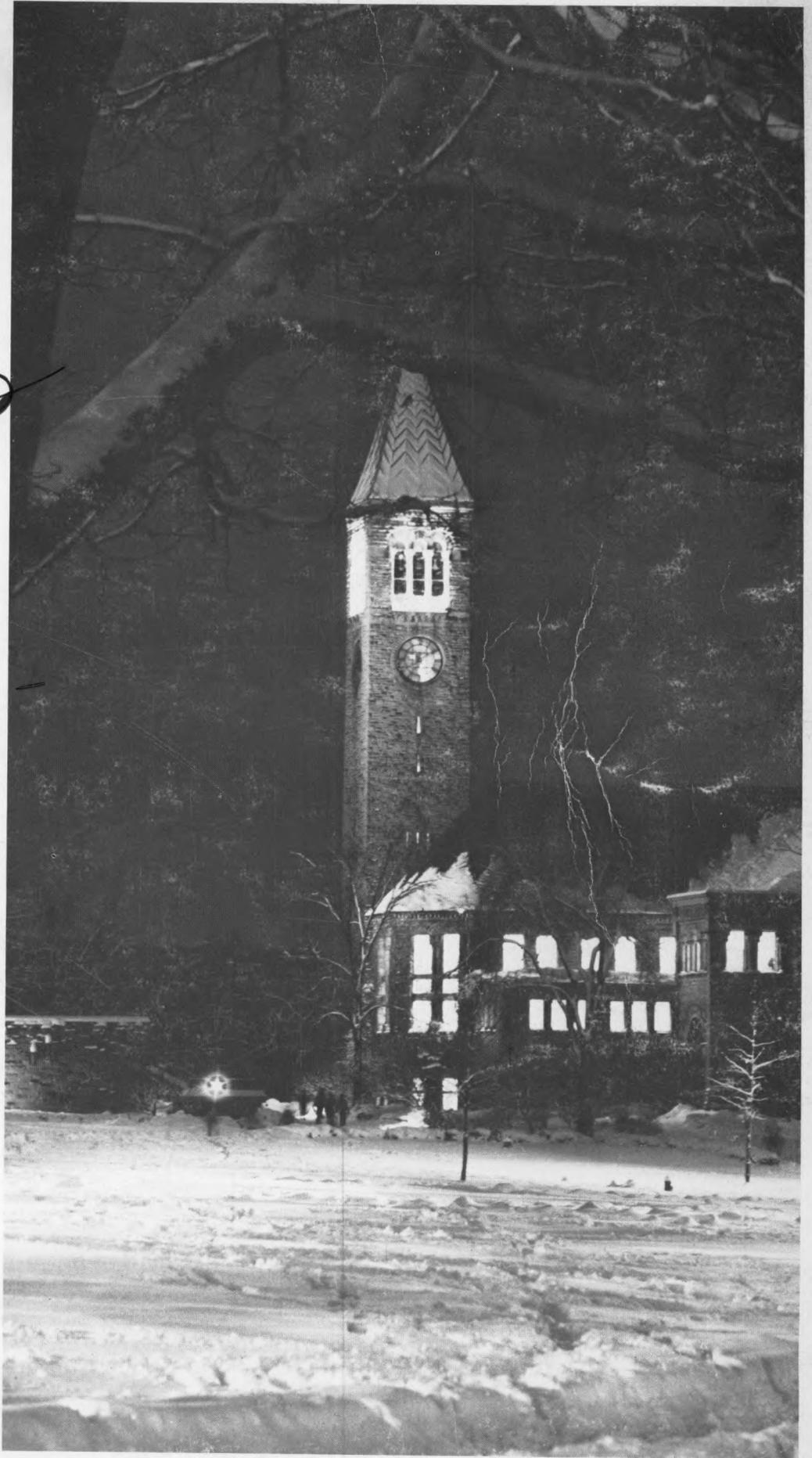


**Cornell
University
Announcements**

**Description
of Courses**

*Property of
Joseph M. Bellinger*



Cornell University

Description of Courses

1980-81

Cornell University Announcements
USPS 132-860

Volume 72 of the Cornell University Announcements consists of fifteen catalogs, of which this is number 10, dated July 25, 1980. Issued fifteen times a year: four times in May and August, three times in July, and once in March, April, June, and October. Published by Cornell University, Sheldon Court, 420 College Avenue, Ithaca, New York 14850. Second-class postage paid at Ithaca, New York.

Cornell Academic Calendar

	1980-81	1981-82
Registration	Thursday and Friday, August 28 and 29	Monday and Tuesday, August 31 and September 1
Fall term instruction begins	Tuesday, September 2	Thursday, September 3
Fall recess:		
Instruction suspended, 1:10 p.m.	Saturday, October 11	Saturday, October 17
Instruction resumed	Wednesday, October 15	Wednesday, October 21
Thanksgiving recess:		
Instruction suspended, 1:10 p.m.	Wednesday, November 26	Wednesday, November 25
Instruction resumed	Monday, December 1	Monday, November 30
Fall term instruction ends, 5:00 p.m.	Wednesday, December 10	Saturday, December 12
Final examinations begin	Saturday, December 13	Monday, December 14
Final examinations end	Monday, December 22	Tuesday, December 22
Registration	Thursday and Friday, January 29 and 30	Thursday and Friday, January 28 and 29
Spring term instruction begins	Monday, February 2	Monday, February 1
Spring recess:		
Instruction suspended, 1:10 p.m.	Saturday, March 28	Saturday, March 27
Instruction resumed	Monday, April 6	Monday, April 5
Spring term instruction ends, 1:10 p.m.	Saturday, May 16	Saturday, May 15
Final examinations begin	Tuesday, May 19	Tuesday, May 18
Final examinations end	Thursday, May 28	Thursday, May 27
Commencement Day	Sunday, May 31	Sunday, May 30

The dates shown in the academic calendar are subject to change at any time by official action of Cornell University; the 1981-82 calendar is still tentative.

In enacting this calendar, the University has scheduled classes on religious holidays. It is the intent of the University that students missing classes due to the observance of religious holidays be given ample opportunity to make up work.

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Introduction

Founded in 1865, Cornell University is an independent Ivy League institution and the land-grant university of New York State. There are thirteen colleges and schools, of which four are state supported and nine privately endowed. Eleven of these divisions are located on the Ithaca campus and two—the Medical College and the Graduate School of Medical Sciences—are located in New York City.

This volume describes courses offered by those divisions on the Ithaca campus. Those interested in the divisions located in New York City should write to the appropriate division requesting its Announcement. Courses offered during the summer are not always noted in this book. The Announcement listing summer courses is distributed on campus each spring and is available by writing Cornell University Announcements, Building 7, Research Park, Ithaca, New York 14850. (The writer should include a zip code.)

Academic Information Information concerning requirements for graduation, grades and academic standing, major or program requirements, advanced placement, financial aid, University procedures, and student services is contained in the *Announcement of Academic Information*, distributed to enrolled students. Students may also consult their advisers or college offices for further information.

The courses and curricula described in this Announcement, and the teaching personnel listed herein, are subject to change at any time by official action of Cornell University.

It is the policy of Cornell University actively to support equality of educational and employment opportunity. No person shall be denied admission to any educational program or activity or be denied employment on the basis of any legally prohibited discrimination involving, but not limited to, such factors as race, color, creed, religion, national or ethnic origin, sex, age, or handicap. The University is committed to the maintenance of affirmative action programs which will assure the continuation of such equality of opportunity.

Cornell University is committed to assisting those handicapped students who have special needs. A brochure describing services for the handicapped student may be obtained by writing to the Office of Equal Opportunity, Cornell University, 217 Day Hall, Ithaca, New York 14853. Other questions or requests for special assistance may also be directed to that office.

Special Opportunity Programs

Cornell University administers a variety of special opportunity programs designed to provide financial assistance and other forms of assistance to (1) minority students and (2) low-income students meeting program guidelines. The emphasis of these special programs is to aid in increasing representation of students from minority groups present in New York State who historically have been underrepresented in higher education. However, participation is also available to those residing outside New York State. For details, prospective students should consult the *Guide for Candidates* which accompanies each undergraduate application or will be sent upon request by the Office of Admissions, 410 Thurston Avenue, Ithaca, New York 14850.

Course Numbering System

The course levels have been assigned as follows:

- 100-Level Course—introductory course, no prerequisites required, open to all qualified students.
- 200-Level Course—lower-division course, open to freshmen and sophomores, may require prerequisites.
- 300-Level Course—upper-division course, open to juniors and seniors, prerequisites required.
- 400-Level Course—upper-division course, open to seniors and graduate students, requires 200- and 300-level course prerequisites or equivalent.
- 500-Level Course—professional level (e.g., B&PA, Law, Vet.).
- 600-Level Course—graduate-level course, open to upper-division students.
- 700-Level Course—graduate-level course.
- 800-Level Course—master's level, thesis, research.
- 900-Level Course—doctoral level, thesis, research.

Guide to Course Listings

This list of courses that follows is arranged into two broad groups.

Group 1: Divisions that offer both undergraduate- and graduate-level courses

Agriculture and Life Sciences	Hotel Administration
Architecture, Art, and Planning	Human Ecology
Arts and Sciences	Industrial and Labor Relations
Biological Sciences	Nutritional Sciences
Engineering	Officer Education

Group 2: Graduate professional divisions

Business and Public Administration
Law
Veterinary Medicine

There are no courses offered by the Graduate School as a unit; graduate-level courses are contained in the various departments that offer the instruction.

Within each division courses are generally arranged in alphabetical order by department and in numerical order within the departments. All courses, 0–999, are briefly described for those divisions (group 1) offering instruction to both undergraduate and graduate students. Courses in the graduate professional divisions (group 2) are designated by number and title only.

It is not possible to keep this single-volume course list completely up-to-date. The most current information regarding course schedules, sections, rooms, credits, and registration procedures may be found in the *Course and Time Roster* and the *Course and Room Roster*, each issued twice a year by the Office of the University Registrar. Students are also advised to consult the individual college and department offices for up-to-date course information.

New York State College of Agriculture and Life Sciences

Introduction

Programs in agriculture and life sciences offered at Cornell lead to the degrees of Bachelor of Science, Master of Science, and Doctor of Philosophy, as well as several professional degrees, including the Master of Professional Studies, the Doctor of Education, and the Master of Arts in Teaching.

Descriptions of courses, both undergraduate and graduate, are given by department. Information about academic programs, admissions, financial aid, placement, and career opportunities may be found in the *Announcement of Academic Information*.

Graduate study is organized under graduate fields, which generally coincide with the departments. Graduate degree requirements are described in the *Announcement of the Graduate School*. Courses for graduate students are described in the section on the academic department that offers them.

Nondepartmental Courses

ALS 5 Basic Review Mathematics Fall or spring. 3 credits (this credit is not counted toward the 120 hours required for the degree). Primarily for entering students.

Fall: M W F 8 (two sections) or 12:20 (two sections).
Spring: M W F 12:20 (two sections).
H. A. Geiselmann.

Exposes students to some of the concepts necessary for success in other mathematics and science courses. Basic concepts of algebra, analytic geometry, and trigonometry are covered. Considerable emphasis is placed on the analysis and reasoning involved in the solution of verbal problems requiring the use of mathematics.

ALS 27 Introduction to Farm Techniques Fall or spring. Noncredit. Grade does not appear on transcript. For permission to register, contact the Office of Career Planning and Placement, 16 Roberts Hall.

Fall: T or W 2-5. Spring: M T W R or F 2-5.
Classes meet at various college farm facilities.
W. F. Miller.

Provides supervised instruction in the basic manual skills of farming, including milking by hand and machine, handling livestock, and operating tractors and field equipment. General orientation to the practices and procedures of day-to-day farm operation.

ALS 115 Introductory College Mathematics Fall or spring. 4 credits.

M W F 8, 9:05, or 12:20 (two sections); lab, T 11:15 or 12:20, or R 11:15 or 12:20. H. A. Geiselmann.
Designed to give students with sound high school mathematics backgrounds a unified treatment of the basic concepts of college algebra, analytic geometry, and the elements of calculus. Considerable emphasis is placed on the concept of function, graphing, problem solving, and methods of proof. The Cornell University Computing Language (PL/C) is taught and used to strengthen and integrate the mathematical topics covered.

ALS 401—402 America and World Community (also Government 401-402) 401, fall; 402, spring. 3 credits each term.

M W 7:30 p.m. One World Room, Anabel Taylor. N. E. Awa, R. A. Baer, H. Feidman, J. C. Mbata, R. J. McNeil, K. L. Robinson, and other professors to be announced.

The theme of world community is examined in terms of the directions that the concept suggests, with special reference to the role of the United States in translating the concept to reality. The course seeks to examine the American experience against the background of world community from the points of view of the humanities, the social sciences, the natural sciences, and religious studies.

ALS 416 Agriculture, Society and the Environment Spring. 3 credits.

Lecs, T R 12:20; disc W evenings and by arrangement. D Pimental and others to be announced.

This course, designed and conducted by Cornell students and staff, is aimed at interrelating the many facets of agriculture. The course stresses the importance of a holistic approach to agriculture by offering perspectives on many factors related to food production: soil fertility, plant breeding, pest control, ecosystems, world food problems, livestock production, energy, economics, social and political concerns, labor problems, and land and water management. This approach is used to develop the basic framework on which future options and strategies for food production in the United States and the world are examined and evaluated.

ALS 695 Environmental Biology Fall and spring. 1-3 credits. Prerequisite: permission of instructor.

Hours to be arranged D. Pimental.
Focuses on complex energy-environmental problems, using a multidisciplinary approach. Task forces of nine students, each group representing several disciplines, investigate significant energy-environmental problems. Each task force spends two semesters preparing a report for publication, modeled after National Academy of Sciences reports.

Agricultural Economics

O. D. Forker, chairman; D. J. Allée, B. L. Anderson, R. D. Aplin, R. Barker, P. Barkley, S. L. Barraclough, N. L. Bills, D. Blandford, R. N. Boisvert, M. E. Brunk, J. B. Bugliari, D. L. Call, G. L. Casler, L. D. Chapman, H. E. Conklin, G. J. Conneman, J. Conrad, L. M. Day, D. K. Freebairn, G. A. German, D. C. Goodrich, Jr., L. L. Hall, R. B. How, R. J. Kalter, W. A. Knoblauch, E. L. LaDue, W. H. Lesser, J. F. Metz, Jr., R. A. Milligan, T. D. Mount, A. M. Novakovic, T. T. Poleman, K. L. Robinson, D. G. Sisler, R. S. Smith, B. F. Stanton, R. P. Story, J. A. Sweeney, L. Tauer, W. G. Tomek, G. B. White

150 Economics of Agricultural Geography Fall. 3 credits.

Lecs, M W F 11:15 or 12:20. Prelims, R 7 p.m. Sept. 29 and Oct. 27. D. G. Sisler.
The economics and geography of world agriculture, providing a basis for understanding past development and future changes. Elementary economic principles, historical development, physical geography, and population growth are studied in their relation to agricultural development and the economic problems of farmers. Where possible, current domestic and foreign agricultural issues are used to illustrate principles.

220 Introduction to Business Management Fall. 3 credits.

Lecs, M W F 10:10. disc, M 12:20-2:15 or 2:30-4:25; T 8-9:55, 10:10-12:05, 12:20-2:15, or 2:30-4:25; W 8-9:55, 10:10-12:05, 12:20-2:15, or 2:30-4:25. In weeks when discussions are held,

there will be no W lecture. Discussions will be held instead of a lecture in all but four weeks of the term. R. D. Aplin.

Principles and tools useful in performing four major functions of management: planning, organizing, directing and leading, and controlling. Within this framework, consideration is given to social, legal, and economic environments; forms of business ownership; financial statements; cost behavior; and a few key concepts and tools in financial management.

221 Accounting Spring. 3 credits. Not open to freshmen.

Lecs, M F 10:10; lab, T W or R 8-9:55, 10:10-12:05, 12:20-2:15, or 2:30-4:25; two evening prelims. J. Sweeney.

A comprehensive introduction to financial accounting concepts and techniques, intended to provide a basic understanding of the accounting cycle and the elements of financial statement analysis and interpretation. Concepts rather than procedures are emphasized.

240 Marketing Spring. 3 credits.

Lecs, M W F 11:15, lab, M 2:30-4:25. T 12:20-2:15 or 2:30-4:25, W 2:30-4:25, R 12:20-2:15 or 2:30-4:25, or F 10:10-12:05. In weeks labs are held, there will be no F lecture. D. C. Goodrich.
An introductory study of the food marketing system and the society it serves, including the goals and practices of farmers and marketers (in such areas as buying and selling, grading, transporting, packaging, and advertising), price-making institutions (such as commodity futures markets), the behavior and purchasing practices of consumers, and the interrelationships among these groups.

250 Introduction to Energy Resources Spring. 3 credits.

Lecs, M W F 11:15. D. Chapman.
An introduction to the concepts of efficiency, competitive equilibrium, and social cost. The course focuses on basic energy resources, examining production costs and demand for petroleum, natural gas, electricity, nuclear power, and solar energy. The ownership and regulatory structure of each energy industry is discussed, as well as selected policy issues such as price control, taxation, public ownership, conservation, and renewable resource use.

302 Farm Business Management Spring. 4 credits. Not open to freshmen. This course is a prerequisite for Agricultural Economics 402.

Lecs, M W 10:10; disc, F 8, 9:05, 10:10, 11:15, or 12:20; lab, T W or R 1:25-4:25. On days farms are visited, the laboratory period is 1:25-5:30. One all-day trip and four half-day trips are taken to visit farm businesses. G. J. Conneman.

