community. (3) Two 1-hour lectures and one 2-hour discussion per week. An interdisciplinary course on health, society, and implications for public health: the individual, family, group and community life, dimensions of society and community behavior, process of and approaches to behavioral change. Mr. Fisher (F); Mr. Romano-V. (Sp).

*294W. Voluntary Health Agency Programs. (2) One 2-hour lecture, one 4-hour field observation per week. Study of a structure and function 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 seminar-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 (F). Biological aspects of family planning and physiology of conception. Mr. Minkler (W).

Community and health programs in medical specialties. Mr. Minkler (Sp).

294Z. Problems and Programs in Mental Health. (2) 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. Mr. Apte (W).


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).


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. Approval is required for 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).

Note: The following sections have been established for courses 197, 199, 200, 293 through 298, 301 and 602. The courses may be repeated for credit, but some sections may not be given every quarter.

A. Health Administration

C. Hospital Administration

E. Public Health Social Work

F. Maternal and Child Health

G. Public Health Education

H. Behavioral Sciences

J. Public Health Nutrition

M. Comprehensive Health Planning

R. Community Mental Health

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 203A-203B-203C. Concepts of Mental Dysfunction. (3-3-3) See Interdepartmental Studies for the complete description of this course.

IDS 217A-217B-217C. Theoretical Concepts in Mental Health. (3-3-3) See Interdepartmental Studies for the complete description of this course.

IDS 232A-232B-232C. Interdisciplinary Course 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.

Graduate School of Public Policy

Graduate School of Public Policy Office, 2507 Hearst Avenue

Professors: C. Bertett McCullough, V.A.M.D., Arnold Mellencamp, Ph.D., Allan P. Sinder, Ph.D., Percy H. Tannenbaum, V.D.M.D., Ph.D.

Associate Professors: Eugene Anonymous, Edinburgh, Ph.D., David L. Kipp, V.J.D., Frank Low, V.D.M.D., Ph.D.

Assistant Professor: Lee S. Friedman, Ph.D.

Associate Dean: Leyton Graham

The School offers two programs of graduate study. The professional degree, the Master of Public Policy, is designed to provide students with the knowledge, skills, and sensitivities required to conduct policy studies. The Ph.D. program is oriented toward the generation of new knowledge, theories, and methodologies for the analysis of public policy.

The two-year Master's degree program consists of a required first-year core curriculum, a summer internship, and a second year devoted to elective courses and an advanced Policy Analysis sequence. The first-year core includes courses in political and organizational analysis, applications of economic analysis, modeling and quantitative approaches, legal analysis, and a workshop which provides opportunities to perform research experience in one or more substantive policy areas chosen by the students, and theoretical work in the disciplines most directly related to the individual's central policy concerns.

Students from diverse disciplinary backgrounds are accepted into this program so long as they wish to prepare themselves to perform systematic work in public policy. Graduates from the professional Master's degree program will be qualified to take positions with federal, state and local governments and with policy research organizations. Many will become analysts while others may take administrative and political positions in which they will initiate and utilize policy studies.

The Ph.D. program is primarily designed to prepare students for careers in policy research in academic institutions, research institutes, or with government agencies. The program is small and admission into it is highly selective. The Ph.D. program will include advanced methodological training, advanced research experience in one or more substantive policy areas chosen by the students, and theoretical work in the disciplines most directly related to the individual's central policy concerns.

Brochures and information on admission procedures and program content are available at the Graduate School of Public Policy, 2607 Hearst Avenue, Berkeley, CA 94720.

UNDERGRADUATE COURSES

*176. Political Dilemmas of Social Policymaking. (6) Four hours of lecture per week. Recent American social policies often have received mixed or negative verdicts. Criticism has focused on the ideas themselves and on problems at the adoption and implementation stages. This course analyzes why more than good intentions are needed to achieve effective social policies. Mr. Levine (F).
176. Analysis of Social Surveys for Public Policy. (4) Four hours of lecture per week. Prerequisite: permission of instructor. Data gathered through social surveys are a major source of information in the development and evaluation of public policies. This course deals with problems in the design and analysis of surveys, with implications for public policies. Mr. Trow

180. Dilemmas of Public Policy in Higher Education. (8) Two hours of lecture per week. Prerequisite: limited to students who have had some interaction with Public Policies. This course will focus on the interplay of social forces, values, and interests which shape public policy at all levels of society. The Staff (Sp)

181. Ethical Dilemmas in Public Policy. (9) Two hours of lecture per week. Prerequisite: consent of instructor. Selected empirical, normative and ethical dilemmas, such as conflicting concepts of equality; refusal to neutralize opponents, and to issues of "timming." Analysis of these problems in the context of American legislative and bureaucratic structures. Focuses on professional and citizen activist roles. Mr. Bardach (W)

183. Taxes, Politics and Public Policy. (8) Two hours of lecture per week. Prerequisite: consent of instructor. An introduction to the politics of taxation at both the federal and local levels. This course will examine public policies for getting taxes and revenue, tax reform and public tax preferences. Mr. Meltsner

184. Problem Solving in the Public Sector. (6) Two hours of lecture per week. Prerequisite: consent of instructor. An introduction to the problems of public sector organizations. Students will be asked to apply knowledge of politics, economics, sociology, and quantitative methods in the analysis of increasingly complex problems. Credit and grade will be assigned upon completion of the sequence. Mr. Levy, Mr. Bardach (F, W, Sp)

185. An Introduction to the Politics of Ad- vancing. (4) Four hours of lecture per week. Starting with an examination of the history of the States, this course examines the conditions under which it is accepted or rejected and the political and bureaucratic environment of policy advising. Mr. Mettner (F)

187. Legal Processes and Public Policy. (2) Two hours of lecture per week. Prerequisite: consent of instructor. May be taken as the first quarter of a sequence with course 271. Open to both graduates and undergraduates. Exams the processes by which court decisions, the interactions between judge-made law and law made by legislators, administrative agencies, and other courts, and the policy implications of this model of decision-making. Credit and grade will be assigned upon completion of the sequence. Mr. Kip

188. Poverty and Welfare Reform. (5) Three hours of lecture and one hour of discussion per week. Prerequisite: credit for course 164A prior to fall 1975. Summarizes the major issues concerning welfare reform, the logic of welfare reform and the criteria for choices among welfare reform proposals. Discussion of the political history of various initiatives and the analytical aspects of the problem including income dynamics and labor force participation. The Staff (Sp)

189. Policy Issues in Communication. (4) Four hours of lecture per week. An examination of the role of communication in a selected topic or topics in Public Policy. The Staff (F, W, Sp)

190. Supervised Independent Study and Research. (1-8) Prerequisite: upon standing. Open to qualified upper division students wishing to pursue special study and research under the direction of a member of the staff. Enrollment is restricted by regulations listed on page 38. Must be taken on a pass/fail basis. The Staff (F, W, Sp)

GRADUATE COURSES

The following courses except those numbered 244 are open to all qualified graduate students from other Schools or Departments, with the consent of the instructor.

200A-200B-200C. Introduction to Policy Analysis. (4-4-4) Two hours of lecture and three hours of seminar per week. Prerequisite: consent of instructor. This introductory course will integrate various social science disciplines and apply these perspectives to problems of public policy. Through the academic term, students will apply knowledge of politics, economics, sociology, and quantitative methods in the analysis of increasingly complex problems. Credit and grade will be assigned upon completion of the sequence. 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. Mr. Levy and Mr. Bardach (F, W, Sp)

220A-220B. 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 Staff (F, W, Sp)

225A-225B-225C. Political and Organizational Aspects of Policy Analysis. (4-4-4) Two 2-hour sessions per week. Prerequisite: consent of instructor. This course will examine the political and organizational aspects of new policy initiatives. Credit will be assigned upon completion of the sequence. Mr. Kip

228A-228B-228C. Information for Decision. (4-4-4) Three hours of lecture per week. Prerequisites: consent of instructor. The process of designing and evaluating information for specific policy areas, with a focus on public policy. The Staff (F, W, Sp)

239A-239B-239C. Supervised Independent Study and Research. (1-8) Prerequisite: upon standing. Open to qualified upper division students wishing to pursue special study and research under the direction of a member of the staff. Enrollment is restricted by regulations listed on page 38. Must be taken on a pass/fail basis. The Staff (F, W, Sp)

239A-239B-239C. Seminar in Mass Communication Policy. (4-4-4) Three hours of lecture per week. Prerequisite: consent of instructor. This seminar will examine the principles and issues in American higher education with special attention to the forces that shape public policy in this area. Topics will include the history and structure of mass communication, political context, finance, function, and government. Mr. Trow

243A-243B-243C. Seminar in Mass Com- munication Policy. (4-4-4) Three hours of lecture per week. Prerequisite: consent of instructor. This seminar will examine the principles and issues in American higher education with special attention to the forces that shape public policy in this area. Topics will include the history and structure of mass communication, political context, finance, function, and government. Mr. Trow

244A-244B. Research Methods in Public Policy Analysis. (4-4) Three hours of lecture per week. Prerequisites: permission of instructor. Examination of various methodological approaches in designing, collecting, analyzing and interpreting data; emphasis on techniques for program evaluation, including quantitative methods (e.g., experimental and quasi-experimental designs); emphasis on qualitative research. Credit and grade will be assigned upon completion of the full sequence. Mr. Milstein (W)

244A-244B. Issues in Mental Health Policy. (4-4) Three hours of lecture per week. Prerequisite: consent of instructor. A research seminar examining selected policy problems in mental health. Special emphasis on...
Graduate Program

The School of Social Welfare is a graduate professional school which offers:

1. A program of studies 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 graduate program 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 evidence ability to successfully complete doctoral study and must have undergraduate preparation as outlined below.

2. A two-year program of studies for the Master of Social Welfare degree in preparation for the professions of social practice. Students 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.

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 are considered for admission only during the final quarter of the seminar. The essay which will be produced with reference to a timetable for completion. Some time in the senior seminar is devoted to the planning and writing of the essay.

UPPER DIVISION COURSES

*100. The Field of Social Welfare. (5) Two 2-hour sessions per week. Survey of social welfare problems, programs, and issues. Designed to acquaint non-majors with the field of social welfare. Not open to students who have completed or are taking course 110A–110B–110C.

102A–102B. Social Work as a Profession. (3–3) Three 2-hour sessions per week. Preparation of a senior independent study and research. (1–5) Enrollment is restricted by regulations of the various academic departments. Required experience relevant to specific aspects of social work settings. The Staff (F, W, Sp)

130A–130B–130C. Field Practicum. (2–2–2) Eight hours of field work per week. Prerequisite: course 103A–103B must be taken concurrently. Course 103A–103B must be taken concurrently. An introduction to the practice of social work: values and ethical principles to help make the decision. The Staff (F, W, Sp)

110A–110B–110C. The Social Services. (5–5–5) Three 2-hour sessions per week. Prerequisite: course 100A–100B–100C. Required experience relevant to specific aspects of social work settings. The Staff (F, W, Sp)

111A. Social Welfare as an Institution. The background and development of the social services in relation to economic, political, and social change; analysis of the organization and delivery of social services in an industrial society. The Staff (F, W, Sp)

119B. Social Welfare Policy and Program. Analysis of social welfare policies and programs including public assistance, social insurance, urban renewal, anti-poverty programs, and emerging policies for income maintenance. The Staff (F, W, Sp)

110C. Seminar in Social Policy. Examination of the philosophy, organization and purpose of selected social welfare programs. The Staff (F, W, Sp)

H195A–H195B–H195C. Senior Honors Course. (3–3–3) Formerly numbered H197A–H197B–H197C. Weekly hours to be arranged. Problems in social welfare and social work. Preparation of a senior essay. Credit and grade will be assigned upon completion of the full sequence. Some time in the senior seminar is devoted to the planning and writing of the essay. The Staff (F, W, Sp)

197. Field Study in Social Welfare. (1–0) Supervised experience relevant to specific aspects of social welfare in off-campus organizations. Regular individual meetings with faculty sponsor and written reports required. The Staff (F, W, Sp)

198. Group Study for Advanced Undergraduates. (1–0) The Staff (F, W, Sp)

G78. Supervised Independent Study and Research. (1–0) Enrollment is restricted by regulations of the various academic departments. Required experience relevant to specific aspects of social work settings. The Staff (F, W, Sp)
200A–200B. Development of the Person. (2–2) One 1 1/2-hour session per week. Physical, psychological, and social development and adaptations of the person, as related to social welfare. The Staff (F, W)

201A–201B. Social Organization and Social Welfare. (2–3, 2–3) One 1 1/2-hour session per week for 2 units; an additional 1 1/2 hours every other week for students with an additional unit. Structure and dynamics of organizations, communities, groups, and families, as related to social welfare. Credit and grade will be assigned upon completion of the sequence. Sequence beginning (W) Mr. Wolins (W, Sp)

203. Development of the Social Deviant. (2) One 1 1/2-hour session per week. Prerequisite: course 200A–200B or consent of instructor. The social welfare implications of selected problems in human development and adaptation in situations involving physical illness, psychopathology, or stressful social conditions. Seminar topics will be announced annually. The Staff (F, W, Sp)

211. Seminars in Human Development and Pathology. (2) One 1 1/2-hour session per week. Prerequisite: course 201A–201B or consent of instructor. Advanced study of selected problems in social organization and social welfare. Seminar topics will be announced annually. The Staff (Sp)

220A–220B. Social Policy and Social Welfare. (2–2, 2–2) One 1 1/2-hour session per week for 2 units; an additional 1 1/2-hour discussion section per week for students who elect an additional unit. 220A. Income Maintenance. (2) One 1 1/2-hour session per week. A review of major income maintenance programs. Evaluation of alternative ways to influence them by legislative, administrative, and philosophical means. The Staff (Sp)

220C. Issues in Social Welfare Policy. (2-2) One 1 1/2-hour session per week. Analysis of organizational character of different types of voluntary social welfare agencies. Possibilities and constraints on their functions of innovation, social change and citizen participation. Professional-volunteer relationships in policy making, service delivery and social action. Mr. Kramer (F)


240A–240B–240C. Social Work Methods with Individuals and Groups. (2–2–2) One 1 1/2-hour session per week. Basic principles of social work practice with individuals, families, and small groups. (F, W)