An intensive study of problems associated with planning, organizing, operating, and managing a farm business, with emphasis on the tools of managerial analysis and decision making. Topics include management information systems, business analysis, economic principles, and budgeting; and acquisition, organization, and management of capital, labor, land, and machinery.

310 Introductory Statistics Fall. 3 credits. Prerequisite: ALS 115 or equivalent level of algebra.

Lecs, M W F 12:20; lab, M 2:30 or 3:35, T 2:30 or 3:35, or W 2:30 or 3:35. D. Blandford.
An introduction to statistical inference including probability concepts, estimation, hypothesis testing, and linear regression.

320 Business Law Fall. 3 credits. Limited to upperclass students.

Lecs, M W F 9:05; one evening prelim. J. B. Bugliari.
Consideration is given chiefly to legal problems of particular interest to persons who expect to engage in business. Emphasis is on personal property, contracts, agency, real property, and partnerships and corporations.

6 Agriculture and Life Sciences

321 Business Law Fall. 4 credits. Limited to upperclass students. Prerequisite: permission of instructor.

Lecs, M W F 9:05; disc, M 4; one evening prelim. J. B. Bugliari.

The lecture portion is the same as Agricultural Economics 320. Discussions deal with practical applications of the legal principles covered in that course and attempt also to give some deeper insight into the roles and functions of the lawyer and the judiciary in our society.

322 Taxation in Business and Personal Decision Making Spring. 3 credits. Recommended: background in accounting and business law.

Lecs, M W 2:30-4. J. B. Bugliari, R. S. Smith.

The impact of taxation, both state and federal, on business and personal decision making. After a brief discussion of tax policy and state and local taxes an in-depth examination is conducted of federal income and estate and gift taxes affecting individuals and business entities. Both tax management and tax reporting are stressed.

323 Managerial Accounting and Economics Fall. 3 credits. Prerequisites: Agricultural Economics 221 and Economics 102 or equivalents.

Lecs, M W 1:25; disc, R 10:10-12:05, 12:20-2:15, or 2:30-4:25 or F 10:10-12:05, 12:20-2:15, or 1:25-3:20; two evening prelims. J. Sweeney.

An introduction to cost accounting that emphasizes the application of accounting and economic concepts to managerial control and decision making. Major topics include basic costing, standard costing, cost behavior, cost allocation, pricing, budgeting, linear programming, inventory control, transfer pricing, and measuring divisional performance.

324 Financial Management Spring. 3 credits.

Prerequisites: Agricultural Economics 220 and Economics 102 or equivalents. Recommended: Agricultural Economics 221 or equivalent.

Lecs, M W F 9:05; disc, W 12:20-2:15 or 2:30-4:25, R 8-9:55 or 12:20-2:15, or F 9:05-11 or 12:20-2:15; two evening prelims. In weeks when discussions are held, there will be no F lecture. Discussions will be held instead of lecture in all but two weeks of the term. B. L. Anderson.

Designed to provide knowledge and understanding of business finance. Major topics include capital investment decisions; techniques for handling risk, uncertainty, and inflation in decision making; sources and forms of financing; financial structure; cost of capital; working capital management; and special problems of financial management in the small firm.

332 Economics of the Public Sector Fall. 3 credits. Prerequisite: Economics 102 or equivalent.

Lecs, M W F 11:15; disc, W 2:30-4 or 7:30-9 p.m., R 12:20-1:50, or F 12:20-1:50. P. W. Barkley.

The application of economic concepts to evaluation of the structure and performance of the public sectors of the economy. Emphasis on microeconomic analysis of public finance and public resource allocation. Principal topics: market failure, articulation of public choice and interests, evaluation of public decisions, and current public policy.

340 Economics of Marketing Spring. 3 credits.

Prerequisites: Economics 101-102 and Agricultural Economics 240 recommended.

Lecs, M W F 12:20-1:10. L. L. Hall.

This course provides an integrative framework for analysis of marketing functions, activities, and decisions in the food industry. Producer, consumer, and government behavior in the marketing system are explored, and their interaction is discussed. The course focuses on the importance of demand, the industrial organization of the food industry, and the causes and consequences of government intervention.

342 Marketing Management Fall. 3 credits.

Prerequisites: Agricultural Economics 240 and Economics 101-102.

Lecs, M W F 10:10; disc, R 2:30 or F 10:10, 11:15, or 12:20. In weeks discussions are held, there will be no F lecture. D.C. Goodrich.

Deals with principles and practices in the management of the marketing function. Emphasizes the revenue aspects of marketing by considering sales forecasting and strategies of the firm in product and brand selection, pricing, packaging, promotion, and channel selection. Identification and generation of economic data necessary for marketing decisions are considered.

[346 Pricing Milk and Dairy Products Fall.

3 credits. Not offered 1980-81.

Lecs, M W F 11:15; disc, F 12:20.

A review of the structural characteristics of the dairy industry and an analysis of the pricing systems for market milk. Particular attention is given to government programs, including marketing orders, price supports, and import policies.]

347 Marketing Horticultural Products Fall.

3 credits. Prerequisite: Agricultural Economics 240 or equivalent.

T R 8-9:55. All-day field trip the last Saturday in September. R.B. How.

A study of markets, marketing channels, and marketing services for fruits, vegetables, and floricultural commodities. An evaluation of marketing alternatives facing growers, shippers, wholesalers, and retailers of horticultural products. The role of public agencies in market information and regulation. The potential for group action to improve marketing operations.

350 Resource Economics Fall. 3 credits.

Prerequisite: either Natural Resources 201 and introductory economics or permission of instructor.

Lecs, T R 10:10; disc, T 1:25-3:20 and as arranged. D. J. Allee, H. E. Conklin.

The application of economic and political science concepts to the use of natural resources, with varying attention to water, land, forests, and fisheries. Considers regional growth, the impact of urban growth, and public decision making in the resources and environmental management area.

351 Farm and Food Policies Fall. 3 credits. S-U

grades optional.

Lecs, T R 9:05; disc, R 11:15 or 1:25 or F 10:10.

K. L. Robinson

The course deals broadly with farm and food policies, including price support and storage or reserve policies, international food aid, agricultural protection, the structure of agriculture, and domestic food subsidy programs.

352 Agricultural Prices Spring. 3 credits.

Recommended: background in economics, such as Economics 101-102

M W F 11:15. K. L. Robinson.

An analysis of supply and demand characteristics of farm commodities, institutional aspects of pricing farm and food products, temporal and spatial price relationships, price forecasting, and the economic consequences of pricing decisions.

380 Independent Honors Research in Social Science Fall or spring. 1-6 credits. Limited to

students who have met the requirements for the honors program. A maximum of 6 credits may be earned in the honors program.

402 Advanced Farm Business Management

Spring. 3 credits. Prerequisite: Agricultural Economics 302 or equivalent.

Lecs, M W 9:05; disc, W R 1:25-3:20.

G. L. Casler.

Emphasis is on evaluating the profitability of

alternative investments and enterprises. Principal topics include the affects of income taxes on investment decisions, capital investment analysis, linear programming, and financial risk and uncertainty. Experience in computer applications to farm business management is provided.

405 Farm Finance Fall. 3 credits. Prerequisite: Agricultural Economics 302.

Lecs, T R 11:15; disc, W 1:25-3:20. E. L. LaDue. The principles and practices used in financing farm businesses, from the perspectives of the farmer and the farm lender. Topics covered include sources of capital, financing entry into agriculture, financial analysis of a business, capital management, financial statements, credit instruments, financial risk, and the forms of business organizations.

406 Farm and Rural Real Estate Appraisal Fall.

4 credits. Limited to 45 students. Prerequisites: Agricultural Economics 302 or equivalent and permission of instructor.

Lecs, T R 10:10; lab, R 1:25-4:25. On days farms are visited the laboratory period is 1:25-5:30. One all-day trip, G. J. Conneman.

The basic concepts and principles involved in appraisal. Factors governing the price of farms and rural real estate and methods of valuation are studied. Practice in appraising farms and other rural properties.

407 Advanced Agricultural Finance Seminar

Spring. 2 credits. Limited to 16 seniors with extensive course work in farm management and farm finance. Open by application prior to March 1 of the year before the course is offered.

T 3:35-5:30. E. L. LaDue.

A special program in agricultural finance conducted with financial support from the Farm Credit System. Includes two days at Farm Credit Banks of Springfield, one week in Farm Credit Association offices, an all-day field trip observing FHA financing during fall term, a four-day trip to financial institutions in New York City during intersession, and lecture-discussions in the spring term. Representatives from banking, agribusiness, finance, and similar areas participate in spring term lecture-discussion sessions.

409 Farm Management Seminar Fall. 1 credit.

Limited to seniors and graduate students.

M 1:25-3. B. F. Stanton and staff.

Presentation and interpretation of research in farm management and production economics. Each participant conducts a seminar and prepares a publishable evaluation of research results directed toward farmers and extension and business leaders.

412 Introduction to Linear Programming Spring.

3 credits. Primarily for juniors, seniors, and M.S. degree candidates. Prerequisite: Agricultural Economics 310 or equivalent.

Lecs, M W 10:10; lab, W 1:25-3:20 or 3:35-5:20.

B. F. Stanton

An introduction to the concepts and computational procedures of linear programming. Emphasis on interpretation of results, model building, and data requirements for estimation using standard computer programs. Topics include sensitivity analysis, parametric programming, the transportation problem, scheduling, and distribution. Primary applications are made to agriculture and business.

420 Advanced Business Law Spring. 3 credits.

Limited to upperclass students.

Lecs, T R 8:30-9:55; one evening prelim.

J. B. Bugliari.

Designed to provide a fairly detailed and comprehensive legal background. Selected areas covered in Agricultural Economics 320 are further developed, and particular consideration is given to the law pertaining to bailments, sales, secured transactions, bankruptcy, negotiable instruments, and, if time permits, insurance.

421 Advanced Business Law Spring. 4 credits.

Limited to upperclass students. Prerequisite: permission of instructor.

Lecs, T R 8:30-9:55; disc, T 4; one evening prelim. J. B. Bugliari.

Lectures cover the same material as Agricultural Economics 420. The discussions cover aspects of estate planning: estate planning techniques, the law and use of trusts, the law of wills, and federal and New York State estate and gift taxes and probate procedures.

424 Business Policy Spring. 3 credits. Limited to seniors majoring in business management and marketing.

T R 9:30-11 or 11:15-12:45. R. D. Aplin.
An integrating course that examines business policy formulation and execution from the standpoint of the general manager of an organization, focusing on decision making at the top management level. The course is built around a series of cases. Emphasizes improving oral and written communication skills.

425 Personal Financial Management Spring. 2 credits. Primarily for seniors.

Lec, M 12:20-2:15; disc to be arranged. Second hour of lecture will be omitted in weeks when discussions are held. Staff.

Managing personal income to maximize financial goals and objectives. Discussions are devoted to problems and case studies in financial planning for students and young families. Discussion leaders include representatives of financial institutions, such as banks and insurance companies.

426 Management of Cooperative Action Fall. 3 credits.

Lecs, M W F 9:05; disc to be arranged. B. L. Anderson.

Investigates the economic role, function, and impact of various forms of group action in agriculture. Institutions considered range from informal interest groups to marketing boards. Attention is given to the theory and operation of cooperative organizations. Topics covered include organization, decision making, structure, methods of financing, legal status, tax treatment, and market performance.

430 Agricultural Trade Policy Fall. 3 credits.

Primarily for seniors and M.S. degree candidates. Prerequisites: Agricultural Economics 351 and either Agricultural Economics 352 or Economics 311.

Lecs, T R 11:15; lec or disc, W 3:35. D. Blandford.
An examination of the rationale and method of commodity trade policy. The course analyzes problems and issues in both developed and less-developed countries and deals with the major questions associated with the organization of international commodity markets.

443 Food Industry Management Spring. 4 credits. Limited to juniors and seniors.

M W F 10:10, W 2-4. G. A. German.
A case-study approach is used to examine the application of management principles and concepts to operating problems of food retailers and wholesalers. Areas included are site selection, buying, merchandising, personnel administration, private label products, and financing expansion programs. Leading food industry specialists frequently join the W session.

448 Food Merchandising Fall. 3 credits. Limited to juniors and seniors. Prerequisite: Agricultural Economics 240.

Lecs, T R 10:10-11:25. G. A. German.
Merchandising principles and practices as they apply to food industry situations. The various elements of merchandising are examined, including buying, pricing, advertising, promotion, display, store layout, profit planning and control, and merchandising strategy.

449 Field Study of Marketing Institutions Fall.

2 credits. Prerequisites: course work in marketing or business management and permission of instructor. Field trips will cost approximately \$150.

W 3:30-4:30. Two one-day field trips to the upstate area and a three-day trip to the New York City area during intercession just before spring registration. W. J. Lesser, B. L. Anderson.

Opportunity for upper-level students to integrate their classwork through a close examination of the marketing institutions, operations, and price determination methods for a cross section of agricultural products.

450 Evaluating Resource Investment and Environmental Quality Spring. 3 credits. Primarily for juniors and seniors. Prerequisite: an introductory course in economics, a 300-level agricultural economics course, or permission of instructor.

T R 10:10-11:30; disc to be arranged. D. J. Allee.
Means of reaching decisions on environmental questions. Concepts of social value and cost-benefit analysis, determination of degrees of importance of environmental problems, environmental impact statements, definitions of environmental quality, and questions of political economy.

452 Agricultural Land Policy Spring. 3 credits.

Lec, F 8-9:55; disc, F 1:25-3:25; field trips to be arranged. H. E. Conklin.

Recent changes in the laws, programs, and policies at state and local levels that affect the use of farmland in the northeastern United States.

464 Economics of Agricultural Development

Spring. 4 credits. Prerequisites: Agricultural Economics 150 and Economics 101-102, or permission of instructor.

T R 9:05 and T or W 1:25. D. K. Freebairn.
An examination of the processes of agricultural development in Third World nations and their interactions with United States policy. Agricultural and rural development policy, the interdependence of agriculture with other sectors, alternative forms of agricultural organization, and policies tending to alleviate highly concentrated income distributions are all emphasized.

499 Undergraduate Research Fall or spring.

1-4 credits. Limited to seniors with grade point averages of at least 2.7. Prerequisite: written permission of the staff member who will supervise the work and assign the grade; this permission must be attached to course enrollment material. S-U grades optional.

Permits outstanding undergraduates to carry out independent study of suitable problems under appropriate supervision.

540 Marketing Research Spring. 2 credits.

Prerequisite: permission of instructor. Lec, R 12:20-2:15. M. E. Brunk.
Objectives of marketing research, organization and management of research and research agencies, problem identification, selecting and planning projects, and design and use of research by management.

608 Production Economics Fall. 3 credits.

Prerequisite: Economics 311 or equivalent. Recommended: Mathematics 108 or 111 or equivalent.

Lecs, M W F 12:20. G. B. White.
A comprehensive survey of the theory of production economics with emphasis on applications to agriculture and agribusiness. Topics include the derivation, estimation, and use of production, cost, and supply functions.

650 Economic Analysis of Public Policy Spring.

4 credits. Primarily for graduate students but open to seniors. Prerequisite: Economics 311 or 511, or permission of instructor.

T R 9:05-11. R. J. Kalter.

The application of economic theory and analysis to governmental decision-making, budgeting, and expenditure processes with emphasis on the welfare criteria of economic efficiency and income distribution. Techniques of benefit-cost, equity, and environmental analysis will be stressed. Discount rates, benefit estimation, externalities, multipliers, uncertainty and social welfare functions will be covered.

651 Economic Aspects of Energy Use Fall. 4 credits. Offered even-numbered years.

Lec-sem F 1:15-4:15. D. Chapman.
Selected subjects in economic research, including the macroeconomic study of income, employment, and energy use; energy-labor substitutability; decentralized technologies; taxation of utilities and petroleum companies; nuclear economics; competition and monopoly; and public policy.

652 Special Problems in Land Economics Fall or

spring. 1 or more credits. Limited to graduate students. Prerequisite: permission of instructor. Hours to be arranged. D. J. Allee, H. E. Conklin.
Special work on any subject in the field of land economics.

660 Food, Population, and Employment Fall.

5 credits. Enrollment limited to 15 to ensure that students have an opportunity to work individually with instructor.

M W 2:30-4 and an individual weekly meeting with the instructor. T. T. Poleman.
Examines the links between employment, food, and population growth in less-developed countries. Food economics and the world food situation are treated as cornerstones and examined in historical perspective. Requires a major term paper.

661 Food, Population, and Employment II

Spring. 1-3 credits. Prerequisite: permission of instructor.

Individual weekly meeting with the instructor. T. T. Poleman.
Individual, guided research for students who want to carry on with projects initiated in Agricultural Economics 660 or to undertake new ones.

664 Microeconomic Issues in Agricultural Development

Spring. 3 credits. Prerequisite: Agricultural Economics 608, Economics 311, or permission of instructor.

T R 11-12:30. R. Barker.
Issues such as production efficiency, induced technological change, allocation of research resources, and the distribution of benefits from new technology are discussed. The theoretical argument is related to applied research problems.

665 Seminar on Latin American Agricultural Policy

Fall. 3 credits. Prerequisite: Agricultural Economics 464 or permission of instructor.

T 2:30-4:25. D. K. Freebairn.
An examination of policies for the development of the agricultural sector in Latin America, including an identification of policy objectives and a review of the instruments of public policy implementation. Particular attention is paid to the interactions of agrarian structure, agricultural productivity, and rural welfare.

666 Seminar in Agricultural Development Fall or

spring. 3 credits. The seminar is normally taught when a visiting professor is available who has had recent direct experience in low-income countries.

Hours to be arranged.
An analysis of current problems for the development of the agricultural sector of low-income countries, with emphasis on the implications of such problems to the definition of research.

699 M.P.S. Research 1-6 credits. Prerequisite:

registration as an M.P.S. student. Credit is granted for the M.P.S. project report.

8 Agriculture and Life Sciences

700—701 Special Topics In Agricultural

Economics Fall or spring. Credit to be arranged. Limited to graduate students.

Hours to be arranged. Staff.

A group discussion of areas of special interest in the field of agricultural economics. Students are required to review literature and present oral or written reports or both.

708 Advanced Production Economics Fall. 3 credits. Prerequisites: Agricultural Economics 608, 710, or equivalents.

Hours to be arranged. R. N. Boisvert.

Theoretical and mathematical developments in production economics, with emphasis on estimating microproduction and macroproduction relationships, scale economies, technical change, factor substitution, recently developed functional forms, statistical estimation and hypothesis testing. Discussion of topics such as risk, supply response, household production functions, etc., will be determined by student interest.

710 Econometrics I Spring. 4 credits. Not open to undergraduates. Prerequisites: Statistics 416 and 601 or equivalent.

Lecs, T R 2:30—4:25. W. G. Tomek.

A comprehensive treatment of the classical linear regression model at the level of *Econometric Methods*, by Johnston. Generalized least squares, analysis of covariance, and elementary distributed lag models are introduced. Simultaneous equations estimators constitute about 30 percent of the course. Principles of econometrics are emphasized as a basis for empirical research.

711 Econometrics II Fall. 4 credits. Prerequisite: Agricultural Economics 710 or equivalent. Statistics 417 recommended.

Lecs, T R 2:30—4:25. T. D. Mount.

Coverage beyond that of Agricultural Economics 710 of generalized least squares, models with stochastic regressors, testing linear hypotheses, and the effects of specification errors. Applications include seemingly unrelated regressions, three-stage least squares, estimation with pooled data, models with stochastic coefficients, and distributed lag models. Other topics covered are principal components, factor analysis, and probit and logit analysis, with extensions to deal with multinomial problems.

712 Quantitative Methods I Fall. 4 credits. Prerequisite: Statistics 416 or equivalent. Statistics 417 suggested.

Lecs, M W F 11:15. R. N. Boisvert.

A comprehensive treatment of linear programming and its extensions, including postoptimality analysis and the transportation model. Special topics in integer and nonlinear programming, including spatial equilibrium and risk programming models. Input-output models are treated in detail. Applications are made to problems in agricultural, resource, and regional economic problems.

713 Quantitative Methods II Spring. 4 credits. Prerequisite: Agricultural Economics 712 or permission of instructor.

Lecs, M W F 9:05—9:55; disc, F 1:25—3.

R. A. Milligan.

A study of quantitative techniques used to solve dynamic problems. The first half of the course is concerned with simulation; the second, with dynamic optimization.

714 Econometric Models Spring. 3 credits. Offered alternate years.

Lec to be arranged. T. D. Mount, W. G. Tomek.

The theory and art of specifying and evaluating econometric models. Topics include economic theory as a guide to model building, evaluating parameter estimates, sequential estimators, and evaluating the

forecasting ability of a model. Empirical studies in agricultural economics provide a basis for discussion.

717 Research Methods in Agricultural Economics Spring. 2 credits. Limited to graduate students.

M 1:25—3:20. B. F. Stanton and D. G. Sisler.

Discussion of the research process and scientific method as applied in agricultural economics. Topics include problem identification, hypotheses, sources of data, sampling concepts and designs, methods of collecting data, questionnaire design and testing, field organization, analysis of data, and development of research proposals.

730 Seminar on Agricultural Trade Policy Spring. 3 credits. Limited to graduate students. Prerequisites: Agricultural Economics 430 and basic familiarity with quantitative methods. Offered alternate years.

F 1:25—4. D. Blandford, D. G. Sisler.

A discussion of selected topics in agricultural trade policy, such as export promotion versus import substitution in developing countries, and the role of international commodity agreements. The preparation of a term paper is an important part of the course.

[731 Seminar on Methods of Trade and Commodity Policy Analysis Spring. 3 credits.

Limited to graduate students. Prerequisites: basic training in quantitative methods (Agricultural Economics 710 and 712 or equivalent) and permission of instructor. Offered alternate years. Not offered 1980—81.

F 1:25—4. D. Blandford.

A discussion of the structure, use, and usefulness of alternative quantitative methods of commodity policy analysis. Preparing a term paper is an important part of the course.]

741 Agricultural Markets and Prices Fall.

3 credits. Registration by permission of instructor. Recommended: Agricultural Economics 710 and advanced microeconomic theory.

T R 12:20—2:15. Staff.

Economic theory and analytic methodology are discussed as they apply to the analysis of agricultural marketing and pricing problems and policies. Relevant supply, demand, and trade theories and multiproduct, spatial, and temporal models are studied. The emphasis is on the use of economic theory and empirical models to analyze agricultural policies and problems.

742 Agricultural Markets and Public Policy

Spring. 3 credits. Limited to graduate students. Prerequisite: familiarity with multiple regression techniques on the level of Statistics and Biometry 601.

T R 12:20—2:15. W. H. Lesser.

Develops the concepts and methodology for applying and analyzing the effects of public policy directives on the improvement of performance in the United States food marketing system. Topics include a survey of industrial organization principles, antitrust and other legal controls, coordination systems in agriculture and cooperative theory and performance. An application of these techniques to analyzing marketing problems in developing economies is also presented.

743 Export Marketing Fall. 3 credits. Limited to graduate students. Estimated cost of field trip, \$60. Lec, R 2:30—4:25. Overnight field trip to New York City required. M. E. Brunk.

The history and development of commercial United States exports of agricultural commodities and the mechanics and procedures of exporting. Alternatives in sales contracts, shipping, insurance, financing, business structure, researching markets, and promotion. Trading experiences of specific commodity specialists.

751 Seminar on Agricultural Policy Spring. 2 credits. Limited to graduate students. Offered alternate years.

W 1:25—3:20. K. L. Robinson.

A review of the professional literature relating to agricultural policy issues, and techniques appropriate to the analysis of such issues.

752 Readings in Philosophy Spring. 3 credits. Limited to Ph.D. degree candidates.

S 9:05—12. H. E. Conklin.

Readings, selected for their relevance to research in agricultural economics, are chosen from among books such as *Structure of Scientific Revolutions*, *The Theory of Experimental Inference*, *The Nerves of Government*, *Economics as a Science*, and *A Theory of Economic History*.

Related Courses in Other Departments

Statistics II (I&LR 311)

Introduction to Computer Uses In Data Analysis (Agricultural Engineering 304)

Matrix Algebra I (Statistics and Biometry 416)

Matrix Algebra II (Statistics and Biometry 417)

Agricultural Engineering

N. R. Scott, chairman; L. D. Albright, J. A. Bartsch, R. D. Black, J. K. Campbell, J. R. Cooke, R. B. Furry, R. W. Guest, W. W. Gunkel, D. A. Haith, W. W. Irish, L. H. Inwin, W. J. Jewell, F. G. Lechner, G. Levine, R. C. Loehr, H. A. Longhouse, R. T. Lorenzen, D. C. Ludington, E. D. Markwardt, W. F. Millier, R. A. Parsons, R. E. Pitt, D. R. Price, G. E. Rehkugler, J. W. Spencer, T. S. Steenhuis, L. P. Walker, M. F. Walter

101 Mechanical Drawing Fall. 3 credits.

Lecs, T R 8; lab, W 1:25—4:25. H. A. Longhouse.

Introduction to mechanical drawing including lettering, sketching, multiview drawings, sections, auxiliaries, revolutions, pictorial drawings, elementary descriptive geometry, and the application of these principles to problems. Both machine and architectural drawing conventions are discussed. Introduction to computer graphics is included.

110 Farm Metal Work Fall or spring. 2 credits.

Lec, R 9:05; fall labs, M or T 1:25—4:25; spring labs, M T or R 1:25—4:25. F. G. Lechner.

M lab, limited to 24 students, includes instruction in the fundamentals of metal lathe work and arc and oxyacetylene welding. T and R labs, each limited to 20 students, include instruction in sheet metal work, pipe fitting, hot and cold metal work, and arc and acetylene welding.

131 Elements of House Design Spring. 3 credits.

Prerequisite: high school or college physics. S-U grades optional.

Lecs, T R 10:10; lab, T W or R 1:25—4:25.

L. D. Albright.

An introduction to the design process. The basic principles of planning and design of buildings and systems for human habitation, with emphasis on the rural dwelling. Topics include site selection, structural design, water and waste water systems, electrical systems, lighting, heating, solar systems, ventilation, and air conditioning.

132 Farm Carpentry Fall. 2 credits. Each lab limited to 15 students.

Lec, T 9:05; labs, T W or R 1:25—4:25.

F. G. Lechner.

Instruction in the fundamentals of farm carpentry, including concrete work, and equipment and buildings constructed of wood. Each student is required to plan and construct an approved carpentry project.

- 151 Introduction to Agricultural Engineering and Computing** Fall. 2 or 3 credits. Prerequisite: one term of calculus or concurrent registration in a calculus course.
Lecs, T F 1:25-2:15; rec-labs, T F 2:30-4:25.
R. B. Furry.
An introduction to digital computing with the PL/C and WATFIV languages through the use of computing problems in agricultural engineering subjects and related areas such as environmental technology and agriculture. Basics of PL/C and WATFIV are completed in 10 weeks for 2 credits. The remainder of the course introduces interactive computing and requires the completion of a comprehensive computing problem.
- 152 Engineering Drawing** Spring. 3 credits. Limited to 72 students (36 in each lab).
Lecs, M W 8; lab, M or T 1:25-4:25.
H. A. Longhouse.
Designed to promote an understanding of the engineer's universal graphic language. The lectures and laboratories develop working knowledge of drawing conventions, drafting techniques, and their application to machine and pictorial drawing problems. Introduction to descriptive geometry and computer graphics is also included.
- 200 Undergraduate Seminar** Spring. 1 credit.
Lec, M 2:30. N. R. Scott.
A forum to discuss the contemporary and future role of agricultural engineering in society. A series of lectures will be given by practicing agricultural engineers, Cornell faculty members, and students. Written critiques are required. Students may take the seminar more than once but are limited to 2 credits maximum.
- 201 Energy and Man** Spring. 3 credits. Prerequisite: high school or college physics.
Lec, M W F 10:10. D. R. Price.
Basic concepts of energy and traditional and alternate sources of energy. The energy transfer process is investigated. Topics include heating, cooling, drying, solar radiation, electricity, refrigeration, wind power, geothermal energy, biogas production, and energy economics and policy.
- 208 Application of Physical Sciences I** Fall. 3 credits. Prerequisite: a term of calculus and high school physics or a year of college physics.
Lecs, T R 8-9:55; rec, F 8, 9:05, or 10:10.
D. C. Ludington.
The application of statics, dynamics, mechanics of materials, and fluid mechanics to physical problems in agriculture. Topics include torque, free-body diagrams, friction, energy, stress, bending, shear, fluid flow, and wall pressures. Emphasis is on problem solving.
- 209 Application of Physical Sciences II** Spring. 3 credits. Prerequisite: Agricultural Engineering 208.
Lecs, T R 8:20-9:55; rec, F 8, 9:05, or 10:00.
D. C. Ludington.
A continuation of Agricultural Engineering 208. The laws of thermodynamics and principles of energy transfer, psychrometrics, and electricity are covered. Topics include applications in agriculture of the various gas and vapor cycles used in engines and refrigeration, heat conduction through multiple layers, convection, solar radiation, lighting principles, behavior of air and water vapor mixtures, and basic electricity. Solving practical problems is emphasized.
- 221 Plane Surveying** Fall. 3 credits. Limited to 30 students (30 per lab). S-U grades optional.
Lecs, T R 11:15; lab, M T or W 1:25-4:25. Staff.
An introduction to plane surveying. The use and care of equipment is stressed during field problems related to construction and mapping.
- 250 Engineering Applications in Biological Systems** Spring. 3 credits. Prerequisite: coregistration in Mathematics 294, Engineering M&AE 221, and Engineering T&AM 202.
Lec, M W F 12:20. R. E. Pitt.
Case studies of engineering problems in agricultural and biological systems including animal and crop production, environmental control, energy, and food engineering. Emphasis will be on the application of mathematics, physics, the engineering sciences, and biology to energy and mass balances in agricultural systems.
- 301 Safety and Accident Prevention** Spring. 2 credits. S-U grades optional.
Lecs, T R 9:05. Staff.
Educational programs, engineering design, and legal efforts including the federal Occupational Safety and Health Act will be studied. Safety-related organizations ranging from local police and fire departments to international organizations such as National Fire Protection Association and the United Nations are reviewed. Emphasis is on agricultural and rural applications.
- 304 Introduction to Computer Uses in Data Analysis** Spring. 3 credits. Each lab limited to 36 students. Prerequisite: one course in college mathematics or statistics or permission of instructor. S-U grades optional.
T R 11:15; lab, M T W R or F 1:25-2:15. R. B. Furry.
An introductory course in computing for those interested in using digital computers to handle data. Topics include description and preparation of data, preparing and processing computer programs, computer attributes and applications, computer library programs, and related computing facilities. No prior knowledge of computers or computing languages is necessary.
- 305 Principles of Navigation** Fall. 4 credits.
3 lecs, disc, and project period at hours to be arranged. R. D. Black.
Coordinated systems, chart projections, navigational aids, instruments, compass observations, tides and currents, soundings. Celestial navigation: time, spherical trigonometry, motion of stars and sun, star identification, position fixing, Nautical Almanac. Electronic navigation.
- 310 Advanced Farm Metal Work** Fall or spring. Fall, 1 credit; spring, 1 or 2 credits. Prerequisite: permission of instructor.
Lab, F 1:25-4; for 2 credits a second lab must be arranged. F. G. Lechner.
Fall: advanced machine shop. Spring: advanced welding and metal construction project.
- 311 Farm Machinery** Fall. 3 credits. Not open to freshmen. Each lab limited to 16 students. Prerequisite: high school physics or equivalent.
Lec, T R 10:10; rec-lab, T W or R 1:25-4:25.
W. F. Millier.
A study of the operating principles, use, selection, and methods of estimating costs of owning and operating farm machines. Lab work includes practice in the calibration of planting, fertilizing, and pesticide application machinery and study of the functional characteristics of agricultural machines and machine components.
- 312 Internal Combustion Engines for Agriculture** Spring. 3 credits. Each lab limited to 16 students. Prerequisite: high school physics or equivalent.
Lec, T R 11:15; lab, M T W or R 1:25-4:25.
W. F. Millier.
A study of the principles of operation, adjustment, and maintenance of hydrocarbon-fueled single cylinder and multicylinder internal combustion engines. Topics include engine cycles, fuels, lubricants, carburetion, fuel injection systems, ignition, charging circuits, pollution control methods, valve reconditioning, and engine testing.
- 315 Electricity on the Farm** Spring. 3 credits. Prerequisite: Agricultural Engineering 131, Physics 102, or equivalent.
Lec, T R 10:10; lab, T or R 1:25-4:25.
D. C. Ludington.
The application of electricity for light, heat, and power on farms, with emphasis on the principles of the operation, selection, and installation of electrical equipment for the farmstead.
- 321 Soil and Water Conservation** Spring. 2 credits. Must be taken with Agronomy 321. S-U grades optional.
Lec, F 8; disc-lab, M or T 1:25-4:25 (additional labs offered if enrollment requires it). R. D. Black.
A study of the principles and practices used in the solution of soil and water conservation problems. Both farm and nonfarm problems are explored. Engineering aspects of erosion control, water management, water storage, and drainage are examined.
- 325 Introduction to Environmental Pollution** Spring. 3 credits. S-U grades optional.
M W F 9:05. Staff.
A general course dealing with impairment of the environment by human wastes. The causes and effects of air, water, and soil pollution are discussed. Fundamental factors underlying waste production, abatement, treatment, and control are included. Wastes from urban, rural, and industrial areas are used to illustrate the factors.
- 331 Farmstead Production Systems** Fall. 3 credits. S-U grades optional.
M W F 8. R. T. Lorenzen.
A study of layout, material handling, and environment associated with agricultural production on the farmstead. Planning and design techniques pertaining to biointrinsic and integrated systems are emphasized.
- 332 Farm Buildings Design** Fall. 2 credits. Prerequisite: concurrent or previous registration in Agricultural Engineering 331.
Lec-lab, R 1:25-4:25. R. T. Lorenzen.
Structural design of buildings used for farmstead production systems. Wood is emphasized as a structural material. For students with no background in statics or properties of structural materials.
- 371 Introduction to Hydrology** Spring. 2 credits. S-U grades optional.
Lec, R 9:05; lab, T 1:25-4:30. T. S. Steenhuis.
Elements of water and nutrient flow as applied to common problems. Emphasis is on understanding of hydrological cycle, runoff mechanism, and rainfall and runoff probabilities.
- 401 Career Development in Agricultural Engineering** Fall. 1 credit. Limited to seniors. S-U grades optional.
Lec, T 12:20. W. W. Gunkel.
A presentation and discussion of the opportunities and qualifications for and responsibilities of positions of service in the various fields of agricultural engineering.
- 414 Power Transmission Systems** Spring. 2 credits. Limited to 16 students. Prerequisite: Agricultural Engineering 312
Lec, F 12:20; lab, F 1:25-4:25. W. F. Millier.
A study of the principles and operation of hydraulic and mechanical power transmission systems used in agricultural tractors and equipment. Hydraulic power transmission includes system components, circuit diagrams, hydrostatic transmissions, and system analysis. Mechanical power transmission includes clutches, brakes, parallel shaft and planetary transmissions, traction, and drawbar horsepower.
- 461 Agricultural Machinery Design** Fall. 3 credits. Prerequisite: mechanical design or equivalent.
Lec, T R 10:10; lab, F 1:25-4:25. W. W. Gunkel.
The principles of design and development of

agricultural machines to meet functional requirements. Emphasis is given to computer-aided analysis and design, stress analysis, selection of construction materials, and testing procedures. Engineering creativity and agricultural machine systems are also stressed.