241A–241B–241C. Social Work Methods with Special Population Groups. (2–2–2) One 1 1/2-hour session per week. Basic principles of social work practice with individuals, groups, and communities of special population groups such as aged or minority groups. The Staff (F, W)

244. Introduction to Community Planning and Organization. (2) Formerly 242A. One 1 1/2-hour session per week. An overview of the field, issues and modes of professional practice. Mr. Gilbert, Mr. Kramer, Mr. Specht (F)

245. Development of Social Service Programs. (3) Formerly 242B. Two 1 1/2-hour sessions per week. Principles and methods of program design and proposal writing. Mr. Kramer, Ms. Weiss (W, Sp)

246. Processes of Community Planning and Organizing. (2) Formerly 242C. One 1 1/2-hour session per week. Principles and methods of building organizations for social action and planning. Mr. Specht (W)

248A–248B–248C. Theory and Practice of Social Work. (2–2–2) Two 1 1/2-hour sessions per week. Prerequisite: permission of the program director or consent of instructor. Analysis of the historical, philosophical, and theoretical bases of social work practice with individuals, groups, organizations, and communities. Mr. Miller (F, W, Sp)

250. Advanced Social Casework. (2) One 1 1/2-hour session per week. Prerequisite: course 240A–240B–240C or consent of instructor. Generic and specific components of social casework in different fields of practice, including corrections, family and child welfare, medical, psychiatric, public welfare, and school social work. The Staff (F)

251. Specialized Methods of Social Work Practice. (2) One 1 1/2-hour session per week. Prerequisite: consent of instructor. A study of selected methods of social work practice with pro individaus, families, and communities in relation to social problems. Topics will be announced annually. The Staff (F, W, Sp)

252A–252B. Advanced Social Group Work. (2–2) One 1 1/2-hour session per week. Prerequisite: course 241A–241B or consent of instructor. Advanced analysis of social group work theory and practice; application in a variety of settings. Sequence beginning (F). (F, W)

253. Community Planning Theories and Methods. (2) One 1 1/2-hour session per week. Analysis of models, sociopolitical and technical tasks and professional roles. Mr. Kramer (Sp)

254A–254B. Social Welfare Administration. (2–2) One 1 1/2-hour session per week. Prerequisite: course 240A–240B or consent of instructor. Administrative process and programs in social welfare organizations. Sequence beginning (F). Mr. Pruger (F, W)

256A–256B–256C. Social Work Practice in Public Health. (3–3–3) Two 1 1/2-hour sessions per week. Prerequisite: primarily for workers in the School of Public Health and for others with the consent of instructor. Advanced study of the conceptual basis for social work contributions to public health and medical care programs. Analysis of the issues affecting the design and implementation of social work services in selected settings. Emphasis is given to skills in training, consultation, planning and evaluation. (F, W, Sp)

256B. Media and Methods in Social Work. (2–2) One 1 1/2-hour session per week. Uses the School's educational media laboratory, especially video-recording and playback, to improve professional functioning and to teach utilization of new media in social work practice. The relation of medium to message, and ethical, legal, philosophical, artistic issues are discussed and demonstrated. Mrs. Wilson (F, W, Sp)

257. The Good Bureaucrat. (2) One 1 1/2-hour session per week. Prerequisite: graduate standing. An analysis of the problems and opportunities faced by the professional service giver in a bureaucracy. The many problems that can the professional manage the bureaucratic environment of service giving rather than be managed by it? Mr. Pruger (F)
259. Methods of Supervision in Social Work (2) One 1 1/2-hour session per week. Prerequisite: one-year standing in the M.S.W. program or consent of instructor. **259A-259B-259C. Seminars in Social Work Theory (3-3-3) Two seminar hours per week: Primarily for doctoral students. Sequence beginning (W) 259A, analysis of selected theories of social work practice; 259B, selected social problems from the light of theory in social work and the social and behavioral sciences; 259C, theories of change and their implications for social work practice. The Staff (F, W, Sp)

200. 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, activities and structures 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)

279A-279B-279C. Seminars in History and Philosophies of Social Welfare (3-3-3) Two seminar hours per week. Primarily for doctoral students. 279A. A review of efforts to conceptualize the field of social welfare and to analyze its tendencies. 279B. Historical research and writing and selected topics. 279C. Values in social work: seeking a revised philosophy and an empirical inquiry into decisions that seem value-laden.

282A-282B-282C. Social Welfare Research Theory (2—2—2) At least one 1 1/2-hour session per week in lecture and/or laboratory. Primarily for M.S.W. students. A three-quarter research sequence in which students design and carry out studies, analyze and interpret the results, and report their findings. Mr. Boyd (Sp)

287. Library Research in Social Welfare (1) One 1 1/2-hour session per week. Primarily for doctoral students. A systematic introduction to tasks and tools of library research, particularly reference procedures and bibliographic aids. Attention to historical sources, current data collection, and the student's research needs. Mrs. Britt, Mrs. O'Day, Ms. Weiss (F, W, Sp)

298. Individual Study for Graduate Students (1-9) Designed to permit any qualified graduate student to pursue special study in a subject of his own choosing under the direction of a faculty member. The Staff (F, W, Sp)

**201. 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 satisfactory/unsatisfactory basis. The Staff (F, W, Sp)

202. Laboratory in Social Work Practice and Social Welfare Agencies. (1—2) One-half or one full day per week. Introduces the student to the range of professional roles and services in social welfare through a series of visits, interviews, observations, and active participation in meetings. Designed to correspond to student's program concentration. Graded on a satisfactory/unsatisfactory basis.

210. Research Methods in Social Work Practice and Social Welfare Agencies. (2—2) One and 1/2 hours per week. Introduces the student to the range of professional roles and services in social welfare through a series of visits, interviews, observations, and active participation in meetings. Designed to correspond to student's program concentration. Graded on a satisfactory/unsatisfactory basis. Mrs. Britt, Mrs. O'Day, Ms. Weiss (F, W, Sp)

288. Policy Analysis and Research in Social Welfare. (2—3—2) One-half or one full day per week. Introduces the student to the range of professional roles and services in social welfare through a series of visits, interviews, observations, and active participation in meetings. Designed to correspond to student's program concentration. Graded on a satisfactory/unsatisfactory basis. Mrs. Britt, Mrs. O'Day, Ms. Weiss (F, W, Sp)

289A-289B-289C-**289D. Workshop in Applied Research and Statistics. (4) See Interdepartmental Studies for the complete description of this course. Mrs. Gambrill, Mr. Segal (Sp)

21. The Food Crisis. (10) 8-10 hours of course work and tutorial per week. Prerequisite: Open to freshmen and sophomores enrolled in the Collegiate Seminar Program or by consent of the Instructor. Mrs. Dreyfus (W)

Special Studies

**21. The Food Crisis. (10) 8-10 hours of course work and tutorial per week. Prerequisite: Open to freshmen and sophomores enrolled in the Collegiate Seminar Program or by consent of the Instructor. Problems
of global food needs, and of eating well, and safely, in

SPECIAL STUDIES: Energy & Resources / 245

of energy and Resources: Mr. Holdren (W)

26. Economic Aspects of Global Environmental Problems (Environmental Studies 102). Four hours of lecture and one hour of discussion per week. Prerequisite: Environmental Studies 101 or by consent of instructor. A study of the economic aspects of environmental problems and the role of economic policies in achieving environmental goals.

Mr. Dreyfus (W)

76T. Comparative Revolutions. (10) 8-10 hours of course work and tutorial per week. Prerequisite: Open to freshmen and sophomores enrolled in the Collegiate Seminar Program or by consent of the instructor. A study of the causes and consequences of revolutions in various parts of the world, and the impact of revolutions on the development of modern society.

SPECIAL DIVISION INTERDISCIPLINARY COURSES

70A-70B-70C. Problems and Documents of Women's History. (4-6) Three hours of lecture per week. Prerequisite: Open to women and men, with supporting readings in women's studies.

Energy and Resources: Mr. Holdren (W)

70B. Women, Work, and Society. (10) 8-10 hours of course work and tutorial per week. Prerequisite: Open to women in the Collegiate Seminar Program or by consent of the instructor. A study of women's roles in contemporary society, with emphasis on the economic, political, and social aspects of women's lives.

Energy and Resources: Mr. Holdren (Sp)

70C. Women and Hungarians. (9 or 10) 8-10 hours of course work and tutorial per week. Prerequisite: Consent of the instructor. A study of the role of women in Hungarian society, with emphasis on the cultural, economic, and political aspects of women's lives.

Energy and Resources: Mr. Holdren (W)

71. European Colonialism in Literature, Film, and Television. (10) 8-10 hours of course work and tutorial per week. Prerequisite: Open to freshmen and sophomores enrolled in the Collegiate Seminar Program or by consent of the instructor. A study of the cultural and ideological consequences of European colonialism as reflected in literature, film, and television.

Energy and Resources: Mr. Holdren (W)

72. Culture and Personality, (10) 8-10 hours of course work and tutorial per week. Prerequisite: Open to freshmen and sophomores enrolled in the Collegiate Seminar Program or by consent of the instructor. A study of the relationship between culture and personality, with emphasis on the role of culture in shaping individual behavior.

Energy and Resources: Mr. Holdren (Sp)

73. Utopias. (10) 8-10 hours of course work and tutorial per week. Prerequisite: Open to freshmen and sophomores enrolled in the Collegiate Seminar Program or by consent of the instructor. A study of utopian and dystopian thought and movements and their social and political implications.

Energy and Resources: Mr. Holdren (Sp)

74. Public vs. Private: Participation and Alienation. (10) 8-10 hours of course work and tutorial per week. Prerequisite: Open to freshmen and sophomores enrolled in the Collegiate Seminar Program or by consent of the instructor. A study of the role of public and private life in contemporary society, with emphasis on the relationship between individuals and society.

Energy and Resources: Mr. Holdren (Sp)

75. Comparative Politics. (10) 8-10 hours of course work and tutorial per week. Prerequisite: Open to freshmen and sophomores enrolled in the Collegiate Seminar Program or by consent of the instructor. A study of the role of politics in shaping society, with emphasis on the political systems of various cultures.

Energy and Resources: Mr. Holdren (Sp)

76. Comparative Revolutions. (10) 8-10 hours of course work and tutorial per week. Prerequisite: Open to freshmen and sophomores enrolled in the Collegiate Seminar Program or by consent of the instructor. A study of the causes and consequences of revolutions in various parts of the world, and the impact of revolutions on the development of modern society.

Energy and Resources: Mr. Holdren (Sp)

77. Problems and Documents of Women's History. (4-6) Three hours of lecture per week. Prerequisite: Open to women and men, with supporting readings in women's studies.

Energy and Resources: Mr. Holdren (Sp)

78. Economic Aspects of Global Environmental Problems (Environmental Studies 102). Four hours of lecture and one hour of discussion per week. Prerequisite: Environmental Studies 101 or by consent of instructor. A study of the economic aspects of environmental problems and the role of economic policies in achieving environmental goals.

Mr. Yokay (W)

79. Supervised Independent Study and Research. (1-9) For students in good standing who wish to undertake a program of individual inquiry initiated jointly by the student and a professor. There are no other formal prerequisites, but the supervising professor must be convinced that the student is likely to profit by the program. Must be taken on a passed/not passed basis.

Energy and Resources: Mr. Holdren (Sp)

GRADUATE INTERDISCIPLINARY COURSES

260. Critical Issues in Energy Technology. (3) Formerly Engineering 260. Three hours of lecture per week. Prerequisite: Engineering 160 or equivalent. An examination of selected issues in energy technology combining analytical approaches and inputs from several disciplines. Issues include: technology of energy conservation; technology of solar, wind, and hydroelectric power; technology of nuclear power; technology of coal, safety and siting of nuclear reactors, uranium supply, and short-term solar energy applications.

Energy and Resources: Mr. Holdren (Sp)

280. Economic Aspects of Energy Use. (4) Three hours of lecture per week. Prerequisite: E & R 100 or equivalent; Econ 104A or equivalent; basic calculus or linear algebra. An examination of the economic aspects of energy use applied to energy; exhaustion theory and economics of energy supply; patterns of energy use; trade-offs in energy conservation; governmental programs; the supply demand curves; projecting future energy use.

Energy and Resources: Mr. Chapman (Sp)

290. Group Seminar. (1-3) Two hours of lecture per week.

NOTE: For key to symbols, see page 10.
week. Prerequisite: graduate standing in the Energy and Resources Group. Graduate student presentations and faculty-student discussions of advanced topics in interdisciplinary energy research.

Energy and Resources: Mr. Holtden, Ms. Draper, Mr. Christensen

299. Individual Research in Energy and Resources. (1-8) Investigation of problems in energy and resources from an interdisciplinary perspective. Energy and Resources: The Staff

Ethnic Studies

Department Office, 3326 Dwinelle Hall

Group Major In Ethnic Studies

The Group Major in Ethnic Studies, leading to a Bache-
lor of Arts degree, represents the joint commitment of the Asian American Studies Program, the Chicano Studies Program, and the Native American Studies Program to provide a core curriculum whose educational objectives are as follows:

1. Development of a sensitivity and commitment in students to understanding the situations affecting Third World people and their communities.
2. Development of a methodology emphasizing comparative analysis of the histories and contemporary positions of Third World peoples.
3. Development of research capabilities in students who 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.

Major In Ethnic Studies

In addition to the general university requirements regarding GPA, Subject A and American history and literature, the Group Major in Ethnic Studies Includes a Breadth Requirement and a Major Requirement. In fulfilling these requirements, students will work closely with an academic advisor and select an area of emphasis. The areas of emphasis are defined as follows:

1. Social Sciences, comprising subject matter roughly corresponding to the organization of knowledge in courses offered in the Division of Social Sciences in the College of Letters and Science.
2. Humanities, comprising subject matter roughly corresponding to the organization of knowledge in courses offered in the Division of Humanities in the College of Letters and Science.
3. Community Service, comprising subject matter roughly corresponding to the organization of knowledge in the Professional Schools.

Breadth Requirements

1. Demonstrated proficiency in reading and composition.
2. Demonstrated proficiency in alternate systems for the structure and conceptualization of knowledge, which may be met by completing A of the following and either B or C: (A) Demonstration of competence in a language other than English; (B) Completion of two courses in such fields as mathematics, statistics, linguistics, computer science, logic; (C) Completion of two courses in such fields as aesthetics, art criticism, literary theory.