462 Agricultural Power Spring. 3 credits.

Prerequisite: dynamics and thermodynamics or equivalent.

Lec, T R 10:10; lab, F 1:25–4:25. W. W. Gunkel. Use of energy in agriculture. Emphasis is given to basic theory and analysis and testing of internal combustion engines and suitable components for use in farm tractors and other power applications. Soil mechanics related to traction and vehicle mobility; economics and human factors in design will be considered.

465 Processing and Handling Systems for Agricultural Materials Fall. 3 credits. Offered alternate years.

Lec, T R 11:15; lab, W 2:30–4:25. R. B. Furry. Drying, psychrometrics, fluid flow measurement, material handling applications, with an introduction to dimensional analysis and controls for agricultural applications. Problem solutions employ both analog and digital computers.

466 Engineering Design and Analysis of Food Processing Equipment Spring. 3 credits.

Prerequisite: Food Science 302, its equivalent, or concurrent enrollment in an engineering curriculum.

T R 9:05, W 1:25–4:25. G. E. Rehkugler. The analysis and design of food-processing equipment from the point of view of selecting and designing equipment appropriate for transporting or modifying a food product.

471 Soil and Water Engineering Fall. 3 credits.

Prerequisite: hydrology and fluids or permission of instructor.

Lec, T R 9:05; lab, R 2:30–4:25. M. F. Walter. The application of engineering principles to problems of soil and water management. Analysis and design of water management systems including hydraulic structures, channels, small reservoirs, and sediment control.

475 Introduction to Environmental Systems Analysis Fall. 3 credits. Prerequisite: a year of calculus.

M W F 11:15. D. A. Haith. Introduction to systems analysis and its application to environmental quality management. Simulation, linear programming, and dynamic programming applied to problems in water and air pollution control, solid waste disposal, agricultural wastes, etc.

481 Agricultural Structures Design Spring. 3 credits. Prerequisite: Engineering CEE G301.

Lec, T R 1:25; disc-lab, R 2:30–4:40. R. T. Lorenzen. Application of basic structural concepts to design of agricultural structures. Emphasizes wood structures, including design of trusses, rigid frames, prefabricated panels, and columns.

482 Environmental Control for Animals and Plants Spring. 3 credits. Prerequisite: thermodynamics.

Lec, M W 11:15; lab, F 1:25–4:25. L. D. Albright. Thermal interchanges between animals (including humans) and plants and the environment. Physiological principles affecting thermal comfort and health. Ventilation, thermal modeling, psychrometrics, solar energy, and weather phenomena.

491 Highway Engineering Fall. 3 credits.

Prerequisite: Engineering CEED301 or permission of instructor.

Lec, W F 12:20; lab, M 12:20–3:20. L. H. Irwin. Highway systems, planning, economy analysis, road location and geometric design, traffic engineering,

drainage design, and soil engineering. Introduction to highway materials, pavement design, and highway maintenance.

492 Bituminous Materials and Pavement Design

Spring. 3 credits. Prerequisite: concurrent registration in Engineering CEED301 or permission of instructor.

Lec, W F 12:20; lab, M 12:20–3:20. L. H. Irwin. Properties of asphalts, aggregates, and bituminous mixtures; bituminous mixture design. Seal coat and surface treatment design. Soil stabilization methods. Flexible pavement design methods, rigid pavement design methods, pavement design for frost conditions.

497 Special Problems in Agricultural Engineering Fall or spring. 1 credit or more.

Normally reserved for seniors in upper two-fifths of their class.

Undergraduates must attach to their course enrollment material written permission from the staff member who will supervise the work and assign the grade. Prerequisite: adequate ability and training for the work proposed.

Staff.

Special work in any area of agricultural engineering on problems under investigation by the department or of special interest to the student, provided, in the latter case, that adequate facilities can be obtained.

501–502 M.P.S. Project Fall and spring. 1–6 credits. Required of each M.P.S. candidate in the field.

Hours to be arranged. Staff. A comprehensive project utilizing applied problems pertinent to agricultural engineering.

551–552 Agricultural Engineering Design Project

Fall and spring. 6 credits. Prerequisite: admission to the M.Eng.(Agr.) degree program or equivalent preparation.

Hours to be arranged. L. D. Albright and staff. Comprehensive design projects dealing with existing engineering problems in the field. Emphasis is on the formulation of alternative design proposals that include consideration of economics, nontechnical factors, engineering analysis, and complete design for the best design solution.

[651 Similitude Methodology Fall. 3 credits. Not offered 1980–81.

Lecs, M W 8; lab to be arranged. R. B. Furry. Similitude methodology, including the use of dimensional analysis to develop general equations to define physical phenomena; model theory, distorted models, and analogies, with an introduction to a variety of applications in engineering.]

652 Instrumentation Spring. 3 credits.

Prerequisite: electrical systems or permission of instructor.

Lecs, T R 12:20; lab to be arranged. N. R. Scott. The application of instrumentation concepts and systems to physical and biological measurements. Characteristics of instruments, signal conditioning and interfacing, shielding and grounding, transducers, data acquisition systems; microprocessors, and radiotelemetry are considered.

[672 Drainage Engineering Spring. 4 credits.

Prerequisite: Agricultural Engineering 471 or permission of instructor. Offered alternate years. Not offered 1980–81.

Lecs, M W F 10:10; lab, F 1:25–4:25. T. S. Steenhuis, R. D. Black. Analysis and design of surface, subsurface, and combined drainage systems, with emphasis on agricultural applications. The elements of surface, channel, and porous media flow are analyzed, as well as entire systems of collectors, storages, pumps, and methods of overflow protection for large areas. Effect of drainage on water quality is reviewed.]

673 Irrigation Engineering Spring. 3 or 4 credits. Prerequisites: Agronomy 200 and Agricultural Engineering 471 or permission of instructor. Offered alternate years.

Lecs, M W F 10:10; lab, F 1:25–4:25. R. D. Black, T. S. Steenhuis. Analysis and design of irrigation systems. Soil-plant-water relationships, water quality, water supplies, water delivery systems, and water distribution system are analyzed.

677 Treatment and Disposal of Agricultural Wastes Fall. 3 credits. Prerequisite: permission of instructor.

3 lecs, hours to be arranged. R. C. Loehr. Emphasis is on the causes of agricultural waste problems and the application of fundamentals of treatment and control methods to minimize related pollution. Fundamentals of biological, physical, and chemical pollution control methods are applied to animal, food production, and food-and-fiber-processing wastes, using examples of designs of management systems.

678 Nonpoint Source Water Quality Models

Spring. 1–3 credits. Limited to upperclass or graduate students. Prerequisites: computer programming, a year of calculus, and permission of instructor. S-U grades optional.

Lecs, M W F 9:05. D. A. Haith. Mathematical models for analysis of agricultural and urban nonpoint sources. Three 1-credit sequential units: (1) stormwater models—computer models of runoff and moisture balances; (2) basic nonpoint source models—simple models for urban and agricultural runoff, land application of wastes; (3) agricultural simulation models—pesticides, nutrients, and salinity.

679 Use of Land for Waste Treatment and Disposal

Spring. 3 credits. Prerequisite: permission of instructor.

Lecs, T R 3:35–4:50. Staff. Covers the socio-legal-technical factors, the properties of land and crop systems that make land application of wastes a viable alternative, and the use of fundamentals in the development of regulations and the design of full-scale units.

685 Biological Engineering Analysis Fall.

4 credits. Prerequisite: Engineering T&AM 311 or permission of instructor.

T R 10:10–11:40. R. E. Pitt. Engineering problem-solving strategies and techniques are explored. The student solves several representative engineering problems that inherently involve biological properties. The mathematical modeling emphasizes problem formulation and interpretation of results. The student's knowledge of fundamental principles is used extensively. Principles of feedback control theory are applied to biological systems.

700 General Seminar Fall. Noncredit.

M 12:20. N. R. Scott. Presentation and discussion of research and special developments in agricultural engineering and related fields.

701 Special Topics in Agricultural Engineering

Fall or spring. 1–6 credits. Prerequisite: permission of instructor. S-U grades optional.

Hours to be arranged. Staff. Topics are arranged by the staff at the beginning of the term.

750 Orientation for Research Fall. 1 credit.

Limited to newly joining graduate students. S-U grades only.

Lecs: first 5 weeks, M 3:20; remainder, M R.

G. E. Rehkugler. An introduction to departmental research policy, programs, methodology, resources, and degree candidates' responsibilities and opportunities.

761 Power and Machinery Seminar Spring. 1 credit. Limited to graduate students. Prerequisite: permission of instructor. S-U grades only.

Hours to be arranged. W. W. Gunkel.
Study and discussions of research and new developments in agricultural power and machinery.

771 Soil and Water Engineering Seminar Fall or spring. 1-3 credits. Prerequisite: graduate status or permission of instructor. S-U grades optional.

Hours to be arranged. Staff.
Study and discussion of research or design procedures related to selected topics in irrigation, drainage, erosion control, hydrology, and water quality.

[775 Agricultural Waste Management Seminar Spring. 1 credit. Prerequisite: permission of instructor. S-U grades only. Not offered 1980-81.

Hours to be arranged. Staff.
Management of agricultural wastes, with emphasis on physical, chemical, biological, and economic factors affecting waste production, treatment and handling, utilization, and disposal.]

781 Agricultural Structures and Related Topics Seminar Spring. 1 credit. Prerequisite: graduate status or permission of instructor. S-U grades only.

Disc to be arranged. L. D. Albright.
Consideration of farmstead production systems, with emphasis on biological, economic, environmental, and structural requirements.

785 Biological Engineering Seminar Spring. 1 credit. Prerequisite: graduate status or permission of instructor. S-U grades only.

Disc to be arranged. N. R. Scott, J. R. Cooke.
The interaction of engineering and biology, especially the environmental aspects of plant, animal, and human physiology, are examined in order to improve communication between engineers and biologists.

Agronomy

R. F. Lucey, chairman; M. Alexander, W. H. Allaway, D. R. Bouldin, B. E. Dethier, W. B. Duke, J. M. Duxbury, G. W. Fick, D. L. Grunes, W. K. Kennedy, W. R. Knapp, W. W. Knapp, J. Kubota, D. J. Lathwell, A. C. Leopold, D. L. Linscott, M. B. McBride, R. D. Miller, R. L. Obendorf, G. W. Olson, A. B. Pack, D. A. Paine, J. H. Peverly, W. S. Reid, S. J. Riha, T. W. Scott, R. R. Seaney, T. L. Setter, P. L. Steponkus, F. N. Swader, A. Van Wambeke, R. M. Welch, M. J. Wright, R. W. Zobel

Atmospheric Sciences

101 Basic Principles of Meteorology Fall. 3 credits. Limited to 140 students.

Lecs, T R 11:15; lab, M T W or R 1:25-4:25.
B. E. Dethier.

A simplified treatment of the structure of the atmosphere: heat balance of the earth; general and secondary circulations; air masses, fronts, and cyclones; hurricanes, thunderstorms, tornadoes, and atmospheric condensation. In the lab, emphasis is on techniques of analysis of weather systems.

103 Basic Principles of Meteorology, Laboratory Fall. 1 credit. Prerequisite: an introductory course in meteorology without a lab.

M T W R 1:25-4:25. B. E. Dethier.
Techniques of analysis of weather systems and the application of dynamical and empirical methods of predicting the daily atmospheric circulation.

202 Dynamic Climatology Spring. 3 credits. Prerequisite: Atmospheric Sciences 101.

M W F 11:15. B. E. Dethier.
The first part of the course is devoted to a description of world climates in terms of global distribution of radiation, temperature, pressure, and wind;

precipitation; and air masses. The second part of the course relates climates and climatic anomalies to planetary, regional, and local circulations.

314 Agricultural Meteorology Spring. 3 credits. Limited to 35 students.

T R 10-11:25. A. B. Pack.
An introduction to the relationships of radiant energy, temperature, wind, and moisture in the atmosphere near the ground. The interplay between physical processes of the atmosphere, plant canopies, and soil is examined. Moisture relationships in the atmosphere-soil-plant continuum, the effects of environmental modification, and the bioclimatic requirements of plants are also discussed.

325-326-327-328 Meteorological Communications 325 and 327, fall; 326 and 328, spring. 1 credit each semester. Primarily for undergraduate meteorology majors. S-U grades optional.

Hours to be arranged. Staff.
The student becomes acquainted with facsimile, teletype, and satellite receiving equipment and the data products used in weather forecasting.

411-412 Theoretical Meteorology I and II Fall and spring. 3 credits each semester. Prerequisites: a year each of calculus and physics; 411 is prerequisite to 412 unless permission is obtained from instructor.

M W F 10:10. W. W. Knapp.
Topics include thermodynamics of dry air, water vapor, and moist air; hydrostatics and stability; meteorological coordinate systems; variation of wind and pressure fields in the vertical; winds in the planetary boundary layer; surfaces of discontinuity; mechanisms of pressure change; vorticity and circulation.

417 Physical Meteorology Fall. 3 credits. Prerequisite: a year each of calculus and physics. Offered alternate years.

M W F 12:20. W. W. Knapp.
Primarily a survey of natural phenomena of the atmosphere, with emphasis on their underlying physical principles. Topics include composition and structure of the atmosphere, atmospheric optics, acoustics and electricity, solar and terrestrial radiation, and principles of radar probing of the atmosphere.

430 Synoptic Meteorology Spring. 4 credits. Prerequisites: either Atmospheric Sciences 411 and 412 or permission of instructor.

Lecs, M R 1:25; lab, R 2:30-4:25. D. A. Paine.
The application of quasi-geostrophic theory as a diagnostic and forecast method, including the use of minicomputer products derived from the barotropic, baroclinic, and primitive equation numerical models. Lab work includes surface and upper air analyses and thickness and vorticity computations using radiosonde data documenting macroscale cyclogenesis.

432 Isentropic Theory and Analysis Spring. 4 credits. Prerequisite: Atmospheric Sciences 430 or permission of instructor.

Lecs, T F 1:25; lab, T 2:30-4:25. D. A. Paine.
The conservation laws for mass, energy, and momentum in constant entropy coordinates. Derivation and construction of adiabatic versus diabatic trajectories. Ertel's potential vorticity theorem evaluated by the quasi-Lagrangian trajectory technique. The lab employs the Atmospheric Sciences 430 storm data to contrast constant pressure and isentropic methods of analysis.

464 Biometeorology Spring. 2 credits. Prerequisite: with permission of the instructor (no course prerequisites).

Lec, W 1:25; lab, W 2:30-4:25. D. A. Paine.
Interactivity between the atmosphere and biosphere is of central concern when considering many of the challenges of this decade, such as acid rain, severe

winter cold stress, fossil fuel burning, and CO₂ increase. Empirical and theoretical models of such interactivity will be presented. A systems-level approach to environmental protection decisions will be emphasized.

499 Undergraduate Research in Meteorology Fall and spring. 1-3 credits.

Staff.
Required of honor students in the physical sciences majoring in meteorology.

650 Special Topics in Meteorology and Climatology Fall or spring. 1 or more credits.

Staff.
A study of meteorological topics more advanced than or different from those in other courses. Subjects depend on the background and desires of those enrolled.

691 Seminar in Meteorology Fall or spring. Prerequisite: permission of instructor.

Hours to be announced. B. E. Dethier.
Subjects such as weather modification, paleoclimatology, and atmospheric pollution.

962 Research in Meteorology Fall or spring. 1 or more credits.

Staff.
Thesis research.

Crop Science

311 Grain Crops Fall. 4 credits. Prerequisite: Agronomy 200 or Biological Sciences 241.
Lecs, M W F 10:10; lab, M T or W 1:24-4:25. One or two field trips during lab periods (until 5 p.m. or on weekends). Fall, R. L. Obendorf.

Principles of field crop growth, development and maturation, species recognition, soil and climatic adaptations, liming and mineral nutrition, weed control, cropping sequences, management systems, and crop improvement are considered. Grain, protein, fiber, and sugar crops are emphasized.

312 Forage Crops Spring. 4 credits. Prerequisites: Agronomy 200 or Biological Sciences 241. Recommended: Animal Science 112.

Lecs, M W F 11:15; lab, M T or W 1:24-4:25. One field trip during a lab period (until 5 p.m.) or on a weekend. G. W. Fick.
The production and management of crops used for livestock feed are considered in terms of establishment, growth, maintenance, harvesting, and preservation. Forage grasses, forage legumes, and corn are emphasized, and consideration is given to their value as livestock feed in terms of energy, protein, and other nutritional components.

314 Production of Tropical Crops Spring. 3 credits. Prerequisite: a course in crop production.

Lecs, M W F 10:10. M. J. Wright.
An introduction to the characteristics and culture of the principal food staple crops of the tropics and subtropics and of some of the crops grown for export. Vegetables and fruits are not emphasized.

315 Weed Science Fall. 3 credits. Prerequisites: Agronomy 200, and Biological Sciences 103 and 104 or Biological Sciences 241.

Lecs, T R 8; lab, M T or W 2-4:25. W. B. Duke.
Principles of weed science are examined. Emphasis is given to (A) weed ecology; (B) chemistry of herbicides in relation to effects on plant growth; and (C) control of weeds in all crops. Lab covers weed identification, herbicide selectivity, herbicide injury symptoms, and farm pesticide problem solving.

[317 Seed Science and Technology Fall. 3 credits. Prerequisite: Biological Sciences 241 or equivalent. Offered alternate years. Not offered in 1980-81.

Lecs, T R 11:15; lab, R 1:25-4:25. R. L. Obendorf.
The principles and practices involved in the production, harvesting, processing, storage, testing,

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quality management, certification, and use of high quality seed from improved cultivars. Information will be applicable to various kinds of agricultural seeds.]

371 Undergraduate Research in Crop Science

Fall or spring. Credit to be arranged. Written permission from the staff member who will supervise the work and assign the grade must be attached to course enrollment material.

Hours to be arranged. Staff.
Independent research on current problems selected from any phase of crop science.

[610 Physiology of Environmental Stresses

Spring. Prerequisite: Biological Sciences 242 or 341. 3 credits. Offered alternate years. Not offered 1980-81.

Lecs, T R 10:10. P. L. Steponkus.
A study of the responses of plants to environmental stresses, including chilling, freezing, high temperature, and drought. Emphasis is on the physiological and biochemical basis of injury and plant resistance mechanisms at the whole-plant, cellular, and molecular levels.]

[611 Crop Simulation Modeling

Fall. 3 credits. Prerequisite: Biological Sciences 242 or 341. Recommended: Computer programming experience. Offered alternate years. Not offered 1980-81.

M W F 11:15. G. W. Fick.
A study of existing crop models is followed by development and refinement of programs representing the students' work. The computer language CSMP is used. Emphasis is on quantitative formulation and testing of complex hypotheses related to crop growth. Carbon exchange, transpiration, microclimate, soil water supply, root functions, and dry-matter distribution in growing crops are covered.]

612 Grain Formation

Spring. 3 credits. Prerequisite: plant physiology.
M W F 12:20. R. L. Obendorf.
Morphology, physiology, and biochemistry of cereal, legume, and oil seed formation, composition, storage, and germination. Emphasis will be on the deposition of seed reserves during seed formation, stabilization of reserves during storage, and mobilization of reserves during germination. Coverage will range from practical, "on-farm" problems to molecular biology.

[613 Ecology and Physiology Yield

Fall. 2 credits. Prerequisites: Agronomy 111 and 200 and Biological Sciences 242. Offered alternate years. Not offered 1980-81.

Two 2-hour class meetings a week for last 10 weeks, hours to be arranged. T. L. Setter.
A study of special techniques used to obtain and analyze physiological data on crop plant responses to environmental conditions occurring in the field.]

651 Special Topics in Crop Science

Fall or spring. 1-6 credits. S-U grades optional. Undergraduates must attach to their course enrollment material written permission from the staff member who will supervise the work and assign the grade.

Hours to be arranged. Staff.
The topic is arranged at the beginning of the term for individual study or for group discussions.

761 Graduate Research in Crop Science

Fall, spring, or summer. Credit by arrangement. Limited to members of the graduate field.
Hours to be arranged.

790 Agronomy Seminar

Noncredit.
See course description in soil science section below.

Related Courses in Other Departments

Forages of the Tropics for Livestock Production (Animal Sciences 403)

Special Studies of Problems of Agriculture in the Tropics (International Agriculture 602)

Soil Science

200 Nature and Properties of Soils Fall or spring. 4 credits. Prerequisite: Chemistry 103, 207, or 215. S-U grades optional.

Lecs, M W F 9:05; lab, M T W or R 1:25-4:25. Fall, D. J. Lathwell; spring, T. W. Scott.

A comprehensive introduction to the field of soil science, with emphasis on scientific principles and their application in solutions of practical soil management problems.

301 Identification, Appraisal, and Geography of Soils

Fall. 4 credits. Prerequisite: Agronomy 200 or permission of instructor. S-U grades optional.

Lec, M W F 10:10; lab, W 2-4:25; field trips. Staff.
The soil as a natural body. Principles of identification and classification of geographic units of soil and interpretation of such units for applied objectives. Geography of major kinds of soil of North America in relation to environment and cultural patterns. Lab exercises and field trips to assist in identifying and interpreting soils.

302 Field Identification of Soils

Fall. 1 credit. Prerequisite: Agronomy 200.
R 1:25-4:25. Staff.
The principles for field identification of soil properties, profiles and landscapes are presented. A series of soil pits will be examined, described, classified, and interpreted in the field.

321 Soil and Water Conservation

Spring. 2 credits. Prerequisites: Agronomy 200 and concurrent registration in Agricultural Engineering 321. S-U grades optional.

M W 8. W. H. Alloway.
A study of the principles and practices used in soil and water conservation, agronomic aspects of erosion control, water management, storage, drainage, and irrigation.

324 Soil Fertility Management

Fall. 3 credits. Prerequisite: Agronomy 200 or permission of instructor.
M W F 9:05. D. R. Bouldin.
An integrated discussion of soil-crop yield relationships, with emphasis on the soil as a source of mineral nutrients for crops and the role of fertilizers and manure in crop production.

331 Aquatic Plant Management

Fall. 3 credits. Prerequisites: Biological Sciences 101-102 and Chemistry 103-104 or equivalents.
T R 11:15; T 1:25-4:25. J. H. Peverly.
The chemistry and physiology of higher aquatic plants are studied, from the inorganic solid, solution, and gaseous phases of the environment to cellular and subcellular levels of plants. Application of the basic physical and chemical concepts, presented to predict effects on aquatic plant growth, are illustrated in lab and field situations.

401 Geography and Appraisal of Soils of the Tropics

Spring. 3 credits. Prerequisite: Agronomy 200 or equivalent. S-U grades optional.
Lecs, W F 12:20; disc, F 2:30-4:25. A. Van Wambeke.
The character of principal kinds of soils in the major regions of the tropics. Soil properties are related to the position in the landscape and to profile genesis. Emphasis is on soil properties as a basis for interpretation of crop management requirements and production potential. Lectures introduce principles

whose applications are examined through discussions, problem solving, and independent reading.

403 Organic Soils

Fall. 2 credits. Prerequisite: Agronomy 200. Offered alternate years.
W 1:25-4:25; some field trips will not return before 5:30. J. M. Duxbury.
A combination of field study and discussion of the genesis, ecology, physical and chemical properties, agricultural uses, and management of organic soils.

404 Forest Soils

Fall. 2 credits. Prerequisite: Agronomy 200 or permission of instructor.
Lecs, T R 8; lab, M or W 2:25-4:25. Some field trips may not return before 5:30. S. J. Riha.
Ecology of forest soils. Application of basic physical and chemical principles to the study of energy, water, and nutrient budgets of forest ecosystems. Implications for forest management. Labs consist of field trips and problem solving.

[406 Soil Microbiology, Lectures

Spring. 3 credits. Prerequisite: Agronomy 200 or Microbiology 290. Offered alternate years. Not offered 1980-81.
M W F 10:10. M. Alexander.
A study of the major groups of soil microorganisms, their ecological interrelationships, and the biochemical functions of soil organisms.]

410 Microbial Ecology

Spring. 3 credits. Prerequisite: an elementary course in some facet of microbiology. Offered alternate years.
M W F 10:10. M. Alexander.
An introduction to the basic principles of microbial ecology. Attention is given to the behavior, activity, and interrelationships of bacteria, fungi, algae, and protozoa in natural ecosystems.

480 Management Systems for Tropical Soils

Spring. 3 credits. Prerequisite: Agronomy 401 or permission of instructor. S-U grades optional. Offered alternate years.
Lec, W F 8; disc, W 2:30-4:25. A. Van Wambeke.
Land evaluation in tropical areas; water requirements in semiarid tropics. Management of tropical soils in relation with nitrogen, acidity, liming, phosphorus, and other nutrients. Effects of cropping systems on soils, soil conservation methods, and erosion control.

497 Special Topics in Soil Science

Fall or spring. 1-6 credits. S-U grades optional. Undergraduates must attach to their course enrollment material written permission from the staff member who will supervise the work and assign the grade.
Hours to be arranged. Staff.
The topics are arranged at the beginning of the term for individual study or for group discussions.

499 Undergraduate Research in Soil Science

Fall or spring. Credit to be arranged. Written permission from the staff member who will supervise the work and assign the grade must be attached to course enrollment material.
Hours to be arranged. Staff.
Independent research on current problems selected from any phase of soil science.

[506 Use of Soil Information and Maps as Resource Inventories

Fall. 2 credits. S-U grades optional. For anyone interested in using soils. Offered alternate years. Not offered 1980-81.
T R 11:15. G. W. Olson.
Principles, practices, and research techniques in interpreting soil information and maps for planning, developing, and using areas of land.]

602 Chemical Methods of Soil Analysis

Spring. 3 credits. Prerequisites: Agronomy 200 and Chemistry 207-208 or equivalents.
T R 1:25-3:30. M. B. McBride.
Lectures and lab exercises present the fundamental concepts and analytical methods of soil chemistry.

603 Morphology, Genesis, and Classification of Soils Spring. 3 credits. Prerequisite: Agronomy 301 or permission of instructor. Offered alternate years.

T R 10:30-12. Staff.

Principles of soil classification, reactions, and processes of soil genesis, soil taxonomy, and development and significance of major groups of soils of the world.

606 Advanced Soil Microbiology Fall. 1 credit. Prerequisite: Agronomy 406 or permission of instructor. S-U grades only for graduate students.

T 12:20. M. Alexander.

Discussions of current topics in special areas of soil microbiology. Particular attention is given to biochemical problems in microbial ecology.

607 Soil Physics Fall. 3 credits. Prerequisites: Agronomy 200 and a year of college physics or permission of instructor. Offered alternate years.

M W F 11:15. R. D. Miller.

A study of physical properties and processes in soils, with emphasis on basic principles.

608 Water Status in Plants and Soils Fall. 2 credits. Prerequisite: permission of instructor. S-U grades optional. Offered alternate years.

Lec, 1 hour to be arranged; lab, R 1:25-4:25 or as arranged. R. D. Miller, T. L. Setter.

Techniques for field appraisal of the status of water in plants and soil, including methods used in evapotranspiration studies.

[609 Soil Organic Matter Fall. 2 credits. Prerequisites: Agronomy 200 and Chemistry 357-358 or equivalent. Offered alternate years. Not offered 1980-81.

T R 9:05. J. M. Duxbury.

A discussion of current concepts of the nature, mode of formation, dynamics, and role of organic matter in soils. Some consideration is given to the behavior of manufactured organic chemicals in the soil environment.]

701 Soil Chemistry and Mineralogy Fall. 3 credits. Prerequisites: Agronomy 200 and a year of physical chemistry, or permission of instructor. Offered alternate years.

T R 10:10-11:25. M. B. McBride.

Chemical properties of soils, with emphasis on structure and surface chemistry of soil minerals, ion exchange, mineral-solution equilibria, and adsorption reactions of soil clays and oxides.

724 Soil Fertility Advanced Course Spring. 3 credits. Prerequisite: graduate status with a major or minor in agronomy. Offered alternate years.

T R 8:30-9:55. D. R. Bouldin.

A study of selected topics in soil-crop relationships, with emphasis on concepts of soil fertility, interpretation of experimental data, and soil fertilizer chemistry.

760 Graduate Research in Soil Science Fall or spring. Credit by arrangement. Limited to students in the graduate field.

Hours by arrangement.

790 Agronomy seminar Fall or spring. Noncredit. Required of graduate students majoring or minoring in the department.

T 4.

Related Course in Another Department

Special Studies of Problems of Agriculture in the Tropics (International Agricultural Development 602)

Animal Sciences

Department of Animal Sciences: R. J. Young, chairman; H. R. Ainslie, B. J. Appar, D. E. Bauman, D. H. Beermann, R. D. Boyd, W. F. Brannon, W. R. Butler, L. E. Chase, W. B. Currie, J. M. Elliot, R. W. Everett, R. H. Foote, D. G. Fox, R. C. Gorewit, W. Hansel, H. F. Hintz, D. E. Hogue, R. E. McDowell, W. G. Merrill, R. P. Natzke, E. A. Oltenacu, P. A. Oltenacu, R. L. Quaas, S. W. Sabin, H. F. Schryver, S. T. Slack, D. R. Smith, C. J. Sniffen, J. R. Stouffer, M. L. Thonney, H. F. Travis, D. R. Van Campen, N. L. VanDemark, P. J. Van Soest, L. D. VanVleck, R. G. Warner

Department of Poultry Sciences: R. C. Baker, chairman; R. E. Austic, S. E. Bloom, G. F. Combs, Jr., D. L. Cunningham, R. R. Dietert, H. G. Ketola, J. A. Marsh, C. E. Ostrander, J. M. Regenstein, E. A. Schano, A. van Tienhoven

100 Introductory Animal Science Fall. 3 credits. For beginning students. S-U grades optional.

Lecs, W F 10:10; lab, T R or F 2-4:25. J. M. Elliot. An introduction to animal science dealing with domestic animals and with current practices and problems of the livestock and meat industries. The place of the physical and biological sciences in animal agriculture is discussed. Emphasis is on the nutrition, physiology, breeding, and management of dairy cattle, beef cattle, sheep, swine, and horses.

105 Contemporary Perspectives of Animal Science Spring. 1 credit. Limited to freshmen, sophomores, and first-year transfers.

T 1:25, W 12:20. Staff.

A forum to discuss the contemporary and future role of animals in relation to human needs and career planning.

112 Livestock Nutrition Spring. 4 credits.

Prerequisite: Chemistry 103 or 207. Recommended: Animal Science 100.

Lecs, M W F 10:10; lab, M T W R or F 2-4:25. D. E. Hogue.

An introduction to animal nutrition, covering fundamentals of nutrition, the composition of feeds, and feeding standards and their application to various forms of production in dairy and beef cattle, sheep, swine, and horses.

113 Nutrition of Companion Animals Fall, weeks 1-7. 1 credit. Prerequisite: Animal Science 112 or equivalent. S-U grades optional.

W 7:30-9:25 p.m. H. F. Hintz. Nutrition of companion animals, with emphasis on the dog and cat. Digestive physiology, nutrient requirements, feeding practices, and interactions of nutrition and disease.

200 Animal Physiology Fall. 3 credits. Limited to sophomores and juniors except with permission of instructor. Prerequisite: a year of college biology.

Lecs, M W F 9:05. W. B. Currie. General animal physiology with emphasis on physiologic concepts and the understanding of animal function in physiologic terms. Lectures and discussion sections are designed to encourage independent supportive study. Groups of students will prepare and present demonstrations on subjects of their own choosing to the class. This course provides a basis for the study of nutrition and production and the more specialized physiology courses in animal science.

220 Animal Reproduction and Development

Spring. 4 credits. Each lab limited to 36 students. Prerequisite: a year of college biology or equivalent.

Lecs, T R 9:05; demonstration and lab, M T W or R 2-4:25 or T 10:10-12:35 or F 12:20-2:45. R. H. Foote.

An introduction to the comparative anatomy and physiology of reproduction of farm animals. The life cycle from fertilization through development and

growth to sexual maturity is studied, with emphasis on physiological mechanisms involved, relevant genetic control, and the application to fertility regulation of animal and human populations. An audio-tutorial lab is available for independent study to prepare for lab experiments.

221 Introductory Animal Genetics Fall. 3 credits. Prerequisite: a year of college biology.

Lecs, T R 9:05; disc, W R or F 2-4:25. E. J. Pollak.

An examination of basic genetic principles and their application to the improvement of domestic animals, with emphasis on the effects of selection and mating systems on animal populations.

230 Poultry Biology Spring. 3 credits.

Lecs, T R 11:15; lab, W 2-4:25. Field trips during lab periods may last longer. G. F. Combs, Jr. Designed to acquaint the student with the scope of the poultry industry. Emphasis is on the principles of avian biology and their application in the various facets of poultry production.

250 Dairy Cattle Fall. 3 credits. S-U grades optional.

Lecs, T R 10:10; lab, M T R 1:25-4. Staff. Introduces the major components of the dairy industry. Topics discussed include breeding, feeding, reproduction, milking, milk secretion, replacement rearing, disease prevention, and record keeping. Laboratories are designed to provide limited practice in husbandry techniques.

251 Dairy Cattle Selection and Type Evaluation Spring. 3 credits.

Lab, W 12:20-4:25. 1 S all-day field trip. Staff. Emphasis on conformation characteristics for practice type to achieve wearability for high lifetime production. Practical sessions include planned trips to outstanding herds in the state.

265 Horses Spring. 3 credits. Prerequisite: Animal Science 100 or permission of instructor.

Lecs, T R 9:05; lab, R 1:25-4:25. H. F. Hintz, J. E. Lowe.

Selection, management, feeding, breeding, and training of light horses.

290 Meat and Meat Products Spring. 3 credits.

Lecs, T R 9:05; lab, M T or W 1:25-4:25. J. R. Stouffer.

An introduction to meat science through a study of the characteristics of meat from slaughter to consumption. Structure, composition, inspection, grading, preservation, cutting, and processing are included. A trip to commercial meat plants is taken.

321 Seminar on Genetics of the Horse Spring.

1 credit. Prerequisite: Animal Science 265 or permission of instructor. Recommended: Animal Science 221 or Biological Sciences 281.