3. Satisfactory completion of an introductory course in one of the four Ethnic Studies Programs (including Afro-American Studies).
4. Satisfactory completion of six courses outside the student's declared Area of Emphasis.

Major Requirements

1. Completion of 20 units of common core courses which are: E.S. 20, Introduction to Ethnic Studies; E.S. 21, Comparative Survey of Third World Experience; E.S. 130, Comparative Analysis of Racism in America: An Historical Perspective; E.S. 170: Selected issues in Methodology for Third World Research.
2. Completion of two additional upper division courses in Ethnic Studies.
3. Completion of six additional upper division courses which form the basis of the declared Area of Emphasis.

COURSES IN ETHNIC STUDIES

20. Introduction to Ethnic Studies. (5) Five hours of lecture per week. Prerequisite: none. The University's relationship to corporate structures, legislative bodies, and specifically Third World people and their communities. 

21. A Comparative Survey of Third World Experiences in the United States: An Introduction. (5) Three and one-half hours of lecture per week and one and one-half hours of discussion sections per week. Prerequisite: none. A comparative analysis of the political, social, economic, and cultural status of Third World people in Third World societies. Choice of instructor. 

100. Third World Literature. (5) Five hours of lecture per week. Prerequisite: none. The purpose of this course is to explore through the literary works poetry, fiction, essays, and novels written in and by Third World authors presenting different forms. 

141. Third World Politics. (5) Five hours of lecture per week. Prerequisite: none. A comparative analysis of the political ideologies of the Third World. 

142. Ethnicity, Race, and the State. (5) Five hours of lecture per week. Prerequisite: Ethnic Studies 20 or consent of the instructor. Advanced seminar in Third World politics to be announced at the beginning of each quarter. May be repeated for credit. 

190. Advanced Seminar in Third World Studies. (5) Four hours of seminar per week. Prerequisite: Ethnic Studies 20 or consent of the instructor. Advanced seminar in Third World Studies to be announced at the beginning of each quarter. May be repeated for credit. 

197. Field Work in Third World Communities. (1-5) Individual conferences to be arranged. Prerequisite: upper division standing and consent of instructor. Supervised experience related to the political aspects of Third World Communities in off-campus settings. Regular individual meetings with faculty sponsor and written reports required. 

Asian American Studies Program

Program Office, 3407 Dwinelle Hall

Associate Professor: Ronald Takaki
Assistant Professors: Sucheng Chan, Ronald Takaki
Assistant Professor: P. Agnes Chan

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 Asian American communities. Toward this, the program draws heavily on the curricula of such schools as Education, Public Health, Law, and Sociology. The program itself offers instruction in those areas relating to the special needs of Asian American communities. Second, the program explores the histo-
Asian American perspective; cultural roots; immigration and settlement patterns; economic, political, and social history. 20B: Introduction to Asian-American communities covering the evolution of social, economic, political and political institutions of Asian-American communities and their relationship to the larger American society. Course employs race and class analysis.

Staff

UPPER DIVISION COURSES

120. Comparative History of Asian Experience in America. (5-5) Three and two hours of discussion per week. Satisfies American History requirement. Prerequisite: course 20. Analysis of the similarities and differences across communities, ethnicities, and periods of American history; methods of comparative approach to Asian-American history; common Asian experiences in areas such as immigration, labor, economic development, and political participation relative to the development, and occupational patterns will be analyzed and compared. L. Wang (F)

121A–121B. Chinese American History. (5–5) Formerly 20A. Three and two hours of discussion per week. Each course satisfies American History requirement. Prerequisite: course 20 is recommended. This course will be presented as a prosenium with selected topics in order for students an opportunity to participate in the dynamics of the study of Chinese-American history. Topics include immigration, anti-Japanese racism, labor, concentration camps, art and culture, and personality. Suchan Chan

122. Korean American Historical and Contemporary Issues. (5) Three hours of lecture and two hours of discussion per week. Satisfies American History requirement. Prerequisite: course 20 is recommended. This course will be presented as a prosenium with selected topics in order for students an opportunity to participate in the dynamics of the study of Korean-American history. Topics include immigration, anti-Japanese racism, labor, concentration camps, art and culture, and personality. L. Wang (W, Sp)

123. Korean American Historical and Contemporary Issues. (5) Three hours of lecture and two hours of discussion per week. Satisfies Asian Studies requirement. Prerequisite: consent of instructor. Koreans in America from 1876 to the present. Topics include emigration, immigration and settlement patterns; labor and socioeconomic life; political, social, community organization and issues related to Korea and American communities. H. E. Kim in charge

124A–124B–124C. Filipino 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 economy of the Philippines under colonialism, the subsequent effects in the political and cultural structure, the process of imperialist expansion, the development of Filipino immigration to America, the history of Filipino labor in America and the current struggle of Filipinos in America. L. Wang (F, W, Sp)

124A–124B–124C. The Revolution and the Asian American Experience. (5–5-5) Three hours of lecture and one hour of discussion per week. A two-quarter interdisciplinary course on the consequences of the Chinese Revolution on Asian American communities and individuals. 124A is a comparative analysis of how key social, economic and political institutions in China and the United States today affect the quality of life in each context. It is strongly recommended that students take both quarters of the course. Suchan Chan

125. Twentieth Century Asian Political Thought. (5) Three hours of lecture and two hours of discussion per week. Prerequisite: consent of instructor. A survey of the political ideologies of leading contemporary figures in Asia. How these ideologies affect the political attitudes and behavior in Asian Americans in the United States. P. A. Chan

126A–189B. Community Planning. (5–5) Formerly 126A–189B. Three and two hours of lecture and 2 hours of language lab per week. Prerequisite: consent of instructor. The development of conversational and writing skills in the language most commonly used in Pilipino and Pilipino American communities. Includes an examination of historical, social, and cultural aspects of the Pilipino American communities and their influence on the Pilipino and Pilipino Americans.


20A–20B. Introduction to the Asian American Experience. (5–5) Formerly 20 and 40. Three hours of lecture and one hour of discussion per week. Satisfies American History requirement. Introductory comparative analysis of the Asian American experience from 1848 to the present. Topics include an analysis of the Asian American perspective; cultural roots; migration and settlement patterns; economic, political, and social history. 20B: Introduction to Asian-American communities covering the evolution of social, economic, political, and political institutions of Asian-American communities and their relationship to the larger American society. Course employs race and class analysis. P. A. Chan

145. Social Institutions in the Asian American Communities. (5) Three and two hours of discussion per week. Prerequisite: course 20 or consent of instructor. A comparison of the influence of education, politics, economics and other social institutions and their impact on Asian American communities. Students will have an opportunity to focus on particular institutions in discussion sections.

146. Selected Topics and Issues in the Asian American Community. Three hours of lecture and two hours of discussion per week. Prerequisite: AsAmSt 145. Three hours of discussion per week. This course will examine the nature, structure and operation of selected legal institutions as they affect Asian American communities and will examine the roles and effects of law, class and race in Asian American society.

146B. Mental Health. (4) Prerequisite: AsAmSt 145. This course is designed to acquaint the students with the basic understanding of the concepts relevant to the mental health of Asian Americans with particular emphasis on the service delivery aspect. It attempts to correct the traditional deficiencies in the academic curricula, which fail to focus on the ethnic and cultural complexity of the Asian American communities in the United States.

146C. Housing. (4) Prerequisite: AsAmSt 145. This course will focus on the role and overall performance of housing-related institutions in minority communities by examining their formal and informal structures and by explaining some of the underlying reasons and consequences of the policies and programs. Primary emphasis will be placed on analyzing how HUD housing and urban renewal policies have come to bear on Bay Area Asian community projects.
experience interested in approaching art as a medium of expression of Asian Americans. Will focus on how, in practice, art can be combined with the current concerns of Asian Americans.

171. Seminar on Selected Topics in Asian American Studies. (3) Three hours of lecture and two hours of laboratory per week. Prerequisite: Consent of Instructor. Supervised experience relevant to specific aspects of the topic in course 146 in which student is enrolled. Experience will be in organized activities located in the Bay Area Asian American communities. Completion of specific project and/or paper required in conjunction with course 146A or 146B.

197A. Field Study in Asian American Communities. (1-6) One to three hours of meetings and two to twelve hours of field work per week. Prerequisite: must be taken concurrently with course 146A or 146B, May be repeated up to 10 units. Supervised experience in the area of health. Field placement will be with mental health organizations located in Bay Area Asian American communities. Completion of a specific project and/or paper required in conjunction with course 146A or 146B.

197B. Field Study in Asian American Communities: Mental Health. (1-6) One to three hours of meetings and two to twelve hours of field work per week. Prerequisite: must be taken concurrently with course 146A or 146B. May be repeated up to 10 units. Supervised experience in the area of mental health. Field placement will be with mental health organizations located in Bay Area Asian American communities. Completion of a specific project and/or paper required in conjunction with course 146A or 146B.

197C. Field Study in Asian American Communities: Housing. (1-6) One to three hours of meetings and two to twelve hours of field work per week. Prerequisite: must be taken concurrently with course 146A or 146B. May be repeated up to 10 units. Supervised experience in the area of housing. Field placement will be with housing organizations located in the Bay Area Asian American communities. Completion of a specific project and/or paper required in conjunction with course 146A or 146B.

197D. Field Study in Asian American Communities: Health Care. (1-6) One to three hours of meetings and two to twelve hours of field work per week. Prerequisite: must be taken concurrently with course 146A or 146B. May be repeated up to 10 units. Supervised experience in the area of health care. Field placements will be with health care organizations located in Bay Area Asian American communities. Completion of a specific project and/or paper required in conjunction with course 146A or 146B.

197E. Field Study in Asian American Communities: Media. (1-6) One to three hours of meetings and two to twelve hours of field work per week. Prerequisite: must be taken concurrently with course 146A or 146B. May be repeated up to 10 units. Supervised experience in the area of media. Field work will be in the area of media in relationship to the Asian American Communities. Completion of a specific project and/or paper required in conjunction with course 146A or 146B.

198. Directed Group Study for Advanced Undergraduates. (1-6) Prerequisite: consent of instructor. Group study of a selected topic or topics in Asian American Studies.

The Staff (R. Takaki in charge) (F, W, Sp)

199. Supervised Independent Study and Research. (1-6) Prerequisite: at least one upper division Asian American Studies course and consent of instructor. Enrollment is restricted by regulations listed on page 26. May be taken on a passed/not passed basis. The Staff (F, W, Sp)

Chicano Studies Program

Program Office, 3041 Dwinelle Hall

Assistant Professors:

Lita Gonzalez, Ph.D.
Carlos Munoz, Ph.D.

The Chicano Studies Program has revised its curriculum and major. List of courses to be offered in 1977-78 is available at the Chicano Studies Program office.

Native American Studies Program

Program Office, 3415 Dwinelle Hall

Associate Professors:

Clara Sue Kidwell (Choctaw-Chickasaw), Ph.D.

Assistant Professors:

J. Youngblood Henderson, Ph.D.
Ann R. Metcalf, Ph.D.
Chokasaw-Chickasaw, J.D.
Terri Wilson (Pawotawam), Ph.D.

The Native American Studies Program exists to provide a point of academic focus and identity for Native American students and to broaden the understanding of other students interested in the history, culture, and contemporary situations of Native Americans.

The curriculum has been structured to provide courses that deal with both historical and cultural analysis of Native American cultures and contemporary legal and social institutions that affect Native American life. The Program stresses not only sound academic preparation in the classroom but also allows students the flexibility to take part in community-oriented education through field work or studies directed toward community situations and problems. Ongoing projects with Native American communities in the Bay Area and at Ascension Mission and at San Quentin are examples of this kind of community concern.

All courses reflect a Native American perspective in the interpretation of information and their attempt to give students critical and analytical ability to deal with information and situations concerning Native Americans, both past and present.

The Major

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 work out 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 Sovereignty (5).
D. Research Methods (10). ^6
5. Completion of an additional 25 units in Native American Studies, at least 20 of which must be in upper division courses.

The ten units of research methods may be taken within Native American Studies (N.A.S. 198) or within a division or department that other units that would be better suited to the goal of the students program of study.

6. Completion of at least 12 units in courses that have significant Native American content, by divisions or departments other than Native American Studies.

Note. Changes, effective Fall Quarter 1977, are expected regarding prerequisites to the major and major requirements. Inquiries should be directed to the Academic Adviser, 3415 Dwinelle Hall.

Honor 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 term of 12 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 such 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, quarter offerings, and schedule changes are available in 3415 Dwinelle 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. (5) And one-half hours of lecture per week. Prerequisite: satisfaction of Subject A requirement. Expository composition directed to the needs of Native American students.

1B. Native American Studies Reading and Composition. (5) Four and one-half hours of lecture per week. Prerequisite: satisfaction of English requirement and course 1A or equivalent. Continued emphasis on the development of proficiency in expository composition with an increased emphasis on being geared to the Native American literary tradition.

15. Ideology of Native American Studies. (2) Two hours of seminar per week. Prerequisite: consent of instructor. A theoretical and philosophical course inquiring into the meaning and content of the existence of Native American Studies within a university structure. This course is especially designed for prospective majors and must be taken on a passed/not passed basis.

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

20. Native American Education. (5) Formerly 85. Four and one-half hours of lecture per week. Prerequisite: course 71A or 171A or consent of instructor. A study of the historical development of American Indians' education and present solutions to related problems of education in the various types of schools. During the latter part of the quarter, emphasis will be given to the contemporary period.

25. The Native American in Contemporary Society. (5) And one-half hours of lecture per week. Satisfies American institutions requirement. An analysis of political issues and problems of Native Americans on reservations and in urban areas. Major topics to be discussed: the Bureau of Indian Affairs, the United States Public Health Service, the relocation system, the reservation system, discrimination, urban life, Indian organizations, stereotypes, the "New Indian," etc.