T or W 9:05. L. D. VanVleck.

A discussion of genetics of the horse, with special reference to simply inherited traits and selection for quantitative traits.

330 Commercial Poultry Production Fall.

1 credit. Prerequisite: Animal Science 100, 230, or permission of instructor. Offered alternate years.

F 2-4:25. Field trips. D. L. Cunningham.

The course is designed to provide an understanding of what takes place and is required in a commercial egg production operation.

350 Dairy Cattle Production and Management

Spring. 3 credits for students with credit in Animal Science 250 or equivalent; otherwise 4 credits. Prerequisites: either Animal Science 112, 220, or 221 or permission of instructor. Recommended for students with limited dairy experience: Animal Science 250.

Lecs, M W F 9:05; lab, T W 1:25-4:25. 1 all-day field trip. W. G. Merrill, J. M. Elliot, L. D. VanVleck.

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Analysis of breeding, feeding, housing, and management systems for economical production; evaluation of milking systems, including principles of milk secretion and milking procedures. Includes farm visits to observe application of modern technology in operation.

352 Advanced Dairy Cattle Selection Fall. 3 credits. Prerequisite: Animal Science 251 and permission of instructor.

Practice hours to be arranged. S. T. Slack. Emphasis on additional training in comparative judging for students selected from Animal Science 251 to represent Cornell in intercollegiate judging competition.

360 Beef Cattle Spring. 3 credits. Prerequisite: Animal Science 100, 110, 220, 221, or permission of instructor.

Lecs, T R 10:10; lab, M T 2-4:25. M. L. Thonney. Emphasis is on the management of reproduction, nutrition, and selection in beef cattle enterprises. A cattle growth model is studied. Labs acquaint students with the management skills of a beef operation. Students are required to spend several days during the semester feeding, observing calving, and caring for cattle.

370 Swine Production Fall. 3 credits. Limited to 85 students; each lab limited to 45 students. Prerequisite: Animal Science 112, 220, 221 or permission of instructor.

Lecs, T R 11:15; lab, T or W 2-4:25. R. D. Boyd. The objective is to provide an opportunity to acquire practical knowledge and a technical basis for decisions in various types of swine enterprises. Emphasis on the various production systems, selection and breeding programs, reproductive management, nutrition, herd health and housing facilities. Labs are designed to extend and apply principles discussed in lecture and to provide students with the opportunity to perform management skills.

380 Sheep Fall. 3 credits. Prerequisite: Animal Science 100. Recommended: Animal Science 112, 220, and 221.

Lec, T R 10:10; lab and disc periods, M 1:25-4:25 every other week. D. E. Hogue. The breeding, feeding, management, and selection of sheep. Lectures and lab are designed to give the student a practical knowledge of sheep production as well as the scientific background for improved practices.

390 Meat Animal and Carcass Evaluation Fall. 2 credits. Prerequisite: Animal Science 100 or permission of instructor.

Lec and lab, W 2-4:25. J. R. Stouffer. Principles and techniques of meat animal and carcass evaluation. Grading standards, meat quality, and yield factors and criteria used to evaluate growth, development, and fattening will be covered in lectures and demonstrations.

400 Livestock Production in Warm Climates Spring. 3 credits. Prerequisite: either Animal Science 112, 220, or 221 or permission of instructor.

Lecs, T R 10:10; disc, W 1:25-3:20. R. E. McDowell. An analysis of the limitations the tropical environment imposes on livestock production; restrictions on contributions of animals to farm incomes owing to limitations in genetic potential; feed resources; and social structures. The role of animals on small farms and the interdependence of humans and animals for food, services, and nonfood products are stressed. The application of principles introduced in lectures are examined through discussions, problem solving, and independent study.

401 Seminar Dairy Production Spring. 1 credit. Limited to juniors and seniors.

Hours to be arranged. D. E. Bauman and staff. Students, with the help of faculty members, complete

a study of the research literature on topics of current interest in the dairy industry. Students make oral presentations of their findings.

402 Undergraduate Seminar Spring. 1 credit. Limited to advanced undergraduates. S-U grades optional.

Hours to be arranged. L. D. VanVleck. A study of literature pertinent to special topics in animal science. Students are required to review the literature and to present oral and written reports.

[403 Forages of the Tropics for Livestock Production Spring. 3 credits. Limited to seniors and graduate students except by permission of instructor. Prerequisites: crop production and livestock nutrition. Offered alternate years. Not offered 1980-81.

Lecs, T R 12:20; disc, T 1:25. R. E. McDowell, P. J. VanSoest.

A review of tropical grasslands, sown pastures, and fodders and their use as feed resources; grass and legume characteristics; establishment and management of pastures and feed source alternatives; forage quality and utilization; problems of utilization of tropical forages as hays and silages.]

410 Principles of Animal Nutrition, Lectures Fall. 3 credits. Prerequisite: organic chemistry. Recommended: biochemistry or concurrent registration in a biochemistry course.

M W F 8; M 4:30 for students with a scheduling conflict only. 2 discs to be arranged. R. G. Warner. The principles of nutrition are developed from a discussion of the biochemical and physiological interaction of the nutrients as they apply to the cell and the whole animal. Examples are selected from a broad range of animal species including humans.

411 Principles of Animal Nutrition, Laboratory Fall. 1 credit. Limited to 20 students. Prerequisite: concurrent registration in Animal Science 410.

Hours to be arranged. R. G. Warner, H. F. Hintz, R. E. Austic, H. F. Travis, G. F. Combs, Jr., H. F. Schryver, M. L. Thonney. Lab problems with animals introduce the student to techniques of experimental nutrition.

415 Poultry Nutrition Spring. 1 credit. Prerequisite: Animal Science 410 or permission of instructor.

F 11:15. G. F. Combs, Jr. A practical consideration of principles of nutrition applied to feeding poultry, including use of linear programming techniques in diet formulation.

419 Animal Cytogenetics Fall. 4 credits. Prerequisite: Animal Science 221, Biological Sciences 281, or permission of instructor.

Lec, T R 9:05; lab, T or W 1:25-4:25; 2 other hours to be arranged. S. E. Bloom. A study of normal and abnormal chromosomes in higher animals. Lecture topics include chromosome organization, chromosome movement, cytogenetics of abortuses, parthenogenesis, chromosomes and cancer, mitotic and meiotic errors, and human clinical cytogenetics. In labs students obtain chromosome preparations from various animals and use cytochemical and photographic methods for karyotype analysis.

420 Quantitative Animal Genetics Fall. 3 credits. Lec, T R 11:15; lab, W R or F 2-4:25. L. D. VanVleck.

A consideration of problems involved in improvement of animals, especially farm animals, through application of the theory of quantitative genetics with emphasis on selection index.

421 Seminar in Animal Genetics Fall. 1 credit. Prerequisite: Animal Science 221 or concurrent registration in Animal Science 420.

Hours to be arranged. L. D. VanVleck, R. W. Everett.

A discussion of applications of principles of

quantitative genetics and animal breeding to specific types of animals such as dairy animals, meat animals, and horses.

422 Research Techniques in Quantitative Animal Genetics Fall. 1 credit. Prerequisite: Animal Science 420 or concurrent registration in Animal Science 420. R 12:20. L. D. VanVleck.

An introduction to methods of research in quantitative genetics and animal breeding, including estimation of heritability, repeatability, and genetic and phenotypic correlations.

427 Fundamentals of Endocrinology Fall. 4 credits (3 credits without lab). Each lab limited to 55 students. Prerequisite: human or veterinary physiology, or permission of instructor.

Lecs, M W F 9:05; lab, T or R 1:25-4:25. W. R. Butler.

The physiology of the endocrine glands and the roles played by each hormone in the regulation of normal body processes. The laboratory work consists of a series of experiments designed to illustrate the basic principles of endocrinology.

430 Artificial Breeding of Farm Animals Fall, starting August 25. 2 credits. Prerequisites: Animal Science 220 and 221 or their equivalent. Permission of the instructor must be obtained at course enrollment.

Lecs, T R 9:05; labs, M T W R F 8:30-4:30 from August 25-29. R. H. Foote. Principles of artificial breeding and practical animal and laboratory experience in semen collection, semen evaluation, semen freezing, and artificial insemination of farm animals.

440 Application of Systems Analysis in Livestock Production Management Fall. 3 credits. Limited to 30 students. Prerequisites: Mathematics 105 and courses in livestock production or permission of instructor.

M W F 9:05. P. A. Oltenucu. All-embracing systems concepts are applied to livestock production management. The use of mathematical modeling and simulation in solving management problems is illustrated with practical cases. Emphasis is on the principles behind the systems approach and not the technique's methodology.

450 Immunophysiology Spring. 3 credits. Prerequisite: course work in immunology or animal physiology or permission of instructor.

Lecs, M W F 11:15. J. A. Marsh. Emphasis on the development and regulation of the immune system and the physiological parameters affecting and affected by immune functioning. Major topics include developmental immunology, immunoregulation, immunological involvement in reproduction and gonadal function, interrelationships between immune and endocrine functioning, and the immunology of aging. Other topics include tumor and transplantation immunology and autoimmune disease.

451 Physiology and Biochemistry of Lactation Spring. 3 credits. Prerequisite: either Animal Science 220 and Biological Sciences 231 or permission of instructor.

Lecs, T R 9:05; lab, R 2-4:25. R. C. Gorewit. Emphasis is on mammary gland development, anatomy, physiological control of milk secretion, and biochemical synthesis of milk constituents in lab and farm animals.

452 Comparative Physiology of Reproduction of Vertebrates (also Biological Sciences 452) Spring. 3 credits. Prerequisite: Animal Science 427 or permission of instructor.

Lecs, M W F 1:25. One prelim at 7:30 p.m. A. van Tienhoven. Sex and its manifestations. Neuroendocrinology of reproduction, sexual behavior, gametogenesis,

fertilization, embryonic development, care of the zygote environment and reproduction, immunological aspects of reproduction.

454 Comparative Physiology of Reproduction of Vertebrates, Laboratory (also Biological Sciences 454) Spring. 2 credits. Prerequisite: Animal Science 452, concurrent registration in Animal Science 452, or permission of instructor.

Hours to be arranged; organizational meeting F 2:30 first week of semester. A. van Tienhoven. Provides students with an opportunity to independently design and execute experiments with limited objectives.

486 Immunogenetics (also Biological Sciences 486) Spring. 3 credits. Limited to 25 students. Prerequisites: a course in immunology and Animal Science 221 or Biological Sciences 281, or permission of instructor.

Lecs, M W F 9:05; disc, W or R 12:20. R. R. Diert. The genetic control of a variety of cellular antigens and their use in understanding biological and immunological functions. The genetics of antibody diversity, antigen recognition, immune response, transplantation, and disease resistance.

490 (392) Commercial Meat Processing Fall. 3 credits. Prerequisite: Animal Science 290 or permission of instructor.

Lecs, T R 9:05; lab, M T or W 1:25-4:25. Field trip to commercial meat processing plants. D. H. Beermann.

A study of the classification, formulation, and production of commercially available processed meat products. Physical and chemical characteristics of meat and nonmeat ingredients, their functional properties, various methodologies, microbiology, packaging, handling and storage, and quality assurance are discussed.

497 Special Topics in Animal Sciences Fall or spring. 3 credits maximum. Intended for students in animal sciences. Prerequisite: permission of instructor. S-U grades optional.

Staff. May include individual tutorial study or a lecture topic selected by a professor. Since topics may change, the course may be repeated for credit.

498 (396) Undergraduate Teaching Fall or spring. 1 or 2 credits; 4 credits maximum during undergraduate career. Limited to students with grade point averages of at least 2.7.

Designed to consolidate the student's knowledge. A participating student assists in teaching a course allied with the student's education and experience. The student is expected to meet regularly with a discussion or lab section, to gain teaching experience, and regularly to discuss teaching objectives, techniques, and subject matter with the professor in charge.

499 (395) Undergraduate Research Fall or spring. 6 credits maximum during undergraduate career. Not open to students who have earned 6 or more undergraduate research credits elsewhere in the college. Limited to juniors and seniors with grade averages of at least 2.7.

Affords opportunities for students to carry out independent research under appropriate supervision. Each student is expected to review pertinent literature, prepare a project outline, conduct the research, and prepare a report.

600 Research Fall or spring. Credit to be arranged.

Hours to be arranged. All members of animal science program area.

601 Proteins and Amino Acids in Nutrition (also Nutritional Sciences 601) Fall. 2 credits.

Prerequisites: either physiology, biochemistry, and nutrition or permission of instructors.

W F 11:15. R. E. Austic, M. Morrison.

An advanced course in amino acid and protein nutrition with emphasis on the dynamic aspects of protein digestion, amino acid absorption, protein synthesis, amino acid metabolism, and nitrogen excretion. Discussions include nutritional interrelationships, amino acid and protein requirements, assessment of nutritional status, evaluation of protein quality, bioavailability of amino acids, and techniques of amino acid analysis. Emphasis is on basic principles and their application in animal and human nutrition.

604 Vitamins Fall. 2 credits.

T R 10:10. G. F. Combs, Jr. A discussion of the chemistry, biochemistry, and physiological functions of the vitamins, with emphasis on nutritional aspects.

605 Forages, Fiber, and the Rumen Spring.

4 credits. Prerequisites: either general nutrition and biochemistry or permission of instructor. M W F 12:20, F 1:25. P. J. Van Soest. Ruminant nutrition, lower-tract fermentation in monogastrics, nutritional biochemistry of forage plants, fiber, and cellulosic material.

609 Seminar in Poultry Biology Fall or spring.

Limited to graduate students. S-U grades only. Hours to be arranged. Staff. A survey of recent literature and research in poultry biology.

610 Seminar Fall and spring. 1 credit. Required of

all graduate students with a major or minor in animal science. S-U grades only. M 11:15. Department faculty.

613 Forage Analysis Spring. 2 credits.

Prerequisite: permission of instructor. Lab, R 2-4. P. J. Van Soest. Chemical composition and nutritive evaluation of forage plants and related materials. The course includes a term paper summarizing results of independent lab study of either materials or methods.

619 Field of Nutrition Seminar Fall or spring.

Noncredit. M 4:30. Current research in nutrition is presented by visitors and faculty.

620 Seminar in Animal Breeding Fall or spring.

1 credit. Limited to graduate students with a major or minor in animal breeding. S-U grades only. Hours to be arranged.

621 Seminar in Reproductive Physiology Fall and spring. 1 credit.

Hours to be arranged. R. H. Foote and staff. Topics in reproductive physiology and endocrinology are presented by staff, graduate students, postdoctorals, and outside speakers.

640 Special Topics in Animal Science Fall or

spring. 1 or more credits. Hours to be arranged. Staff. Study of topics in animal science more advanced or different from other courses. Subject matter depends on interests of students and availability of staff.

720 Experimental Methods in Quantitative Genetics and Animal Breeding Spring. 3 credits. Prerequisites: matrix algebra, linear models, and mathematical statistics.

Hours to be arranged. R. L. Quaas. Estimation of genetic and environmental parameters required to design efficient selection programs. Emphasis is given to interpretation of experimental and survey data with unequal subclass numbers and to prediction of genetic progress resulting from alternative selection methods.

Related Courses in Other Departments

Introductory Animal Physiology (Biological Sciences 314)

Introductory Animal Physiology Laboratory (Biological Sciences 319)

Milk Quality (Food Science 351)

Special Studies on Problems of Livestock Production in the Tropics (International Agriculture 602)

Lipids (Nutritional Sciences 602)

Poultry Hygiene and Disease (Veterinary Medicine 255)

Introductory Parasitology and Symbiology (Veterinary Medicine 330)

Medical Parasitology (Veterinary Medicine 331)

Systematics and Bionomics of Animal Parasites (Veterinary Medicine 332)

Health and Diseases of Animals (Veterinary Medicine 475)

Avian Diseases (Veterinary Medicine 555)

Atmospheric Sciences

Courses in atmospheric sciences are offered by the Department of Agronomy. See page 11.

Biological Sciences

See page 134.

Communication Arts

D. F. Schwartz, Chairman; N. E. Awa, R. D. Colle, R. H. Crawford, B. O. Earle, C. H. Freeman, D. A. Grossman, Bruce E. Harding, J. E. Hardy, J. E. Lawrence, R. D. Martin, R. E. Ostman, E. Owens, M. Richards, J. Rowe, T. M. Russo, M. A. Shapiro, R. E. Shew, V. R. Stephen, R. B. Thompson, W. B. Ward, S. A. White, A. M. Wilkinson

150 Writing for Media Fall. 3 credits. Limited to communication arts freshmen and first-year transfer students.

Lec, T 8; disc, W 12:20-2:15 or 2:30-4:25. M. A. Shapiro. Basic writing for print and broadcast. A back-to-basics approach to writing for clarity and style, using news and feature writing as a framework. Media form and style are analyzed. Frequent writing assignments, both in and outside of class, are given.

200 Theory of Human Communication Fall or spring. 3 credits. S-U grades optional.

Lecs, T R 12:20; disc to be arranged. Staff. An introduction to behavioral theories of communication from a multidisciplinary perspective. Contributions from the mass media, anthropology, sociology, psychology, social psychology, rhetoric, and cybernetics are considered.

205 Parliamentary Procedure Fall or spring. 3 credits. Limited to 40 nonfreshman students.

R 1:25-4:25. R. D. Martin. A study of the principles and practice of parliamentary procedure. Emphasis on practical experience and the importance of a well-run meeting as an integral component of effective communication.

16 Agriculture and Life Sciences

Includes recording of minutes, committee assignments, development of bylaws, and meeting evaluations.

210 Communicating Public Information Fall. 3 credits. For those not majoring in communication arts.

M W F 8. J. E. Lawrence.

Examines concepts, methods, techniques, and processes for communicating information to the general public. Explores use of public service time and space through broadcasting, films, publications, and other channels. Emphasis on basic understanding of media requirements and procedures in disseminating public information. Students design information programs.

215 Introduction to Mass Media Fall or spring. 3 credits. Limited to 190 nonfreshman students. S-U grades optional.

M W F 11:15. R. E. Ostman.

History, policies, philosophies, and practice of communication media. The effect of freedom of the press, ethics, libel, and slander on the day-to-day functioning of the media.

230 Visual Communication Fall. 3 credits. Limited to 100 nonfreshman and communication arts freshman students. Not recommended for art or design majors.

M W F 10:10. V. R. Stephen.

A basic course in the use and importance of visual communication methods and materials in today's society. Posters, charts, displays, photographs, slides, overhead projection, motion pictures, and television are among the topics discussed. Practical projects are assigned.

231 Art of Publication Spring. 3 credits. Each section limited to 30 nonfreshman students. Project materials cost about \$20-\$40.

M or W 1:25-4:25. V. R. Stephen.

A basic course designed to explore visual concepts that increase communication effectiveness through the printed word. The importance of selecting and coordinating format, layout, typography, and illustrations is stressed. Lectures, a field trip, in-class assignments, and three outside projects examine opportunities and problems in publication design and production.

301 Oral Communication Fall or spring. 3 credits. Each section limited to 24 sophomores, juniors, and seniors.

Discs, M W F 8, 9:05, 10:10, or 11:15; M T W 1:25; M W 9:05 and T 12:20; T R 9:05 and W 12:20; T R 9:05 and W 1:25; T R 10:10 and W 12:20; T R 10:10 and W 1:25; T R 10:10 and W 2:30; T R 11:15 and W 12:20; T R 11:15 and W 1:25 or T R 11:15 and W 2:30. B. O. Earle, R. D. Martin, E. Owens, M. Richards, J. Rowe, T. M. Russo, R. B. Thompson, and staff.

A study of the basic process and principles of oral communication. Through theory and practice, the student is encouraged to develop self-confidence and competence in public speaking. Provides experience in preparing, delivering, and evaluating oral presentations.

302 Persuasion Fall or spring. 3 credits.

Prerequisite: Communication Arts 301.

Lecs, M W F 11:15; discs, T R 11:15 or 12:20 or W F 11:15. In weeks discussion sections are held, there is no Wednesday or Friday lecture.

B. O. Earle.

The course concentrates on the analysis and understanding of the persuasion events around us. The oral presentations stress the application of various theories of persuasion to the interpersonal communication process.

303 Small Group Communication Fall. 3 credits.

Limited to juniors and seniors. Prerequisite:

Communication Arts 200 or permission of instructor.

T R 10:10; discs to be arranged. N. E. Awa.

Theory and practice in leadership and participation in small-group communication. The course examines the values and limitations of group discussion, collaborative behavior, and conflicts in a democracy.

311 Radio and Television Communication Fall. 3 credits.

M W F 9:05. R. D. Colle.

An overview of the roles of radio and television in contemporary society, with particular emphasis on the development, organization, and influence of these media in the United States. Attention is also given to the structure and uses of radio and television in other nations, to provide perspective on the systems here, and to the techniques and constraints involved in program production.

[312 Advertising and Promotion Fall or spring. 3 credits. Limited to 190 juniors, seniors, and graduate students. S-U grades optional. Not offered fall 1980.

T 1:25-4:25. R. E. Ostman.

Examines advertising principles and techniques from both a historical and an economic perspective. Advertising and promotion campaigns and their overall effectiveness as a multiplier in the economy are analyzed. Current advertising trends and the strategy of media planning are examined.]

314 Technical and Scientific Writing and Editing

Fall or spring. 3 credits. Sections limited to 20 nonfreshman students.

General sections, T R 9:05 and W 11:15, T R 10:10 and W 12:20, or M W F 9:05; biological sciences section, M W F 9:05; engineering and physical sciences section, T R 10:10 and W 12:20.

J. E. Hardy, A. M. Wilkinson.

Designed to develop skills in writing and editing scientific and technical information. Emphasis is on clarity, accuracy, and appropriate format. Students interpret scientific and technical information through the study of reports, instructions, brochures, and articles. One writing or editing assignment each week.

315 Basic Newswriting for Newspapers Fall and spring. 3 credits. Limited to 30 students. Prerequisite: major in communication or permission of instructor. Typing ability is essential.

R 1:25-4:25. R. E. Shew, director, News Bureau, Cornell University.

Writing and analyzing news stories. A study of the elements that make news, sources of news, interviewing, writing style and structure, new publishing techniques, press problems, and press-society relations.

316 Scientific Writing for the Mass Media Fall and spring. 3 credits.

Lec, M 9:05; disc, R 10:10-2:35.

Writing on scientific topics in the print and electronic media for a lay audience. Through frequent outside writing assignments, students will communicate complex technical information and issues and will use interviewing and research methods that ensure technical accuracy. Students will be familiarized with the public policy and institutional milieu that have an effect on science writing and will reflect that knowledge in their writing.

318 Radio Writing and Production Spring. 3 credits.

T 1:25-4:25. J. E. Lawrence.

Scripting and recording various public information formats for possible use on local and state radio stations. Students will create complete broadcasting plans and materials for public and private organizations.

319 Television Writing and Production Spring. 3 credits. Limited to 25 students. S-U grades optional.

R 1:25-4:25. R. D. Colle.

Creation of television information programs, from development of idea through research, scripting, and production.

380 Independent Honors Research in Social Science Fall or spring. 1-6 credits. Limited to undergraduates who have met the requirements for the honors program. A maximum of 6 credits may be earned in the honors program.

401 Communication Law Fall. 3 credits.

Limited to junior, senior, and graduate majors in communication arts; others by permission of instructor.

M W F 11:15. D. A. Grossman.

A practical survey of the law governing mass media for those working in the field. Coverage includes restraints on news gathering and publication, privacy, defamation, copyright, broadcast licensing, access, and the Fairness Doctrine.

[403 Topics in Communication Theory Fall. 3 credits. Prerequisite: Communication Arts 200 or permission of instructor. Offered alternate years. Not offered 1980-81.

Topics in communication theory, determined by the interest of faculty and students, are discussed.]

[404 Psychology of Communication Spring. 3 credits. Prerequisite: Communication Arts 200 or permission of instructor. Not offered 1980-81.

M W F 9:05. N. E. Awa.

An advanced multidisciplinary study of communication theory. Topics include personal interaction, channels of communication, and effectiveness of message. Study includes intensive analysis of primary sources of major communication theorists.]

413 Writing for Magazines Fall or spring. 3 credits. Limited to juniors, seniors, and graduate students.

M 1:25-4:25. Fall, W. B. Ward; spring,

M. A. Shapiro.

Intensive fact writing to help students communicate more effectively through the medium of the printed word in magazines. Art and techniques of good writing are studied; magazines in many fields of interest are reviewed. All articles are analyzed and returned to the student to rewrite and submit to a magazine.

420 Print Media Laboratory Fall. 3 credits. Limited to junior, senior, and graduate communication arts majors. Prerequisite: Communication Arts 231, 314, or 413.

R 1:25-4:25. J. E. Hardy, V. R. Stephen.

Writing, editing, and layout principles practiced in publishing the *Cornell Countryman*. Some additional outside work sessions may be required.

421 Broadcast Media Laboratory Fall. 2 credits.

Limited to junior and senior communication arts majors. Prerequisite: Communication Arts 318 or 319.

T 1:25-4:25. R. D. Colle.

Emphasis on production of television and radio programs for various audiences.

422 Print Media Laboratory Spring. 3 credits.

Limited to junior, senior, and graduate communication arts majors. Prerequisite: Communication Arts 231, 314, or 413.

R 1:25-4:25. J. E. Hardy and V. R. Stephen.

A continuation of Communication Arts 420.

423 Broadcast Media Laboratory Spring. 2 credits.

R 1:25-4:25. J. E. Lawrence.

A continuation of Communication Arts 421.

440 Photo Communication Fall or spring. 3 credits. Limited to 25 junior and senior communication arts majors; others by permission of instructor. For those with limited experience in

photography. Students are expected to furnish their own supplies and cameras. Supplies will cost approximately \$40-\$50.

T 1:25-4:25. C. H. Freeman.

Basic photography; camera handling, film processing, projection printing, and photographic lighting. Photojournalism emphasized during the latter part of the course.

498 Communication Teaching Experience Fall and spring. 1-3 credits each semester. Limited to juniors and seniors. Intended for undergraduates desiring classroom teaching experience.

Prerequisite: permission of the staff member who will supervise the work and assign the grade.

Hours to be arranged. Staff.

Periodic meetings with the instructor cover realization of course objectives, evaluation of teaching methods, and student feedback. In addition to aiding with the actual instruction, each student will prepare a paper on some aspect of the course.

499 Independent Research Fall or spring. 3-6 credits. Limited to senior and graduate communication arts majors. Seniors must attach to their course enrollment material written permission from the staff member who will supervise the work and assign the grade.

Staff.

Permits outstanding students to carry out independent studies in communications research under appropriate supervision.

601 Intercultural Communication Spring. 3 credits.

T 1:25-4:25. Bruce E. Harding.

A systematic analysis of sociocultural and psycholinguistic obstacles to effective communication between cultures, subcultures, and ethnic and identity groups. Also examined are the subtleties and complexities of nonverbal behavior in cross-cultural transactions. Examples are drawn from ethnolinguistic and cross-cultural studies.

[612 Seminar: Interpersonal Communication

Spring. 3 credits. Not offered 1980-81.

W 1:25-4:25. N. E. Awa.

A study of recent advances and research in leadership, small-group interaction, and communication networks. New developments are examined as they relate to business, administration, and education.]

614 Scientific Writing for Scientists Fall and

spring. 3 credits. Prerequisites: a research project in progress and permission of the instructor.

Hours to be arranged. A. M. Wilkinson.

For students with research in progress who wish to write journal articles, theses, reports, and proposals. Workshop, with discussion and lectures on objectives in scientific writing, publication, and review; relation of rhetoric and linguistics to scientific writing; process of publication; preparation of tables and illustrations; advanced and special problems in organization, development, grammatical structure, and usage.

620 Communication in Organizations Fall.

3 credits. Prerequisite: permission of instructor.

W 1:25-4:25. S. A. White.

Review of theories, research, and practical systems as they relate to human communication effectiveness in organizations. Includes components of interpersonal communication, intragroup and intergroup communication, communication factors and organizational goals, skill improvement, and media in organizations—software and hardware, networking, and research methodology.

624 Communication in the Developing Nations

Spring. 3 credits. Limited to seniors and graduate students.

M 1:25-4:25. R. H. Crawford.

An examination of existing communication patterns and systems and their contributions to the

development process. Attention is given to the interaction between communication development and national development in primarily agrarian societies.

631 Studies in Communication Fall. 3 credits.

Limited to graduate students in communication arts; others by permission of instructor.

M 1:25-4:25. N. E. Awa.

A review of classical and contemporary research in communication, including key concepts and areas of investigation. An exploration of the scope of the field and the interrelationships of its various branches.

632 Methods of Communication Research Fall. 3 credits. Limited to graduate students.

T 1:25-4:25. R. E. Ostman.

An analysis of the methods used in communication research. Emphasis is on understanding the rationale for experimental, descriptive (empirical and nonempirical), and historical-critical research methods.

640 Seminar in Organizational Communication

Spring. 3 credits. Open to seniors by permission.

W 1:25-4:25. S. A. White, W. Frank.

Communication functions (human and mass media) in organizational structures of business, industry, labor, education, etc., from the perspectives of academic authorities and managers. Development of conceptual schemes for analyzing components of organizational and human communication effectiveness.

643 Frontiers in Communication Fall. 3 credits.

R 1:25-4:25. R. D. Colle.

A study of recent developments in communication. Emphasis is on the strategic application of the new methods, materials, and technology in visual, print, film, oral, and telecommunication media or contemporary and future problems significantly involving communication.

650 Advanced Communication Seminar Spring.

3 credits. Primarily for graduate students but open to seniors.

W 9:05-12:05. R. H. Crawford.

An analysis of special public communication problems faced by different types of organizations, institutions, and companies. Case histories dealing with health, nutrition, and food and agriculture issues, international affairs, government activities, rural development, etc., are used to show how communication programs are organized and executed to help solve problems.

651 Seminar: Communication Issues 0 credit.

S-U grades only.

Hours to be arranged. Staff.

The seminar deals with contemporary issues in communication, especially those related to the use of mass media as sources of information and influence, organizational communication, and intercultural communication.

690-691 Communication Teaching Laboratory

Fall and spring. 1-3 credits each semester. Limited to graduate students. Prerequisite: permission of the staff member who will supervise the work and assign the grade.

Hours to be arranged.

Designed primarily for graduate students who want experience in teaching communication courses. Students work with an instructor in developing course objectives and philosophy, planning, and teaching.

760 Advanced Communication Projects Fall or

spring. 3 credits. Limited to communication arts graduate students. May not be repeated.

Staff.

Independent studies and projects are carried out in conjunction with selected undergraduate courses.

895 Directed Graduate Study Fall or spring.

3-6 credits. S-U grades only.

Staff.

Education

J. P. Bail, chairman; H. G. Andrus, A. L. Berkey, G. J. Broadwell, R. L. Bruce, J. L. Compton, H. R. Cushman, W. E. Drake, J. A. Dunn, J. R. Egner, R. B. Fischer, H. A. Geiselmann, M. D. Glock, D. B. Gowin, E. J. Haller, D. E. Hedlund, J. Millman, D. M. Monk, J. D. Novak, G. J. Posner, R. E. Ripple, V. N. Rockcastle, K. A. Strike, R. W. Tenney, H. L. Wardeberg

110 Introduction to Psychology Fall and spring. 4 credits.

Lecls, M W F 10:10; 1 disc to be arranged.

D. E. Hedlund.

Survey of the major areas of psychological inquiry with emphasis on the personal application of psychological knowledge to the problems of living and to current social issues, including how to be an intelligent consumer of psychological research.

240 The Art of Teaching Spring. 3 credits.

T R 1:25-2:40. G. J. Posner.

This course is designed for all students interested in finding out more about teaching. Teaching is considered an activity in which people of many occupations engage, not limited to schools. Students engage in field experiences to find out what teaching involves (minimum of 1½ hours a week). Class work builds on this experience and provides skills and concepts to make the field experience more profitable.

311 Educational Psychology Fall or spring.

3 credits. Prerequisite: introductory psychology. S-U grades optional.

Fall, M W F 11:15; R. E. Ripple. Spring, M W F 9:05;

M. D. Glock.

An introductory survey course. Emphasis is on human learning and the educational process from a psychological point of view. The course is set in a broadly based teaching-learning context appropriate for prospective teachers, youth group leaders, community leaders, and those in the service-helping professions.

312 Learning to Learn Spring. 3 credits.

Prerequisite: one or more courses in psychology or educational psychology.

T R 2:30. J. D. Novak.

This course is intended for persons interested in the improvement of educational programs through the application of new knowledge in learning theory. Lectures and discussions are based on assigned readings and the contributions of class members. The learning theory of David Ausubel is presented in some detail. The major focus of the course is how and why concepts play a central role in human learning.

317 Psychology of Adolescence Spring.

3 credits. Prerequisite: introductory psychology. S-U grades optional.

T R 1:25-2:40. R. E. Ripple.

A survey of the nature of adolescent development, with emphasis on causal factors of adolescent behavior. Focus is on an examination of the interrelationships among the major aspects of adolescent development, an examination of some of the dominant themes of adolescence, acquaintance with research on adolescent development, and implications for the educational process.

331 Introduction to Teaching Agriculture Spring. 2 credits. Required of persons who plan to enter the student teaching program.

Lec, M 1:25-3; lab to be arranged. W. E. Drake.

An introduction to the origin, development of curricula, and methods of teaching agriculture in secondary schools. Purposes are (1) to provide exploratory experience in teaching agriculture and (2) to prepare prospective teachers for participation in the resident student teaching program leading to teacher certification.

18 Agriculture and Life Sciences

335 Youth Organizations

Spring. 3 credits.

Prerequisite: introductory psychology.

Lecs, T R 10:10; lab to be arranged. R. W. Tenney. The role of selected youth organizations in providing educational experiences for youth. Factors affecting membership, purposes, design, operation, and administration are surveyed with emphasis on the roles the adult volunteer leader may play. The course is designed to give the student an in-depth, learning-by-doing experience of how youth organizations function. Field experience with a recognized youth organization is required.

340 Theories of Teaching

Fall. 3 credits.

M W 2:30-3:45. G. J. Posner, K. A. Strike. This course is intended to assist the student in conceptualizing the process and contexts of teaching in school and nonschool settings. The course examines representative theories of teaching and provides an opportunity for students to develop their own views.

352 Reading Statistics

Fall or spring. 1 credit.

Prerequisite for spring: concurrent registration in Education 353.

Fall, T 12:20; spring, T R 8:30-9. J. Millman. An introduction to statistical vocabulary and symbolism frequently used in reporting empirical research in education and other social sciences. Students are taught how to comprehend statistical terminology and results.

353 Introduction to Educational Statistics

Spring. 3 credits. Prerequisite: Education 352 or concurrent registration in Education 352, or permission of instructor.

T R 9:05-11. J. Millman. A study of common statistical procedures encountered in educational inquiry. Includes the mathematical bases, computation, and interpretation of univariate and multivariate descriptive and inferential statistics.