Mr. Henderson (F, W, Sp)

71A. History of Native Americans in North America. (5) Formerly 171A. Four and one-half hours of lecture per week. Satisfies American Institutions requirement. Prerequisite: course 71A or consent of instructor. This course is designed as a survey-lecture course. It will deal with the political, cultural, legal, and military relationships between the various American Indian tribes
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. This course is designed to emphasize defining topic or thesis in research, and underlying assumptions in research. Ms. Metcalf (W)

101. Survey of Native American Tribal Government and Policy. (5) Three hours of lecture and one and one-half hours of discussion per week. Prerequisite: consent of instructor. Examination of the relationship between Native American tribes and the federal government and policy through examination of various American Indian nations. Topics include political autonomy, intertribal alliances, and the effect of European contact on tribal policies. Mr. Henderson (F)

102. Native American Community Development. (6) Formerly 111. Three hours of lecture and one and one-half hours of discussion per week. Prerequisite: 71A or consent of instructor. An examination of the development of tribal governments and policy through examination of various American Indian nations. Topics to be considered will include an analysis of political institutions, the tribal society, intertribal alliances, and the effect of European contact on tribal policies. Mr. Henderson (F)

103. Native American Sovereignty. (5) Formerly 130. Three hours of lecture and one and one-half hours of discussion per week. Prerequisite: satisfies American History requirement. An examination of the rights of Native Americans as a product of the history of Anglo-American economic and political development. Mr. Henderson (W)

110A. Introduction to Research Problems of Native American Communities. (5) Formerly 110. Four and one-half hours of seminar per week. Prerequisite: 71A or consent of instructor. This course is designed to emphasize defining topic or thesis in research, and underlying assumptions in research. Ms. Metcalf (W)

110B. Introduction to Research Problems of Native American Communities. (5) Formerly 110. Four and one-half hours of seminar per week. Prerequisite: 71A or consent of instructor. The individual student, with consent and upper division standing preferred. Group work on specific aspects of the Native American community in on-campus settings. Mr. Wilson (F)

114. Contemporary Native American Education. (5) Four and one-half hours of seminar per week. Prerequisite: 50, 71B, 85, or consent of instructor. An overview of the role of women in traditional and modern world. Changes in Indian societies occasioned by contact with Europeans and how these changes have altered sex role definitions. Mr. Henderson (W)

115. Native American Women. (5) Four hours of lecture per week. Prerequisite: course 71A or 71B or consent of instructor. An examination of the history of Native American women in the United States and Canada through the history of film. The format will include representative Indian films, lectures, and guest speakers from the film industry. Mr. Wilson (F)

125. Native American Arts and Contemporary Design. (5) Four and one-half hours of seminar per week. Prerequisite: 71A or consent of instructor. A study of the history and development of contemporary Native American art and design. Mr. Henderson (Sp)

126. History of Native Americans in California. (5) Three hours of lecture and two hours of discussion per week. Prerequisite: course 71A or consent of instructor. An examination of the history of the Native American Nations of the southwestern United States. Ms. Kidwell (W)

127. History of Native Americans in the South. (5) Three hours of lecture and two hours of discussion per week. Prerequisite: course 71A or consent of instructor. A study of the material culture and influence of the Native American Nations of the southeastern United States. Ms. Kidwell (F)

128. Native American Arts and Contemporary Design. (5) Four and one-half hours of seminar per week. Prerequisite: 71A or consent of instructor. A study of the history and development of contemporary Native American art and design. Mr. Henderson (F)

129. Native American Studio Art: Painting. (3) Two 3-hour studio classes per week. Prerequisite: course 184A-184B or consent of instructor. This course is designed to teach students the basics of painting. Students will learn about the concepts of Native American community in on-campus settings. Mr. Kidwell (W)

145. The Native American and Penal Institutions. (4) Four and one-half hours of seminar per week. Prerequisite: consent of instructor. A study of the Native American and penal institutions. The course will emphasize the theoretical problems that urbanization and acculturation present, the problem of identity personal and the social, individual and familial, of education, and the implications of education for the future. (F)

146. The Native American and Penal Institutions. (4) Four and one-half hours of seminar per week. Prerequisite: consent of instructor. A study of the Native American and penal institutions. The course will emphasize the theoretical problems that urbanization and acculturation present, the problem of identity personal and the social, individual and familial, of education, and the implications of education for the future. (F)

Field Studies Program

Field Studies courses involve up to twenty students per course in a coordinated program of internships with community agencies and weekly small-group seminars directly related to a topical area.

Courses currently offered include: Child Care and Sociology, Community Mental Health, Urban Dilemmas, Criminology, Consumer Protection, Public Advocacy, Field Studies Media, and an Internship in Contemporary Sociology, Women and Emerging.

Students are placed as staff members of such service-oriented environments as 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 note: For key to symbols, see page 10.
Health Arts and Sciences

(Administered by the Health and Medical Sciences Program and the Council for Special Curricula)

Program Office, Room 221, Building T-7

Professors: Henrik L. Blum, M.D., M.P.H.
Cieno M. Cipolla, Laurea
Bernard L. Diamond, M.D.
Robert L. Lee, M.D.
Sheldon Morgen, M.D.

Associate Professors: Stephen Cohen, Ph.D.
Theodore E. Cohn, Ph.D.

Lecturers: Stephen R. Blum, Ph.D.
James Seidling, Ph.D.
Joel Swartz, Ph.D.
Abert R. Joneson, S.J., Ph.D.
Isabel Wieselman, M.S.W.

The Program

Health Arts and Sciences is an undergraduate program designed to teach students to identify and analyze critically contemporary health problems. The program is based on the assumption that students should have an understanding of the complexity of health issues before pursuing scholarly or professional specialization. Courses emphasize that health problems are complex and that to be understood and solved they must be analyzed from the perspectives of many disciplines, in addition to the traditional biomedical sciences. Such disciplines include economics, law, political science, and sociology. Further, students learn how narrow analyses and the implicit values of investigators restrict the understanding of health issues and affect resulting policy decisions.

Health Arts and Sciences courses are open to students from all schools and colleges who are interested in contemporary health problems, in developing intellectual skills necessary to pursue health-related professions, and in effecting social change in the area of health. Students are given responsibility for establishing and accomplishing their own educational agendas. In this way, the program attempts to foster in its students an independent approach to work.

The Major

For students with an especially high interest in pursuing an individual investigation of a substantive health problem, Health Arts and Sciences offers an undergraduate major leading to the degree of Bachelor of Arts in Health Arts and Sciences. The major serves as preparation for admission to graduate programs in health planning, and other professional programs and for Ph.D. programs in a variety of academic disciplines. Those majors who go on to professional training will have an understanding of how their fields affect health. The broad perspective of health problems presented by Health Arts and Sciences will be particularly valuable for those students who become health professionals working on the cutting edge of society. In addition, the major attempts to provide students with the research, analytic, and writing skills necessary for success in postgraduate professional or scholarly programs. In order to ensure a basic level of disciplinary knowledge, students in the major are required to complete an academic minor, equivalent to fifteen upper-division units, or a second departmental major.

A sequence of courses, HAS 112, HAS 140, and HAS 196 (Senior Thesis) forms the nucleus of the major. In addition, students are required to develop analytic skills through intensive library research of a specific health problem. In HAS 140, students in the major use these skills to formulate, execute, and evaluate group projects and research projects in community health. HAS majors usually spend three to five quarters doing project work, examining health problems and developing recommendations for change; they are encouraged to work to implement their recommendations as citizen-volunteers. Finally, at the end of the senior year, each student prepares a formal, written senior thesis in HAS 196. The thesis is usually based on the project work with the addition of a thorough discussion of the problem area and a detailed analysis from the disciplinary perspective of the academic minor or second major. Faculty advisors, chosen from disciplines on the basis of their interest in student projects, assist HAS majors in designing their academic programs and supervise the individual thesis work.

Lower Division Requirements

(1) Natural Sciences: at least one course A and one course B; A = biological sciences; Biology 1A–1B or their equivalents; B = Physical Sciences: Chemistry 1A–1B–1C, 5A–5B–5C, 6A–6B–6C.
(2) Statistics: either Statistics 2 or Public Health 12A; (3) Two courses from each of the following two sets of courses: Anthropology 1, 2, 4, 15; Economics 1, 7, 5; Geography 1, 4, 7, 14; History 4A–4B–4C–4D, 5A–17A–17B, 17C–17D, 18A–18B, 19A–19B, 33A–33B–33C–33D; Linguistics 20; Political Science 1, 4, 5, 33A–33B–33C–33P; Psychology 1, 4, 60, 61; Comparative Literature 2A–2B, 2C–2D–2E, 41A–41B–41C–41D–41E; Dramatic Art 2A–2B–2C, 25A–25B–25C, 45A–45B–45C; English 20, 21, 22, 23, 24, 44A–44B, 44C; French 1, 2, 3, 4, 5, 6; German 1, 2, 3, 4, 5; Greek 1, 2, 1A–1B, 40A–40B–40C, Italian 1, 2, 3, 4, 5; Latin 1, 2, 3, Music 1A–1B–1C, 27; Near Eastern Studies 10, 1A–1B–1C, 15A–1B–1C, 20A–20B–20C, Oriental Languages 38; Philosophy 1, 2, 4, 23A–25B–25C–25D–25E; Portuguese 1, 2, 3, 4; Rhetoric 10, 36, 45; Scandinavian 1A–1B, 3A–3B–3A–4B, 4A–4B, 11A–11B, 13A–13B, 14A–14B, Slavic 1, 2, 3, 4, 5, 6; South Asian 10; Spanish 1, 2, 3, 4, 5.

Students must satisfy the University requirements: Subj ect A, Basic Skills in Health, and 15 units from the following two courses: (either may be repeated) Health Arts and Sciences 196A, 196B; and (4) submit the senior thesis in this major. Honors Program. To be enrolled in the honors program, a student must maintain a grade-point average of at least 3.0 overall and 3.3 in the courses required for the major. To receive honors with the bachelor's degree the student must (1) maintain a grade-point average of 3.3 in the major and in the honors program, (2) complete the undergraduate major in Health Arts and Sciences as stipulated above except, (3) undertake 6 units in Health Arts and Sciences H195A–H195B; and (4) submit the senior thesis in this course for a grade.

For further information about Health Arts and Sciences, go to the program office in Room 221, Building T-7.

LOWER DIVISION COURSE

99. Supervised Independent Study and Research. (1–3) Prerequisite: consent of instructor. Limited to freshmen and sophomores. Must be taken on a pass/not passed basis. (The Faculty, W, Sp)

UPPER DIVISION COURSE

112A–112B. Health Problems in Modern Industrial Societies. (4–4) Three hours of lecture and two hours of seminar per week. Prerequisite: Consent of instructor. 112A is not prerequisite to 112B. Intensive library research and analysis of a contemporary health problem. Designed to help students to define a social problem, design a study, retrieve the relevant information, and develop and present a critical analysis. (Mr. Michell, W, Sp)

120. Industrial Pollution and Cancer. (2 Formerly 191A. Three hours of lecture per week. Prerequisite: One course in Biology, or consent of instructor. This course will examine evidence that many industrial pollutants are carcinogenic and contribute significantly to the rising rate of cancer. It will examine scientific, sociological, and economic factors involving carcinogens and in establishing standards and procedures for controlling exposure.

125. Comparative Health Systems and Health Planning. (4) Three hours of lecture per week. Prerequisite: Consent of instructor. This course will investigate the emergence of health planning throughout the world—rich and poor, capitalist and socialist, centralized and decentralized. The nature of health planning and the benefits of international comparisons for health planning will be studied. (Mr. Cohen (Sp)

126. The Practitioner and the Therapeutic Encounter. (4) Three hours of lecture per week. Prerequisite: Consent of instructor. An examination of the world of health care as structured by those who provide care. An examination of their concepts, assumptions of illness, action, and strategies. A review of the organization and delivery of care. (Mr. Lee (W)

135. Introduction to Ethical Perspectives of Health Issues. (3) Seminar meets two hours per week. Prerequisite: Consent of instructor. Formal training in philosophy is not required, but some prior work would prove helpful. Familiarity with at least one area of health issues is assumed (e.g. biology, psychology, genetics, health arts and sciences). The central focus of this seminar is active discussion of an array of issues related discipline would prove helpful, of the interrelation between ethical issues and health and medical issues. (Mr. Blum (W)

140A–140B–140C. Field Projects in Community Health. (140A: 3; 140B: 3; 140C: 6) Three hours of seminar and one hour of Project Group per week. Prerequisite: 140A: course 112A, 112B or consent of instructor. 140B: 140A; 140C: 140B. Field project work combined with weekly analytical seminars will be employed to educate students in the use of intellectual resources for the analysis and solution of contemporary community health problems. Must be taken on a passed/not passed basis. (Mr. Michell (W, F, Sp)

150. Private Writing: Writing for the Health Sciences Journal. (4) Three hours of lecture and 4 hours of field work per week. Prerequisite: Membership in Health Sciences Journal. (I: 140B: 140C: I of Instructor. HAS 150 will train the staff of the Health Sciences Journal in practical writing skills, revision of and journal essays. The course emphasizes the Communication and analytical skills pertinent to health science journalism. To be offered 1977–78 only.

162. Health, Medicine, and Society In History. (4) Three hours of lecture per week. Prerequisite: Consent of instructor. Some background in history and literature of health arts and sciences. The course will examine the development of health policies and their impact on society. Begins with ancient history, and ends with current health care problems. It is not required. Origins of the medical profession. Medical schools in Europe, 1000–1700. The conflict between
171. Concepts of Mental Health. (4) Four hours of seminars each week. Prerequisite: Approval of Instructor and vision standing in Health Arts and Sciences or Public Health or consent of Instructor. Current controversies in mental health care; problems of definition of mental health; Interface of mental health systems with other 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 quarter, 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: consent of instructor. Seminar in topics in health in which a general knowledge is solicited and welcomed. The Staff (F, W, Sp)

196A-196B. Senior Thesis. (4-4) Individual conferences with the adviser 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 adviser. Must be taken pass or 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. Serves to integrate and synthesize the principle theme common to the courses comprising the major. Adviser in charge of the student's major (F, W, Sp)

H196A-H196B. Senior Honors Thesis. (4-4) Individual conferences with the adviser to be arranged. Prerequisites: Open only to students in the Health Arts and Sciences Major. Completion of all lower division prerequisites for the major. General GPA of 3.0 and 3.3 in the courses required for the major and consent of adviser. 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. Serves to integrate and synthesize the principle theme common to the courses comprising the major. Adviser in charge of the student's major (F, W, Sp)

197. Field Study In Health Arts and Sciences. (1-3) (1-6) 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. Regular individual meetings with faculty sponsor and written reports required. The Staff (F, W, Sp)

198. Directed Group Study for Undergraduates. (1-6) Meetings to be arranged. Prerequisite: consent of instructor. Group study of selected topics, which will vary from year to year. Student initiative in the choice of subjects is solicited and welcomed. The Staff (F, W, Sp)

199. Supervised Independent Study in Research. (1-6) Prerequisite: consent of instructor. Must be taken on a passed/not passed basis. Enrollment limited by regulations listed on page 36. The Staff (F, W, Sp)

SPECIAL STUDIES: Interdepartmental Studies / 251

106. Literature and Art in Eighteenth Century England. (6) Four to and one-half hours of lecture per week. A study of the inter-relationships of literature and the visual arts in eighteenth-century England, concentrating on major authors such as Pope, Reynolds, Walpole, Fielding, Thomson, and Blake. Enrollment limited to twenty students majoring in English literature or Art. Advised by course instructors. English majors: Mr. Ettinger; History of Art: Mr. Haister; French majors: Mr. Rex (F)

111. Introduction to Neurobiology. (3) Four hours of lecture per week. Prerequisite: Biology 10A or equivalent. Development of the basic principles of neurobiology, including membrane metabolism, propagation, and transmission of activity in neurons. Integration of information in simple and complex systems. Experimental approaches in sensori systems and control of motor output.

115. Music and Poetry of the English Renaissance. (Formerly English 115 and Music 115) 4 Hours of lecture per week. Prerequisite: major in English or music or consent of instructor. English music, from the carol to the madrigal and "recital music," and English poetry, from late medieval forms to the sonnet and the masque, will be studied to explore their relationships. Music: Mr. Brett; English: Mr. Haister; French: Mr. Rex (F)

120. Environmental Education and Design. (5) Seminar discussions, visits to selected sites. Corequisite: two hours of lecture per week; six hours per week, student-selected field experience. Prerequisite: consent of instructor. Curriculum and resource development. Environmental play, learning, and design in urban and non-urban environments, both natural and man-made. Teaching methods. An experimental project of shared learning. May be repeated twice for credit. CRS: The Staff (F, W, Sp)

122A-122B. Animal Behavior. (5-6). Three hours of lecture and one hour of discussion per week. Prerequisite: any one of the following: Biology 1, or 11 or Zoology 1, or Entomology 100. Strongly recommended: Genetics 100 and Zoology 1. An introduction to comparative animal behavior and behavioral physiology in evolutionary perspective, including analysis of behavioral development, reproduction, aggression, ecological perspectives, and physiological substrates. Credit and grade will be awarded upon completion of the two-quarter sequence. Psychology: Mr. Beach, Mr. Glickman, Mr. Leiman, Mr. Zucker; Zoology: Mr. Barlow, Mr. Held, Mr. Garamszegi, Mr. Rowell (F, W)

124. Chemical Methods in Nuclear Technology. (5) One and one-half hours of lecture, one hour of discussion per week. Prerequisite: Nuclear Engineering 102 or Chemistry 123. An introduction to the inter-relation between chemical and nuclear science and technology; fission process; chemistry of fission products; chemical engineering aspects; applications of radioactive to study of chemical problems; neutron activation analysis. Nuclear Engineering: Mr. Kruisius; Chemistry: Mr. Markowitz (Sp)

137. The High Renaissance under Pope Julius II (1503-1513). (8) Three hours of lecture and one and one-half hours of discussion per week. An in-depth study of the works of Raphael (Vatican Stanze, easel paintings), Michelangelo (Sistine ceiling, Julius tomb), and Leonardo (St. Peter's, Laocoön). The role of the Church in the visual arts and the visual arts in the Church. The Staff (F, W, Sp)

138. Michelangelo and His Age, 1475-1854. (5) Three hours of lecture and one hour of discussion per week. An in-depth analysis of the works of Michelangelo in sculpture, print, and poetry, and the historical and cultural context within which they were produced. History of Art: Mr. Starn (Sp) 2006; Mr. Haister (W)

145. Physical Problems about the Earth. (4) Three 1-hour lectures and one discussion period per week. Prerequisite: Physics 105A-105B. A treatment of some central problems of physical geography, particularly as concerns the Earth from a physical viewpoint. An analysis of the dynamics and deformation of the Earth will be based on a model in which the external forces are due to the tides, meteorodynamics, and nuclear physics. Problems may vary from year to year. Physics: Mr. Judd (Sp) 2006; Mr. Haister (W)

NOTE: For key to symbols, see page 16.
202L. Advanced Laboratory in Neutral Integration and Coordination. (3) Four hours of laboratory per week. Prerequisite: course IDS 200L, 201L or consent of instructor. Advanced laboratory involving use of electrophysiological and psychophysical tools in the investigation of neural integration and coordination. Prospective students should consult instructors before considering this course. Mr. Freeman; Molecular Biology; Electrical Engineering and Computer Sciences: Mr. Werbin (Sp)

203A–203B–203C. Concepts of Mental Dysfunction. (3–3–3) 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 theory of Mental Dysfunction presented from the following perspectives: 1) development and analysis of mental interferences; 2) symptom formation and specific syndromes; 3) approaches to diagnostic assessment. Mr. Muir; Mr. Cooper; Mr. Settlage; Mr. Kaplan (F, W, Sp)

204. Animal Behavior Research Reviews. (1) One and one-half hours of lecture per week. Prerequisite: graduate standing, basic course in animal behavior, and consent of the instructor. Reports and discussions of original research or views, or completed or in progress. Not all participants need report, but all are expected to attend and to enter into the discussions. Meetings during the Fall and Spring will be held in the behavior field laboratory. Zoology: Mr. Barlow (W, Sp); Mr. Caldwell (W, Sp); Psychology: Mr. Freeman; Molecular Biology; Mr. Freeman (F, W, Sp)


205D–205E–205F. Clinical Correlates: Introduction to Clinical Medicine. (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, pediatrics, internal medicine, surgery, psychiatry). Lectures and presentations of clinical cases. Health Sciences: The Staff; Genetics: Mr. S. Margen (F, W, Sp); Biochemistry: E. Penholt; Nutritional Sciences: S. Margen (F, W, Sp)

206A–206B–206C. Introduction to Clinical Medicine. (3–3–3) Three hours of lecture per week. Prerequisite: IDS 206A–206B–206C and graduate standing in the Mental Health and Medical Sciences Program. Presentation of problem- and, through didactic presentations, development of the relationship between clinical manifestations and the underlying structural/functional processes. Mr. Eisenberg and Mr. Picchi (F, W, Sp)

206D–206E–206F. Introduction to Clinical Medicine: Problem-Solving Approach to Clinical Disease. (3–3–3) Three hours of lecture per week. Prerequisite: "IDS 206A–206B–206C and graduate standing in the Mental Health and Medical Sciences Program. Introduction to clinical medicine, its problems and, through didactic presentations, development of the relationship between clinical manifestations and the underlying structural/functional processes. Mr. Eisenberg and Mr. Picchi (F, W, Sp)

208A–208B. Urban Economics: System Equilibrium, Efficiency, Equity A–B. (5–5) Four hours of laboratory per week. Prerequisite: Electrical Engineering and Computer Science 227A or Economics 202A. Analysis of urban systems consisting of two parts: 1) presentation of classical theories relevant to public policy courses; 2) lectures covering the behavioral aspects of urban economic processes. Mr. Eisenberg and Mr. Picchi (F, W, Sp)

209A–209B. Economic Analysis of Decision, Information, and Organization. (5–5) Four to five hours of laboratory per week. Prerequisite: Electrical Engineering and Computer Science 209A–209B–209C. Primarily for doctoral students in the Department of Economics and Business Administration. Credit and grade to be awarded upon completion of 209B, 209A. Representation of individual preferences, individual decision making under information to an individual decision maker. Introduction to the theory of games. 209B. Prerequisite: course 209A or consent of instructors. Analysis of models and decision-making tools in the investigation of internal integration and coordination. Prospective students should consult instructors before considering this course. Mr. Freeman; Molecular Biology; Electrical Engineering and Computer Sciences: Mr. Werbin (Sp)

210A–210B. Urban Economics: Equilibrium, Efficiency, Equity A–B. (5–5) Four hours of laboratory per week. Prerequisite: Electrical Engineering and Computer Science 227A or Economics 202A. Analysis of urban systems consisting of two parts: 1) presentation of classical theories relevant to public policy courses; 2) lectures covering the behavioral aspects of urban economic processes. Mr. Eisenberg and Mr. Picchi (F, W, Sp)

214A–214B–214C. Law and Society. (4–4–4) Two hours of lecture per week. Prerequisite: Mr. Byrne (F, W, Sp) law students and social science graduate students doing advanced graduate work in the area of law and society. Introduction to the field of law and society. Consideration of the influence of geology and site conditions on urban land use. Field trips and discussions of procedures for incorporating geologic and engineering considerations into planning to avoid problems such as landslides, flooding, and earthquake damage. Term paper required.

214A–214B. Geology and Engineering Factors in Environmental Planning. (4) Three hours of lecture and discussion and one half-day field trip per week. Prerequisite: consent of instructors. Consideration of the influence of geology and site conditions on urban land use. Field trips and discussions of procedures for incorporating geologic and engineering considerations into planning to avoid problems such as landslides, flooding, and earthquake damage. Term paper required.

Civil Engineering: Mr. Harder; Landscape Architecture: __________

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214A–214B. Geology and Engineering Factors in Environmental Planning. (4) Three hours of lecture and discussion and one half-day field trip per week. Prerequisite: consent of instructors. Consideration of the influence of geology and site conditions on urban land use. Field trips and discussions of procedures for incorporating geologic and engineering considerations into planning to avoid problems such as landslides, flooding, and earthquake damage. Term paper required.

Civil Engineering: Mr. Harder; Landscape Architecture: __________
require: familiarity with at least one area of health sciences (e.g., biology, genetics, public health, mental health, etc.) is assumed. Prior exposure in required but would be helpful. The purpose of this course is to identify and discuss cases and issues in health where it is clear that philosophical (and specifically ethical) concerns are interwoven with biomedical issues in the world of social policy.

[32x746]254 / SPECIAL STUDIES: interdepartmental Studies
[33x691]course is to identify and discuss cases and issues in health where it is clear that philosophical (and specifically ethical) concerns are interwoven with biomedical issues in the world of social policy.

*221A-221B. Problems in Municipal Services and Regulatory Functions. (4) Two hours of lecture and two hours of recitation per week. Prerequisite: graduate standing; Statistics 134A-134B or equivalent, or Criminology 145. This course deals with practical problems which arise in the production and distribution of municipal services such as police and fire protection, and in implementing regulatory functions through such activities as court operations and building code enforcement. Credit and grade will be awarded on completion of sequence. Electrical Engineering and Computer Science: Education:

*222. Studies in the Music of the Ancient World. (4) Three hours of lecture per week. Prerequisite: open to graduate students in Music, Classics, Sanskrit, and Ancient Near Eastern Studies. The musical systems of Ancient Near East are studied with particular focus on the emerging discoveries in Cuneiform texts concerning Sumerian-Babylonian musicology. Class times: Music: Mr. Giger; Near Eastern Studies: Mrs. Kilmer (F)

223A-223B. Mental Health Practicum. (3–3) Three hours of lecture per week. Prerequisite: Graduate standing in Health Science Program/Mental Health Option, or consent of instructor. Attendance in both quarters required for grade. A practicum approach to a study of human development. Participants observe settings illustrating normal and pathological development. Two-hour observation period including didactic presentation and interviewing followed by one-hour discussion. After the first quarter, students conduct their own interviews. Credit and grade will be awarded on completion of sequence.

Law: Mr. Diamond, Health and Medical Sciences: Mr. Waneman (W, Sp)

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. Participants observe settings illustrating normal and pathological development. Two-hour observation period including didactic presentation and interviewing followed by one-hour discussion. Students conduct their own interviews.

Law: Mr. Diamond, Health and Medical Sciences: Mr. Elson, Mr. Waneman (W, Sp)

223D–223E–223F. Mental Health Practicum. (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. Participants observe settings illustrating normal and pathological development. Two-hour observation period including didactic presentation and interviewing followed by one-hour discussion. After the first quarter, students conduct their own interviews.

Law: Mr. Diamond, Health and Medical Sciences: Mr. Elson, Mr. Waneman (W, Sp)

224. Cooperative Research Workshop in Transportation Economics. (3) Prerequisite: Economics 140 or consent of instructor. An experience for students from varied disciplines who desire to focus on current community needs for waste management systems; and impact of transportation on migration and land use.

225A–225B. Experimental Design Project in Solid Waste Management. (4–4) Four hours of lecture per week. Prerequisite: graduate standing and consent of instructor. Offers task oriented group design experience for students from varied disciplines who desire to focus on current community needs for waste management systems.

Law: Mr. Hurbut; Industrial Engineering and Operations Research: Mr. Glasser; Graduate School of Public Policy: Mr. McGuire (W, Sp)

226. Family Systems. (3) Three hours of seminar per week. Prerequisite: Graduate standing in Health and Medical Sciences Program. Offered by: Joel Diamond, Law: Mr. Foorman; Public Health: Mr. Duhl (F, Sp)

227A–227B. Introduction to the Clinical Process. (3–3) One and a half hours of lecture and one and a half hour lab per week. Prerequisite: Graduate standing in Health and Medical Sciences Program or consent of the instructor. An interdisciplinary approach to basic knowledge and skills necessary for health professional-client interaction. Focus is on development of observational, interpersonal-communication and information-gathering skills. Credit and grade to be awarded on completion of sequence.

Public Health: Mr. Duhl (W, Sp)

227C. Introduction to the Clinical Process. (3) One 1/2-1/2 hour lecture and one 1/2-hour laboratory per week. Prerequisite: graduate standing in the Health and Medical Sciences Program, or consent of the instructor. An interdisciplinary approach to basic knowledge and skills necessary for health professional-client interaction. Focus is on development of observational, interpersonal-communication and information-gathering skills. Credit and grade to be awarded on completion of sequence.

Public Health: Mr. Duhl (W, Sp)

228. Human Evolution, Prehistory and Paleoenvironments. (2) Two hours of seminar per week. Prerequisite: consent of instructor. A seminar course devoted to consider the effects of geology, paleoanthropology and related subjects to be taken on a satisfactory/unsatisfactory basis.

Paleoanthropology: Mr. Clemens Anthropology: (W)

229. Psychosomatics: An Integrative Approach. (3) Three hours of lecture per week. Prerequisite: Graduate standing in Health and Medical Sciences Program, IDS 227A–227B, or consent of the instructor. Seminar exploring the clinical process of primary health care. Assessment, evaluation, and treatment of psychosomatic problems from a holistic perspective—integrating the somatic, psychological, and social dimensions of health and disease.

230. Urban Environmental Planning. (4) Two 1 1/2 hour seminars, interdepartmental courses 231A, 231B, 231C. Seminar will focus on how environmental and amenity values are being changed by the urban design process. Case studies will review planning methods, environmental impact statement, and other implementation techniques in planning for environmental quality. City and Regional Planning: Mr. Appleyard, Landscape Architecture: Mr. Appleyard, Architecture: Mr. Lincoln


232A–232B–232C. Interdisciplinary Seminar in Day Care and Child Development. (2–2–2) Two hours of seminar per week. Prerequisite: permission of Coordinator. Selected topics relevant to the facilitation, coordination, assessment, and supervision of early childhood programs and innovative programs in day care, child development, and related health services. Credit and grade may be awarded upon satisfactory completion of IDS 232A–232B–232C.

Education: Miss Almy; Public Health: Miss Wallace; Mr. Chang; Social Welfare: Mr. Witte (F, Sp)

232L–232L–232L. Laboratory in Day Care. (1–1–1) Formerly IDS 330. One hour of session and five to fifteen hours of field work per week. Prerequisite: admission to Interdisciplinary Program for Key Personnel in Child Care. For graduate students whose work relates to day care and related child development programs. Credit may be awarded upon current consent of the Instructor. IDS 232A–232B–232C. Credit and grade assigned upon completion of full sequence.

Education: Miss Almy; Public Health: Miss Wallace; Social Welfare: Mr. Chang; Social Welfare: Mr. Witte (F, Sp)

233A–233B–233C. Legislation, Administrative Regulation, and Land Planning. (4) Two 2-hour meetings per week. Prerequisite: Second year standing in the Health and Medical Sciences Program. A study of approaches to environmental planning: a consideration of theories and methods, and the legal and administrative contexts of planning and design decisions. Natural environmental and land-use planning practices at local, regional, state and federal levels.


Mr. Bardach, Mr. Kagan (F, W)

235. Analysis of Sex-Role Assumptions Influencing Behavior of Health Professionals. (3) Two hours of lecture per week. Prerequisite: Enrollment in Health and Medical Sciences Program or in Health Arts and Sciences or consent of instructor. An analysis of sexrole pressures and conflicts in education and practice of health care. Brief review of sex-role themes and exploration of analysis of sex role in professional practice models; recommendations for improving relationships among health professionals. Selected reading, discussion, projects.

Ms. Weissman (Sp)

236. Environmental Design, Stress and Health. (3) Three hours of lecture-discussion per week. Prerequisite: limited enrollment, consent of instructor. Interdisciplinary course to explore the influence of selected aspects of the physical and social environment on health. Among topics to be discussed are crowding, migration, urbanization, industrialization, and stress as they influence health and disease.

Ms. and Mr. Duhl (W); Architecture: Mr. Lincoln (W)

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 current trends and programs to meet needs: nutritional status evaluation, nutrition's effect on physical and mental health, mental health, or equivalent, or Criminology 145. Health and Medical Sciences: Mr. Margen (Sp)

241. The Urban Environment. (3–4) Two 1 1/2 hour lectures and one 3-hour laboratory per week. Prerequisite: consent of the instructor. The components, structure, and meaning of the urban environment. Environmental problems, environmental simulation. City and Regional Planning: Examination: City and Regional Planning: Mr. Appleyard (Sp); Psychology: Mr. Craik

242. Perspectives on Genetic Counseling. (2) Two 1-hour seminars. Offered by: Joel Diamond, Law: Mr. Foorman. Lectures by professionals from such fields as pediatrics, medical sociology, and family therapy. Intended primarily for students in genetic science.

246. Mental Health Process and Law. (3) Three hours of lecture per week. Prerequisite: Graduate standing in Mental Health, other options of the Health and Medical Sciences Program, Psychology, Law, Social Welfare, Public Health, or related discipline. Seminar on problems of involuntary hospitalization, prediction of dangerousness, competency, right to treatment, right not to be treated, informed consent, confidentiality, litigation of mental health issues, rights of subjects of psychiatric and psychological experimentation.

250A–250B–250C. Interdisciplinary Seminar in Human Health. (1–1–1) Two hours of lecture per week. Prerequisite: Enrollment in Health and Medical Sciences Program or consent of the instructor. Seminar discussion of the implications of health concepts to a wide range of issues and the potential for increasing systematic and ongoing interactions with the world of health. May be repeated for credit. Must be taken on a satisfactory/unsatisfactory basis.

Health and Medical Sciences: Mr. Duhl and Mr. Blum (F, Sp)

251A–251B. Human Growth and Development. (3) Three hours of lecture per week. Prerequisite: Graduate standing in Health and Medical Sciences Program or consent of instructor. A three-quarter sequence emphasizing a developmental perspective and the interrelationships among biological, psychological...
and social aspects of human development and aging. Emphasis is on preparation to clinical work in areas of human health and welfare. Lecture/discussion format.

Law: Mr. Diamond, Health and Medical Sciences: Mr. Elson (W, Sp)

252A. Stellar Structure and Evolution. (3) Three hours of lecture per week. Prerequisite: Physics 137A–137B–137C, 112, 110A–110B. Equations of stellar structure, radiative transfer and convection, thermal nucleosynthesis, stellar evolution and stellar energetic generation; stellar models, degenerate configurations, evolutionary sequences; supernovae, neutron stars, black holes, nucleosynthesis. Physics: Mr. Chiao; Astronomy: Mr. Aarons (F)

252B. Stellar Structure and Evolution. (3) Three hours of lecture per week. Prerequisite: Physics 137A–137B–137C, 112, 110A–110B. Advanced topics in stellar structure and evolution. Physics: Mr. Chiao; Astronomy: Mr. Arons (W)

253. Astrophysical Spectroscopy. (3) Three hours of lecture per week. Prerequisite: consent of instructor. A review of atomic and molecular spectroscopy and the interaction of radiation and matter, with application to line formation in stellar spectra, H I and H II regions in the interstellar medium, interstellar molecular clouds, interstellar masers, and interstellar grains.

Physics: Mr. McKee; Astronomy: Mr. Philips (F)

254. High Energy Astrophysics. (4) Three hours of lecture and one hour of discussion per week. Prerequisite: Physics 110A–110B or equivalent. Basic physics of high energy radiation processes in an astrophysical environment. Cosmic ray production and propagation. Applications selected from pulsars, x-ray sources, supernovae, interstellar medium, intergalactic medium, optical sources, quasars, and big-bang cosmologies.

Physics: Mr. McKee; Astronomy: Mr. Arons (Sp)

255. Mapping Health Service Agencies. (3) Three hours of lecture per week. Prerequisite: graduate standing. A study of social problems facing the health care field, including the interaction of radiation and matter, with application to line formation in stellar spectra, H I and H II regions in the interstellar medium, interstellar molecular clouds, interstellar masers, and interstellar grains.

Physics: Mr. McKee; Astronomy: Mr. Arons (F, W, Sp)

292A-292B. Psychology and Aesthetics. (5–5) Prerequisite: T.A.'s must be teaching during quarter of enrollment. Two hours of seminar per week at which time a variety of methods of facilitating learning are investigated and evaluated. Common classroom problems are discussed, and videotapes of each T.A.'s classroom teaching are analyzed. Miss Napel (F, W, Sp)

300. Techniques of Teaching for Teaching Assistants. (2) Two hours of seminar per week. T.A.'s must be teaching during quarter of enrollment. Discussion of methods of facilitating learning are investigated and evaluated. Common classroom problems are discussed, and videotapes of each T.A.'s classroom teaching are analyzed.

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.

International Education also sponsors the Professional Studies Program. An orientation program is organized in Berkeley prior to departure, and international language program in Hindi is provided during the first month in India.

UPPER DIVISION COURSES

100. 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)

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,
**131A-131B-131C. National Security Forces In strategic and tactical air superiority concepts.**

The Developmental Qrowtti of as an Instrument of national power. doctrine and application; It Identifies technological and

One hour of lecture per week. This course defines

Selection for Upper Division is based upon aptitude


to complete the AFROTC program. Students

One summer training period, course 440, is required of all cadets before they are commissioned. This training

Throughout the academic year a mandatory leadership lab will be conducted for all ROTC cadets. It consists of a two-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 five weeks and is conducted at Fort Lewis, Washington. The purpose of summer training is to offer a real life training experience 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 ex- pense to the government).

Students who qualify may train as pilots at government expense during the last year of their ROTC program depending on available funds. Successful completion of this course leads to a private pilot's license. Ranger and airborne training is also available to a limited num- ber of cadets.

**Military Science**

Office, 74 Harmon Gymnasium

Associate Professor:

Patrick L. Hatcher, M.A.,

Major, USAF

Assistive Professor:

Terence C. Holland, M.B.,

Michael S. Taylor, M.A.,

Captain, USAF

Adjunct Professor:

William G. Eckhardt, LL.D.,

Major, USAF

The Department of Military Science offers a variety of courses covering a broad and diverse area of study. The course outline is designed to provide a coherent and comprehensive understanding of the role of the military in society, the impact of military technology, and the importance of leadership in the conduct of military operations.

For further details on enrollment, service commitments, deferment, enrollment procedures for students transferring from a four-year ROTC program at another school, etc., please contact the Department staff, 10 Calleghan Hall, or phone 642-3572.

**LOWER DIVISION (GENERAL COURSE)**

**Military Science**

Office, 74 Harmon Gymnasium

Associate Professor:

Patrick L. Hatcher, M.A.,

Major, USAF

Assistive Professor:

Terence C. Holland, M.B.,

Michael S. Taylor, M.A.,

Captain, USAF

Adjunct Professor:

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Major, USAF

The Department of Military Science offers a variety of courses covering a broad and diverse area of study. The course outline is designed to provide a coherent and comprehensive understanding of the role of the military in society, the impact of military technology, and the importance of leadership in the conduct of military operations.

For further details on enrollment, service commitments, deferment, enrollment procedures for students transferring from a four-year ROTC program at another school, etc., please contact the Department staff, 10 Calleghan Hall, or phone 642-3572.

**LOWER DIVISION (GENERAL COURSE)**

**11A-1B-1C. United States Air Force Today. (2-2-2) One hour of lecture per week. This course defines**

the roles and structures of the component categories of the U.S. military forces, with a primary emphasis on the Air Force role. Students will learn about the strengths and weaknesses of the U.S. military as an instrument of national power.

Mr. Camacho (F, W, Sp)

**21A-21B-21C. The Developmental Growth of Air Power. (3-3-3) Three hours of lecture per week. This course traces the evolution of air power, its concepts, doctrine and application; It identifies technological and sociopolitical factors that influenced that evolution and seeks to define its impact on the development of strategic and tactical air superiority concepts.**

Mr. Camacho (F, W, Sp)

**UPPER DIVISION (ADVANCED COURSE)**

**131A-131B-131C. National Security Forces In Contemporary American Society. (3-3-3) Three**

hours of pro semina per week. Prerequisites: upper division standing, consent of instructor. This course identifies and analyzes American civil-military institutional relationships, national security, political, economic, and societal restraints, and elements of the inter- national community (perceived environment) which impact on the formulation and implementation of American defense policy.

Mr. Mowbray (F, W, Sp)

**141A-141B-141C. Aerospace Management. (3-3-3) Three**

hours of pro seminar per week. Prerequisites: upper division standing, consent of instructor. Aerospace management is the comparative study of contemporary and military management with emphasis on human and group behavior, systemic decision making, case analyses, creative thinking, leadership theories, written and oral communicative skills, and comparative-civilian military legal systems.

Mr. Ciabottare (Sp)

**142. Light Aircraft Operations. (3) Three hours of lecture per week. Prerequisites: designation by Pro- fessor of Aerospace Studies, AFROTC, or approval of Instructor. Preparation for qualification as Federally Li- censed Private Pilot. Studies cover Federal Aviation Regulations, basic meteorology for pilots, navigation by dead reckoning and piloting, radio and radio naviga- tion, elementary aerodynamics and aircraft struc- tures.**

Mr. Albright (Sp)

**149. Supervised Independent Study and Re- search. (1-5) Prerequisite: upper division standing, consent of instructor. Application is approved by regula- tions listed on page 36. Supervised independent study and research for undergraduates who desire to study topics of their own selection. Staff (F, W, Sp)**

Mr. Taylor (W)

**12. The Role of the Military In Society. (2) Two**

hours of lecture per week. This course is designed to provide an understanding of the role of the military in society, with emphasis on the impact of military technology and policies on society. Students will explore the ways in which military forces are used to achieve national goals and the impact of military presence on local communities.

Mr. Hatcher (W)

**20. Theory and Evolution of Warfare. (2) Two**

hours of lecture per week. This course is designed to provide an understanding of the theory and evolution of warfare, with emphasis on the impact of military technology and policies on society. Students will explore the ways in which military forces are used to achieve national goals and the impact of military presence on local communities.

Mr. Hatcher (W)

**250. Theory and Evolution of Warfare. (2) Two**

hours of lecture per week. This course is designed to provide an understanding of the theory and evolution of warfare, with emphasis on the impact of military technology and policies on society. Students will explore the ways in which military forces are used to achieve national goals and the impact of military presence on local communities.

Mr. Hatcher (W)


hours of lecture per week. This course is designed to provide an understanding of the theory and evolution of warfare, with emphasis on the impact of military technology and policies on society. Students will explore the ways in which military forces are used to achieve national goals and the impact of military presence on local communities.

Mr. Hatcher (W)


hours of lecture per week. This course is designed to provide an understanding of the theory and evolution of warfare, with emphasis on the impact of military technology and policies on society. Students will explore the ways in which military forces are used to achieve national goals and the impact of military presence on local communities.

Mr. Hatcher (W)
"114. Management Theory. (2) Two hours of lecture per week. An analytical study of management schools, principles, and philosophies as a basis for the court-martial system, the punitive articles of the U.N. Charter. Required for the major in Military Law, and for the major in Military Science. (Sp)

"144. Military Law. (2) Two hours of lecture per week. Topics to be analyzed and discussed include the court-martial system, the punitive articles of the UN Charter. Required for the major in Military Law, and for the major in Military Science. (Sp)

"170A. Comparative Military Systems. (2) Two hours seminar discussion per week. Prerequisite: consent of instructor. A comparative analysis of military systems of developing nations. Discussion of fundamental military philosophy, relationship between military and society, organization, tactics, and strategy. (W)

"170B. Comparative Military Systems. (2) Two hours seminar discussion per week. Prerequisite: consent of instructor. A comparative analysis of the Soviet military systems. Discussions of historical development, fundamental military philosophy, relationship between military and society, organization, tactics and strategy. (W)

"170C. Comparative Military Systems. (2) Two hours seminar discussion per week. Prerequisite: consent of instructor. A comparative analysis of the Eastern military systems. Discussions of fundamental military philosophy, relationship between military and society, organization, tactics and strategy. (W)

"171. Evolution of Recent American Warfare: Korea and Vietnam. (2) Two hours of seminar discussion per week. Investigation of modern revolutionary warfare as means of influencing politics and social change. Emphasis placed on historical theorists on revolutionary warfare in its contemporary context. Course covers the concept of limited war, NATO alliance, US involvement in Korea and Vietnam. (Sp)

"197. Field Study in Military Leadership. (1) One to five hours of lecture per week. Prerequisite: upper division standing and consent of instructor. Department Chairman, and the off-campus military organization. Relationship of leadership to the conduct of military missions. Emphasis on teamwork and the effects of military leadership in off-campus organizations. Regular individual meetings with faculty sponsor and written reports required. (F, W, Sp)

"201. Naval Ship Systems. (4) Four and one half hours of lecture and one hour of seminar per week. Prerequisite: enrollment is restricted by regulations listed on page 36. Must be taken on a pass/not passed basis. Supervised independent study and research for those who desire to do something in the area of their own selection. (F, W, Sp)

"302. Theory of Instruction. (3) Three hours of lecture per week. Prerequisite: designed primarily for students interested in college teaching, military instruction, and/or adult education. Introduction to the fundamentals of the educational process with emphasis on the role of the teacher. Topics to be considered include instructional methods and techniques, instructional planning, audio-visual aids, evaluation processes, and professional ethics. (F, W, Sp)

PROFESSIONAL COURSES

"451. Fundamentals of Terrain Representation and Analysis. One hour of lecture per week. Introduction to the use of topographic maps and aerial photographs. Emphasis on developing those skills necessary to utilize topographic maps for land navigation purposes. Topics include map coordinate systems, scale and distance relationships, intersection and resection, depletion of elevation, and relief, and basic photo interpretation. Open to field trip. (F)

"452. Concepts of Military Operations. (3) Two hours of lecture per week. An introduction to military basic tactics. Emphasis will be on squad and platoon operations to include capabilities, equipment, and missions. Topics include offensive and defensive operations, patrolling, and the use of resource planning techniques and operations orders. (F)

"453. The Combined Arms Concept. (2) Two hours of lecture per week. This course examines the relationship among the various branches of the Army and how they interrelate within the division. Emphasis will be on how these branches work together on company and battalion level operations. Topics include battalion staff organizations and responsibilities, division organizations and responsibilities, and various combined arms operations. (F)

"454. Basic Marine Camp. Prerequisite: open only to ROTC cadets. This course is designed to introduce the student to the basics of military camp life. (F)

"455. Advanced Marine Camp. Prerequisite: open only to ROTC cadets. Attendance is required prior to commissioning. Study for upper division students. Requirements include attendance at meetings, discussions, and exercises, involving the theories and principles of Military Science presented on campus. (F)

"144. Military Law. (2) Two hours of lecture per week. An analytical study of management schools, principles, and philosophies as a basis for the court-martial system, the punitive articles of the U.N. Charter. Required for the major in Military Law, and for the major in Military Science. (Sp)

"145. Contemporary Issues and the Military Officer. (2) Two hours of lecture per week. This course focuses on recent political, economic, and philosophical code of conduct for military officer. Contemporary social issues and problems are examined in relation to their impact on the rights, freedoms, and privileges of members in the armed forces. Specific attention will be focused on the morality of war, the rules of land warfare, race relations, the use of drugs, and interpersonal relationships. (Sp)

"170A. Comparative Military Systems. (2) Two hours seminar discussion per week. Prerequisite: consent of instructor. A comparative analysis of military systems of developing nations. Discussion of fundamental military philosophy, relationship between military and society, organization, tactics and strategy. (W)

"170B. Comparative Military Systems. (2) Two hours seminar discussion per week. Prerequisite: consent of instructor. A comparative analysis of the Soviet military systems. Discussions of historical development, fundamental military philosophy, relationship between military and society, organization, tactics and strategy. (W)

"170C. Comparative Military Systems. (2) Two hours seminar discussion per week. Prerequisite: consent of instructor. A comparative analysis of the Eastern military systems. Discussions of fundamental military philosophy, relationship between military and society, organization, tactics and strategy. (W)

"171. Evolution of Recent American Warfare: Korea and Vietnam. (2) Two hours of seminar discussion per week. Investigation of modern revolutionary warfare as means of influencing politics and social change. Emphasis placed on historical theorists on revolutionary warfare in its contemporary context. Course covers the concept of limited war, NATO alliance, US involvement in Korea and Vietnam. (Sp)

"197. Field Study in Military Leadership. (1) One to five hours of lecture per week. Prerequisite: upper division standing and consent of instructor. Department Chairman, and the off-campus military organization. Relationship of leadership to the conduct of military missions. Emphasis on teamwork and the effects of military leadership in off-campus organizations. Regular individual meetings with faculty sponsor and written reports required. (F, W, Sp)

"201. Naval Ship Systems. (4) Four and one half hours of lecture and one hour of seminar per week. Prerequisite: enrollment is restricted by regulations listed on page 36. Must be taken on a pass/not passed basis. Supervised independent study and research for those who desire to do something in the area of their own selection. (F, W, Sp)

"302. Theory of Instruction. (3) Three hours of lecture per week. Prerequisite: designed primarily for students interested in college teaching, military instruction, and/or adult education. Introduction to the fundamentals of the educational process with emphasis on the role of the teacher. Topics to be considered include instructional methods and techniques, instructional planning, audio-visual aids, evaluation processes, and professional ethics. (F, W, Sp)

"451. Fundamentals of Terrain Representation and Analysis. One hour of lecture per week. Introduction to the use of topographic maps and aerial photographs. Emphasis on developing those skills necessary to utilize topographic maps for land navigation purposes. Topics include map coordinate systems, scale and distance relationships, intersection and resection, depletion of elevation, and relief, and basic photo interpretation. One field trip. (F)

"452. Concepts of Military Operations. (3) Two hours of lecture per week. An introduction to military basic tactics. Emphasis will be on squad and platoon operations to include capabilities, equipment, and missions. Topics include offensive and defensive operations, patrolling, and the use of resource planning techniques and operations orders. (F)

"453. The Combined Arms Concept. (2) Two hours of lecture per week. This course examines the relationship among the various branches of the Army and how they interrelate within the division. Emphasis will be on how these branches work together on company and battalion level operations. Topics include battalion staff organizations and responsibilities, division organizations and responsibilities, and various combined arms operations. (F)

"454. Basic Marine Camp. Prerequisite: open only to ROTC cadets. This course is designed to introduce the student to the basics of military camp life. (F)

"455. Advanced Marine Camp. Prerequisite: open only to ROTC cadets. Attendance is required prior to commissioning. Study for upper division students. Requirements include attendance at meetings, discussions, and exercises, involving the theories and principles of Military Science presented on campus. (F)
258 / SPECIAL STUDIES: University Research Expeditions Program

the concept and trace the evolution of littoral warfare from the 5th Century B.C. through to the most recent developments in amphibious warfare concerns.

Mr. Blizzard (W)

**199. Supervised Independent Study and Research. (1-5) Prerequisite: upper division standing, consent of instructor. Enrollment is restricted by regulations listed on page 36. Must be taken on a passed/not passed basis. Research and conference with the instructor in a field relevant to the naval profession. The field shall be specific enough to enable the student to write a paper based upon research.

401. Naval Ship's Systems (3) Three hours of lecture per week. Prerequisite: NS 1, Physics SC or SC taken concurrently. Application of physical principles to development of naval weapons systems; Electromagnetic and acoustic wave propagation to detection systems; electro-mechanical synchro and servomechanisms to sensor, launcher, and guidance systems; chemical thermodynamics to propellants and explosives; and ballistics to fire control problem.

**411. Naval Operations. (2) Two hours of lecture and one hour of laboratory per week. Prerequisite: courses 1, 401. A study of Naval Operations course includes Naval Shiphandling, communications, organization and tactical maneuvering. Vector solutions to shiphandling situations utilizing the Maneuvering Board.

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 characteristics:

1. Few lectures are given. Students learn the material through study guides, workbooks and textbooks. In some language courses, laboratory attendance may be required.

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, before 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. For example, if a student completes half of the assignments required by a 4 unit course, 2 units of credit are assigned.

This method of instruction is most popular in introductory language and science courses. The following courses are currently taught through PSI (Keller Plan) format: Astronomy 10B; Computer Science 1S, 3S, 101S, 105S; Engineering 17i; German 14A, 14B, 14C, 14D; Italian 14A, 14B, 14C, 14D; Landscape Architecture 112; Latin 14A, 14B; Mathematics P5; Physics 5A (Sect. 2), 5B (Sect. 2), 5C (Sect. 2), 5A, 5B, 5C; Spanish 14A, 14B, 14C.

Subject A: English Composition

Department Office, 216 Dwinelle Annex


1. Introduction to Language. (2) Four hours of lecture and one-half hour of tutorial per week. An introductory course designed to develop the student's ability in expository writing required for successful assignments focusing on the nature and function of language. Fulfills the Subject A requirement.

2. English as a Second Language

Performance on the Examination in English as a Second Language, given at the beginning of each quarter, will determine the course in which an entering student is to enroll. Auditors are not permitted.

23. English Composition. (5) Three 2-hour classes per week. Deals with the structure of simple sentences. Required of undergraduate students whose performance on the diagnostic examination indicates need for work at this level. To be taken concurrently with 27A. Must be passed with a grade of C- or better.

The Staff (F, W, Sp)

25. English Composition. (5) Three 2-hour classes per week. The structure of complex sentences. Required of undergraduate students (1) whose performance on the diagnostic examination indicates need for work at this level or (2) who have passed course 23. To be taken concurrently with 27A unless it has already been completed. Must be passed with a grade of C- or better.

The Staff (F, W, Sp)

27A. English Pronunciation and Conversation. (2) Two 1 1/2-hour classes and two hours of laboratory per week. Aims to improve pronunciation, oral comprehension and fluency. Required of undergraduate students concurrently with course 23 or 25 if their performance on the diagnostic examination indicates need for work at this level. The Staff (F, W, Sp)

27B-27C. English Pronunciation and Conversation. (2-2) Two 1 1/2-hour classes and two hours of laboratory per week. Aims to improve pronunciation, oral comprehension and fluency. Students will be placed in 27B or 27C according to their performance on the diagnostic examination.

The Staff (F, W, Sp)

28. English Composition. (4) Three 1 1/2-hour classes per week. The structure of complex sentences and paragraphs. Required of undergraduate students (1) whose performance on the diagnostic examination indicates need for work at this level or (2) who have passed course 25. A grade of A- or better (or (grade of Pass) at the level of A- or better) satisfies the Subject A requirement. Must be passed with a grade of C- or better.

The Staff (F, W, Sp)

**40. English Composition. (4) Three 1 1/2-hour classes per week. The structure of complex sentences and paragraphs. Required of undergraduate students whose performance on the diagnostic examination indicates need for work at this level or (2) who have passed course 26. A grade of B+ or less. Must be passed with a grade of C- or better to satisfy the Subject A requirement.

The Staff (F, W, Sp)

University Research Expeditions Program

The University Research Expeditions Program (UREP) was recently established on the Berkeley campus to help provide funds for field research in the natural and wildlife habitat studies, botanical collecting expeditions, and other types of field research. Through UREP, University scientists with field research projects that involve techniques which can be learned with minimal training are brought together with individuals interested in actively participating in field work. Participants become short-term members of a field research team and assist in wildlife habitat studies, botanical collecting expeditions, ethnographic field work, ecological surveys, fossil excavations, historical studies, and other types of field research.

UREP projects are open to students, staff and members of the general public. No previous academic or field experience is necessary to participate; instruction in field techniques is provided after participants arrive at their research site. Participants are selected for their interests, skills, experience and willingness to work and learn. A tax deductible donation to the University is required to help subside the research costs of the projects.

Projects planned for 1977-78, each of approximately three weeks duration, include but are not limited to: (1) Wildlife Habitat Study: Western Sierra, California; (2) Botanical Studies in the Peruvian Andes; (3) Plant/Insect Relationships in a Tropical Rain Forest: Costa Rica; (4) Museum Collecting Expedition to the Redcliffe: A Nomadic Tribe in Northern Kenya; (5) Tropical Habitat Study of the World's Largest Leech: South America; (6) Architecture and Art of the Traditional Buddhist Monastery: Pusan, Korea; (7) Field Observations and Collection of Mexican Insects: Talmind Mexico.

For further information, please contact the University Research Expeditions Program: c/o University Harbami; Department of Botany; University of California; Berkeley, CA 94720; Telephone, 642-6556.

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(To be announced)
Graduate School of Public Policy
(To be announced)
School of Social Welfare
**Academic Calendar, 1977/78**

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 should obtain packets from their counselors; others, in person, at or by writing to 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 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.

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.

<table>
<thead>
<tr>
<th>Fall 1977</th>
<th>Winter 1978</th>
<th>Spring 1978</th>
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<tbody>
<tr>
<td>Feb. 1, Tuesday</td>
<td>Sept. 1, Thursday</td>
<td>Dec. 1, Thursday</td>
</tr>
<tr>
<td>July 1 to Aug. 5, Friday</td>
<td>Nov. 7-28, Monday to Friday</td>
<td>Feb. 13-15, Monday to Friday</td>
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<tr>
<td>July 1, Monday</td>
<td>Jan. 9, Monday</td>
<td>Jan. 9, Monday</td>
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<tr>
<td>Aug. 22, Monday</td>
<td>Jan. 9, Monday</td>
<td>Jan. 9, Monday</td>
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<tr>
<td>Sept. 19, Monday</td>
<td>March 29, Wednesday</td>
<td>March 31, Friday</td>
</tr>
<tr>
<td>Sept. 6, Tuesday</td>
<td>Jan. 23, Monday</td>
<td>Sept. 9, Friday</td>
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<tr>
<td>Sept. 10, Wednesday</td>
<td>March 31, Friday</td>
<td>March 31, Friday</td>
</tr>
</tbody>
</table>

*Approved applications for readmission filed with the Office of Admissions and Records by July 15 for Fall Quarter, September 15 for Winter Quarter, and December 15 for Spring Quarter will enable you to register by mail.*

**Except School of Law.**

§Except School of Law.

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**Final dates are subject to change without notice; consult the Office of Financial Aid for further information.**

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1 Registration forms may be obtained beginning May 15 for students registered in Spring Quarter who will continue in the same status for Fall Quarter. Students registered in Spring Term in the School of Law who will continue in the same status for Fall Term may pick up registration forms beginning April 24.
<table>
<thead>
<tr>
<th>Event Description</th>
<th>Fall 1977</th>
<th>Winter 1978</th>
<th>Spring 1978</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final date to register.§</td>
<td>Oct. 14, Friday</td>
<td>Jan. 27, Friday</td>
<td>April 21, Friday</td>
</tr>
<tr>
<td>Final date for filing applications of candidacy for all master's degrees to be conferred in 1977-78; Office of the Dean of the Graduate Division, 1 California Hall. All signatures required on these applications must be obtained in advance.</td>
<td>Oct. 7, Friday</td>
<td>April 14, Friday</td>
<td>Jan. 27, Friday</td>
</tr>
<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 1977-78. Fee thereafter, §3.</td>
<td>Oct. 10, Monday</td>
<td>Jan. 23, Monday</td>
<td>April 17, Monday</td>
</tr>
<tr>
<td>Final date for filing applications of candidacy for the bachelor's degree.</td>
<td>Oct. 14, Friday</td>
<td>Jan. 27, Friday</td>
<td>April 21, Friday</td>
</tr>
<tr>
<td>Final date for filing applications of candidacy for all doctoral degrees to be conferred in 1977-78; Office of the Dean of the Graduate Division, 1 California Hall. All signatures required on these applications must be obtained in advance.</td>
<td>Oct. 14, Friday</td>
<td>April 21, Friday</td>
<td>April 21, Friday</td>
</tr>
<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. 14, Friday</td>
<td>Jan. 27, Friday</td>
<td>April 21, Friday</td>
</tr>
<tr>
<td>Undergraduates not in the College of Letters and Science:</td>
<td>Oct. 14, Friday</td>
<td>Jan. 27, Friday</td>
<td>April 21, Friday</td>
</tr>
<tr>
<td>Graduates:</td>
<td>Oct. 21, Friday</td>
<td>Feb. 3, Friday</td>
<td>April 28, Friday</td>
</tr>
<tr>
<td>Undergraduates enrolled in the College of Letters and Science: 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. 14, Friday</td>
<td>Jan. 27, Friday</td>
<td>April 21, Friday</td>
</tr>
<tr>
<td>Undergraduates enrolled in the College of Letters and Science: Final date to file petition and complete work for course with incomplete grade received Winter Quarter, 1977.</td>
<td>Oct. 28, Friday</td>
<td>Feb. 10, Friday</td>
<td>May 5, Friday</td>
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<tr>
<td>Undergraduates not in the College of Letters and Science: Final date to file petition and complete work for course with incomplete grade received Spring Quarter, 1977.</td>
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<td>May 5, Friday</td>
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<tr>
<td>Undergraduates enrolled in the College of Letters and Science: 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>
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<td>A &amp; E (Architects &amp; Engineers), D-4</td>
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<tr>
<td>Addison St., C-1</td>
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<td>Allston Way, D-1</td>
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<td>Alumni House, D-3</td>
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<td>Arch St., A-2</td>
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<tr>
<td>Architects &amp; Engineers (A &amp; E), D-4</td>
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<td>Art Gallery, D-4</td>
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<td>Art Museum, D-5</td>
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<td>Bancroft Library, C-4</td>
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<td>Bancroft Way, E-1</td>
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<td>Barrows Hall, D-4</td>
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<td>Barrows Lane, D-4</td>
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<td>Bay Area Rapid Transit, C-1</td>
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<td>Berkeley Way, B-1</td>
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<td>Big C Trail, C-7</td>
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<td>Biochemistry Bldg., B-2</td>
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<td>Birge Hall, 0-5</td>
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<td>Botanical Garden, C-7</td>
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<td>Bowditch St., E-5</td>
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<td>Bowles Hall, C-7</td>
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<td>Buses to San Francisco, E-1</td>
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<td>California Hall, C-4</td>
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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 15 and 35)

ASUC
(Associated Students of UC)
211 Eshleman Hall
(see page 32)

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 28)

College or School, Office of the Dean
for academic matters (see Colleges and Schools section, page 35)

Financial Aid, Office of
201 Sproul Hall
for grants, loans, scholarships, prizes, undergraduate scholarships and honors, work-study (see page 27)

Foreign Student Services
International House
2299 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 16 to 27)

Housing and Child Care Services,
Office of
2401 Bowditch Street
(see pages 28 to 30)

International Education
Room 104A, Building D
2537 Channing Way
(see pages 23 and 34)

Relations with Schools, Office of
407 Eshleman Hall
for E.O.P. and general information
(see page 11)

Residence Matters, Attorney In
590 University Hall, for residence status
(see Appendix)

Student Activities and Programs, Office of
103 Sproul Hall
(see page 28)

Student Health Service
Cowell Memorial Hospital
(see page 27)

University Extension
2223 Fulton Street
(see pages 8 and 20)

Publications

General Catalog, Berkeley
Complete information about the academic programs 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 programs, 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 officers 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.)
Appendix

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 CFR 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, or to the Director of the Office for Civil Rights, Department of Health, Education and Welfare, Washington, D.C. 20203.

The University of California does not discriminate on the basis of handicap in violation of Section 504 of the Rehabilitation Act of 1973 or the implementing regulations to the Federal Act (45 CFR 84) in admission or access to, or treatment or employment in, the programs and activities which it operates. Inquiries concerning the implementing regulations to the Federal Act may be directed to Robert F. Kerley, Vice Chancellor—Administration. His telephone number is 642-7374.

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

<table>
<thead>
<tr>
<th>Days</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-14 days</td>
<td>80%</td>
</tr>
<tr>
<td>15-21 days</td>
<td>60%</td>
</tr>
<tr>
<td>22-26 days</td>
<td>40%</td>
</tr>
<tr>
<td>29-35 days</td>
<td>20%</td>
</tr>
<tr>
<td>36 days and over</td>
<td>0%</td>
</tr>
</tbody>
</table>

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.

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

<table>
<thead>
<tr>
<th>FIELD OF STUDY</th>
<th>AVERAGE MONTHLY SALARY OF GRADUATES</th>
<th>PROBABLE OR DEFINITE JOB COMMITMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree Level</td>
<td>Bachelor's</td>
<td>Master's</td>
</tr>
<tr>
<td>Engineering</td>
<td>$960-1,374</td>
<td>$1,065-1,513</td>
</tr>
<tr>
<td>Humanities</td>
<td>532-1,018</td>
<td>684-1,242</td>
</tr>
<tr>
<td>Life Science</td>
<td>587-1,033</td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td></td>
<td>1,067-1,579</td>
</tr>
<tr>
<td>Physical Science</td>
<td>811-1,289</td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td>579-1,061</td>
<td>694-1,324</td>
</tr>
</tbody>
</table>

1Source: A 1976 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.

2Source: The Job Market for UCLA's 1976 Graduates. Percentages are based only upon those students who planned to work immediately after graduation.
CALIFORNIA RESIDENCY AND THE NONRESIDENT TUITION FEE

Students who have not been residents of California for more than one year immediately prior to the residence determination date for each term in which they propose to attend the University are charged, along with other fees, a nonresident tuition fee of $635 for the quarter or $952.50 for the semester. The residence determination date is the day instruction begins at the last of the University of California campuses to open for the quarter, and for schools on the semester system, the day instruction begins for the semester.

General

California residence is established by an adult who has relinquished prior residence and is physically present within the state with the intent to make California the permanent home. California residence must be established more than one year prior to the term for which resident classification is requested. Indicia of California residence include, but are not limited to: registering and voting in California elections; designating California as the permanent address on all school and employment records, including military records if one is in the military service; obtaining a California I.D. card or driver’s license; obtaining California vehicle registration; paying California income taxes as a resident; establishing an abode where one's permanent belongings are kept; licensing for professional practice in California, etc. Conduct inconsistent with the claim of California residence includes, but is not necessarily limited to: maintaining voter registration and voting in person or by absentee in another state; obtaining a divorce in another state; attending an out-of-state institution as a resident; obtaining a loan requiring residence in another state; maintaining out-of-state driver's license and vehicle registration, etc.

As a general rule, students seeking resident classification must perform all acts of intent which are applicable to their particular circumstances within the one year durational period. In addition, a substantial number of these acts must be performed when the student first comes to California or very shortly thereafter. If they are not, the durational period for reclassification is extended until both presence and intent have been demonstrated for one year.

Students who are within California for educational purposes only do not gain the status of resident regardless of the length of their stay in California.

The residence of the parent with whom an unmarried minor (under age 18) maintains his or her place of abode is the residence of the unmarried minor. When minors live with neither parent their residence is that of the parent with whom they maintained their last place of abode. Minors may establish their residence when both parents are deceased and a legal guardian has not been appointed. The residence of unmarried minors who have a parent living cannot be changed by their own act, by the appointment of a legal guardian, or by relinquishment of a parent's right of control.

A man or a woman establishes his or her residence. A woman's residence shall not be derivative from that of her husband, or vice versa.

Exceptions

1. Students who remain in this state after their parent, who was theretofore domiciled in California for at least one year prior to leaving and has, during the student's minority and within one year immediately prior to the residence determination date, established residence elsewhere, shall be entitled to resident classification until they have attained the age of majority and have resided in the state the minimum time necessary to become a resident so long as, once enrolled, they maintain continuous attendance at an institution.

2. Nonresident students who are minors or 18 years of age and can evidence that they have been totally self-supporting through employment and actually present within California for the entire year immediately prior to the residence determination date and have evidenced the intent to make California their permanent home may be eligible for resident status.

3. Students shall be entitled to resident classification if immediately prior to the residence determination date they have lived with and been under the continuous direct care and control of any adult or adults other than a parent for not less than two years, provided that the adult or adults having such control have been California residents during the year immediately prior to the residence determination date. This exception continues until the student has attained the age of 18 and has resided
in the state the minimum time necessary to become a resident student, so long as continuous attendance is maintained at an institution.

4. Exemption from payment of the nonresident tuition fee is available to the natural or adopted child, stepchild, or spouse who is a dependant of a member of the United States military stationed in California on active duty. Such resident classification may be maintained until the student has resided in California the minimum time necessary to become a resident. If a student is enrolled in an institution and the member of the military is transferred on military orders to a place outside of the United States immediately after having been on active duty in California, the student is entitled to retain residence classification under conditions set forth above.

5. Students who are members of the United States military stationed in California on active duty, except members of the military assigned for educational purposes to a state-supported institution of higher education, shall be entitled to resident classification until they have resided in the state the minimum time necessary to become a resident.

6. Students who are adult aliens are entitled to resident classification if they have been lawfully admitted to the United States for permanent residence in accordance with all applicable provisions of the laws of the United States and have thereafter established and maintained residence in California for more than one year immediately prior to the residence determination date.

A student who is an adult alien shall be entitled to resident classification if the student is a refugee who has been granted parolee status or indefinite voluntary departure status in accordance with all applicable laws of the United States; provided that the student has lived in the state for one year. (Effective until June 30, 1980.)

7. Students who are minor aliens shall be entitled to resident classification if they and the parent from whom residence is derived have been lawfully admitted to the United States for permanent residence, provided that the parent has had residence in California for more than one year after acquiring a permanent resident visa prior to the residence determination date for the term.

A student who is a minor alien shall be entitled to resident classification if both the student and his parent are refugees who have been granted parolee status or indefinite voluntary departure status in accordance with all applicable laws of the United States; provided that the student has lived in this state for one year. (Effective until June 30, 1980.)

8. Children of deceased public law enforcement or fire suppression employees, who were California residents, and who were killed in the course of law enforcement or fire suppression duties, may be entitled to resident classification.

Procedures

New and returning students are required to complete a Statement of Legal Residence. The student's status is determined by the Attorney In Residence Matters' Deputy who is located in the Office of Admissions and Records.

Students are cautioned that this summation is not a complete explanation of the law regarding residence. They should also note that changes may have been made in the rate of nonresident tuition and the residence requirements between the time this catalog statement is published and the relevant residence determination date. Regulations have been adopted by The Regents, a copy of which is available for inspection in the Office of Admissions and Records.

All students classified incorrectly as residents are subject to reclassification and to payment of all nonresident fees not paid. If incorrect classification results from false or concealed facts by the student, the student also is subject to University discipline. Resident students who become nonresidents must immediately notify the Attorney in Residence Matters' Deputy.

Inquiries from prospective students regarding residence requirements for tuition purposes should be directed to the Attorney in Residence Matters; University of California; 590 University Hall; Berkeley, California 94720. No other University personnel are authorized to supply information relative to residence requirements for tuition purposes. Any student, following a final decision on residence classification by the Residence Deputy, may make written appeal to the Attorney in Residence Matters at the above address within 120 days after notification of the final decision by the Residence Deputy.
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