370 Issues in Educational Policy

Spring. 3 credits.

M W F 10:10. K. A. Strike. An examination of the social, political, and economic issues that affect teaching and learning in schools and other settings. Included are such issues as educational opportunity, governance and policymaking, school and community, the economics of education, and the teacher in a social context.

371 Sociology of Education

Spring. 3 credits. S-U grades optional.

T R 10:10-11:30. E. J. Haller. An introduction to the sociological study of schooling and education. Topics include the effects of social factors on educational achievement, the norms and values learned as part of the process of schooling, the relations between students and teachers, and the school's functions in the economic and political systems. All levels of education, from elementary school to the university, are considered.

380 Independent Honors Research in Social Science

Fall or spring. 1-6 credits. Limited to students who have met requirements for the honors program. S-U grades optional. A maximum of 6 credits may be earned in the honors program.

Staff.

400 Field Experience

Fall or spring. 1-4 credits. S-U grades optional. Undergraduates must attach to their course enrollment material written permission from the faculty member who will supervise the work and assign the grade.

Staff. Students may engage in planned semiprofessional or professional practice in an educational enterprise. Each student prepares a plan of action including rationale, purposes, and procedures and arranges with a faculty member to supervise and evaluate the field experience.

401 Our Physical Environment

Fall or spring. 3 credits. Prerequisite: permission of instructor.

Charge for lab supplies, approximately \$7.

T 1:25-4:25. V. N. Rockcastle.

A practical, relatively nonmathematical study of some basic relationships and physical interactions in the environment, with emphasis on physics and earth science. Attention is paid to analysis for understanding and techniques for teaching. A two-week session on photography and an individual research project are included. Useful for teachers and environmental educators.

403 Environmental and Natural History Writing

Spring. 3 credits. Limited to upperclass and graduate students. Prerequisites: a course in composition, working knowledge of biology and ecology, permission of instructor.

W 7-9:45 p.m. R. B. Fischer. For those who want to develop skills in changing environmental attitudes and behavior using newspapers, magazines, and radio. The class produces a weekly environmental awareness column for a local newspaper and records scripts for a weekly radio program.

404-405 Field Natural History

Fall and spring. 3 credits each semester. Limited to upperclass and graduate students. Prerequisites: basic biology and ecology and permission of instructor. 404 not prerequisite to 405.

Fall: lec, M 10:10; labs, M R 1:25-4:30. Spring: lec, M 10:10; lab M 1:25-4:30. R. B. Fischer. This course provides students who plan to be professional environmental interpreters and educators with methods and materials for sensitizing people about the complexity and fragility of their living environment. It produces practical experiences in teaching about the environment in a variety of classroom and out-of-classroom settings.

407 Teaching Elementary Science

Fall. 3 credits.

W 1:25-4:25. V. N. Rockcastle. An analysis and synthesis of science concepts and related behaviors for children and young adults, with emphasis on sequencing and instruction in school and environmental centers. Includes practical experiences in local schools and youth centers.

411 Educational Measurement

Fall. 3 credits.

Prerequisite: permission of instructor.

T 2:30-4:30, 1 additional hour to be arranged. M. D. Glock. Construction of achievement tests and use of other measuring instruments in the classification and guidance of pupils for improvement of instruction. Opportunities are given to construct tests and evaluate standardized instruments. Emphasis is on the use of formal and informal instruments by the classroom teacher.

413 Psychology of Human Interaction

Fall. 3 credits. Fee, \$5.

T R 10:10-12:05. D. E. Hedlund. Designed to develop skills for and understanding of effective interpersonal communication and interaction. The course is largely experiential, utilizing audio and video recordings in laboratory sessions. Students should have access to a cassette recorder.

414 Counseling Psychology

Spring. 4 credits. Limited to 30 students. Prerequisites: introductory psychology, social or personality psychology, and Education 413. Not offered 1980-81.

T R 10:10-12:05. D. E. Hedlund. The processes of counseling are examined from the perspectives of behavioral psychology and humanistic psychology. Research on adult development, college-age and on, is reviewed, and typical adult counseling issues are examined. Implications are drawn for counseling strategy with an adult population, including psychological assessment, establishing therapeutic goals,

intervention strategies, and evaluation of outcomes. Alternative models of service delivery such as outreach, consultation, and psychoeducation are emphasized.]

430 (433) Special Problems in Agricultural Education

Fall, spring, and summer. 1-3 credits. S-U grades optional.

Fall: R 1:25. Spring: F hours to be arranged.

R. W. Tenney.

An opportunity to study individually selected problems in agricultural education.

432 Teaching Agriculture: Methods, Materials, Practice

Fall. 9 credits. Prerequisite: Education 331. Education 434 may be taken concurrently.

M T W R F 8-3. A. L. Berkey and staff. Directed participation in teaching agriculture at the secondary school level. Program includes an intensive four-week on-campus period where methods and materials of teaching agriculture are treated in detail, combined with a ten-week period in a student teaching center. Includes evaluation of area resources, instructional materials and facilities, development of curricula, directing work experience, planning instruction, and advising youth organizations.

434 Adult Education Programs in Agriculture

Fall. 3 credits. Prerequisite: concurrent registration in Education 432.

Lec to be arranged. H. R. Cushman. Determining instructional needs, planning programs of instruction, teaching in groups, giving on-the-job instruction, and evaluating adult education programs in agriculture.

435 Educating for Community Action

Spring. 3 credits.

T R 10:10-12:05. R. L. Bruce. The design and execution of educational aspects of community action programs. Deals with the identification and statement of educational goals, selection of teaching strategies, and evaluation of outcomes.

445 Curriculum Design

Fall. 3 credits. Education 545 may be taken concurrently.

T R 10:10-11:30. G. J. Posner. A general practical approach to course planning. Readings, group discussions, workshops, and individual conferences centering on each student's project. This project consists of designing a course in a subject area, for an age level and an institutional setting of the student's choosing.

446 Implementing Instruction

Spring. 2 credits.

Lec-lab, W 1:25-4:25. V. N. Rockcastle. A study of the elements of effective instruction in the lecture, laboratory, seminar, field trip, and other modes of instruction. Practice in developing and presenting various modes of instruction, with critiques by the class.

472 Philosophy of Education

Fall. 3 credits.

T 2:30-4:25. K. A. Strike. A study of central issues in the philosophy of education. Questions of ethics, political philosophy, and the theory of knowledge are examined, and the implications for education assessed.

473 Contemporary Philosophy of Education

Spring. 3 credits.

M W 11:15; disc, 1 hour to be arranged. D. B. Gowin. The topic is value concepts. Issues of value in education (values clarification, behavior modification, moral development) are treated philosophically by drawing on normative concepts of value (e.g., self-interest, utility, freedom, rights and duties, justice) from ethics and social philosophy. A theory of value for education is discussed.

477 Law and Educational Policy Spring.

3 credits. Offered alternate years.

T 2:30-4:30. K. A. Strike.

A study of recent federal court decisions concerning education. Emphasis on examining legal issues against a background of related educational theory and in terms of the consequences of legal decisions for the development and operation of educational institutions.

478 Economics of Education Fall. 3 credits.

T R 12:20-1:50. D. H. Monk.

An introduction to the use of economic principles to study education and educational policy. Specific attention is given to the impact of education on economic growth, the distribution of earnings, and characteristics of the labor force. The concept of human capital is introduced and developed as a means of understanding these phenomena. Techniques of cost-benefit and cost-effectiveness analysis are used to shed light on current controversies regarding the effectiveness of alternate types of schooling. No formal training in economics is presupposed.

497 (500) Independent Study Fall or spring. 1-3

credits. S-U grades optional. Undergraduates must attach to their course enrollment material written permission from the faculty member who will supervise the work and assign the grade.

Staff.

A student may, with approval of a faculty adviser, study a problem or topic not covered in a regular course or may undertake tutorial study of an independent nature in an area of educational interest.

511 Educational Psychology Fall. 3 credits.

Prerequisite: introductory psychology. S-U grades optional.

M W F 1:25. R. E. Ripple.

A basic survey course for graduate students. Emphasis on psychological factors involved in human learning and the educational process. Set in a broad-based conceptual model of any behavioral setting for learning. Appropriate for those seeking an introduction to educational psychology or a refresher course in contemporary educational psychology.

512 Standardized Tests: Use and Interpretation

Fall. 3 credits.

R 3:35-5:15, 1 additional hour to be arranged.

H. G. Andrus.

For teachers, counselors, or personnel majors who plan to work with standardized tests.

513 A Theory of Education Fall. 3 credits.

Prerequisite: Education 311 or 511, or permission of instructor.

T R 9:05. J. D. Novak.

Presents a coherent theory of education combining concepts from philosophy, psychology of learning, curriculum, and instruction. Classes include discussion of student-initiated questions. Students are assisted in applying theory to their own discipline.

[514 Group Processes in Education Spring.

3 credits. Prerequisite: permission of instructor. S-U grades optional. Not offered 1980-81.

T R 10:10-12:20. D. E. Hedlund.

Consideration of effective group membership and leadership, with emphasis on the theory and practice of facilitating small-group processes. Included are the design and evaluation of structured group exercises for the classroom, the use of groups in counseling, and an examination of the consulting role as an educational strategy.]

[515 Affective Education Spring. 3 credits.

Prerequisite: permission of instructor. Not offered 1980-81.

M W 1:25-3:30. D. E. Hedlund.

This course examines the conceptual base and the methodology of teaching for objectives in the affective realm. The first part of the semester is devoted to the intrapersonal dynamics of individual

development and the relationship of affective and cognitive learning. The second part focuses on the interactive nature of the teaching-learning transaction and the effective use of small-group dynamics in teaching. The capability to design teaching-learning experiences that incorporate affective objectives is a major goal. The course is largely experiential, providing participation in a variety of approaches to affective education.]

519 Methods of Educational Inquiry Fall.

3 credits. Prerequisite: statistics, Education 352, or concurrent registration in Education 352.

T R 2:30-4. J. Millman.

Techniques of empirical research in education, including design of experiments and methods of data collection. Provides an opportunity for students to write a research proposal and for small groups to conduct a ministudy. Students are taught how to plan and conduct an empirical research study and how to critique the work of others.

535 Continuing Education Programs Spring.

3 credits. Prerequisite: some work experience.

W 1:20-4. G. J. Broadwell.

An overview of selected theories, principles, and strategies applicable to management of decentralized, professionally staffed nonformal educational organizations and change agencies. Content includes management functions, managerial leadership, management by objectives, and decision-making strategies. Particular attention is given to leadership of organizations with volunteer staff.

543 Structure of Knowledge and Curriculum

Spring. 3 credits. Prerequisite: permission of instructor.

M W 12:20-2:10. D. B. Gowin.

A method for the critical analysis of knowledge and value claims embedded in primary sources is presented. Students use this method of analysis on materials chosen according to their own background or interest. Students develop their materials to the point where they could be used for instructional purposes. A special theory of curriculum developed by the instructor is presented.

[544 Teaching Mathematics Spring. 3 credits. Not offered 1980-81.

T R 2:30-3:45. H. A. Geiselmann.

Intended to provide competence in presenting mathematics using various approaches—discovery, audiovisual aids, laboratory techniques, individualized instruction, use of games, puzzles; acquaintance with teaching resources; geometrical constructions; discussion of the slow learner. Each student selects a project and presents it to the class.]

545 Curriculum Theory and Analysis Fall.

3 credits. Prerequisite: Education 311 or 511, concurrent registration in Education 511, or permission of instructor.

M W 10:10-11:30. G. J. Posner.

An examination of the basic elements involved in making curriculum decisions and an analysis of current approaches to curriculum. Students learn to analyze a curriculum in the context of a conceptual framework. This course is the basic graduate course in curriculum.

546 Evaluation for Program Management Spring. 3 credits. S-U grades optional.

M 2:30-5. R. L. Bruce.

Primary attention is given to educational and other community change programs, but inferences to other program management tasks are made.

561 Administration of Educational Organizations Fall. 3 credits.

W 3:35-6. E. J. Haller.

Perspectives on the administration of educational organizations. Consideration of classic and contemporary organization theories and their application to both public and higher education.

Intended for students who are considering careers as educational administrators as well as for those who want to further their understanding of schools as organizations.

[562 Ethical Issues in Educational

Administration Spring. 3 credits. Offered alternate years. Not offered 1980-81; next offered 1981-82.

T 2:30-4:30. E. J. Haller, K. A. Strike.

This course deals with the identification and conceptualization of ethical problems likely to arise in administering an educational organization. Typical problems concern rights of parents, teachers, and students, equity and due process in hiring, retention and promotion, and race relations. The course integrates case studies with appropriate philosophical literature.]

[563 Governance of Public Education Fall.

3 credits. Offered alternate years. Not offered 1980-81.

W 3:35-6. E. J. Haller.

Consideration of the structure of control in public education. Relationships among federal, state, and local agencies and the administrative roles in school districts. Considerable attention is directed to social and political analyses of the community.]

564 Educational Finance Fall. 3 credits. S-U grades optional.

W 9-11. D. H. Monk.

Attention is focused on tasks and procedures involved in budgeting, support systems, allocation, control, accountability, and the measurement and reporting of benefits and productivity. An opportunity for individuals to focus on their own areas of interest, such as occupational education, the two-year college, the secondary school, or higher education.

565 Systems Analysis in Educational

Administration Spring. 3 credits. S-U grades optional.

W 9:05-11, plus one hour to be arranged.

D. H. Monk.

An exploration of the usefulness of economic tools of analysis in the study of educational productivity and the management of educational systems. Topics will include the impact of state and federal policy on the internal operation of educational organizations, programming approaches to budgeting and scheduling, collective bargaining and the compensation of personnel, input-output analysis of productivity, resource allocation in classrooms, and the economics of instruction. No previous training in economics is assumed.

[569 Personnel Development: Issues in Higher

Education Spring. 3 credits. Not offered 1980-81.

R 3:35-6. H. L. Wardeberg.

An examination of selected issues that affect the administration and development of academic and nonacademic personnel in continuing and higher education institutions.]

574 History of American Education Fall. 3 credits.

M 3:35-5:15. Instructor to be announced.

An examination of American schools, colleges, and other educative agencies from colonial beginnings to the present. An attempt is made to view education in the context of the evolution of American norms and values.

575 Educational Policy Development and Decision Making Fall. 3 credits. S-U grades optional.

R 3:35-5:30. E. J. Haller.

This course provides an introduction to the policymaking process in and around the educational institution. After a consideration of the nature of public policy, topics included are governmental responsiveness, power and influence in policymaking, political parties and interest groups, and administration as policymaking. The class is

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organized as a seminar. Each student prepares and presents a paper relevant to one of the topics considered.

600 Internship in Education Fall or spring. 2-6 credits. S-U grades optional. Each student, before course enrollment, must obtain the approval of a faculty member who will assume responsibility for supervising the work.

Staff.
An opportunity for practical experience in educational professions development.

601 Research Seminar Fall and spring. 0 credits. M 4-5:30.

Presentation of current research in the field of education by graduate students and staff. Opportunities to discuss methodology, findings, and other aspects of research.

602 Proseminar in Organization and Management of Sponsored Research Fall and spring. 2 credits each term. S-U grades optional. Prerequisite: permission of instructor.

F 2:30-4. J. A. Dunn.
Designed for doctoral students, advanced graduate students, and practitioners in the field who have responsibility for the promotion, management, or supervision of educational research, development, or evaluation projects. The seminar is devoted to an in-depth review of the history of educational research, patterns of federal support, the federal procurement process, and proposal preparation. Successful and unsuccessful proposals are analyzed. Attention is given to alternative strategies for proposal development.

606 Seminar in Science and Environmental Education Fall or spring. 1 credit.

T 7:30-9:30 p.m. R. B. Fischer, V. N. Rockcastle.
Coordinates various interest groups in science and environmental education. Discussions center around curriculum development, research and thesis writing, and current problems.

611 Seminar in Educational Psychology and Curriculum Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. Offered alternate years.

Hours to be arranged. R. E. Ripple.
Selected aspects of the relationship between curriculum and the psychology of education. Emphasis is on the psychology of human learning and implications for structuring learning experiences and curriculum development. Appropriate for graduate students in educational psychology, curriculum, and instruction and others with interests in the relationship between psychology and curriculum.

615 Seminar in Counseling Psychology Fall or spring. Variable credit. S-U grades only.

W 1:25-3:30. D. E. Hedlund.
Selected topics in counseling psychology to be announced.

618 Adult Learning and Development Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. Offered alternate years.

Hours to be arranged. R. E. Ripple.
Deals with adult development and learning behavior from points of view of educational psychology, social psychology, and sociology. Inferences are drawn from theory and research to the practice of adult continuing education. Appropriate for graduate students in educational psychology, extension and continuing education, community service education, and others interested in adult learning and development.

619 Conceptual Problems in Educational Inquiry Fall. 3 credits. Prerequisite: experience or course work in research. S-U grades optional.

R 12:20-2:20. D. B. Gowin.

Techniques and procedures for the critical appraisal of research documents. Practice in such appraisal is required, with primary emphasis on conceptual structures rather than research techniques. Students may use their own research proposals or research products as material for analysis.

624 Designing Extension and Continuing Education Programs Fall. 3 credits. Prerequisite: permission of instructor.

T 1:25-4. Staff.
Designed to help students understand current theories, concepts, principles, and procedures central to the process of developing programs and curricula for the continuing education of adults. Emphasis is on such key problems as conceptualization of the nature and role of programming, situation analysis and needs identification, choosing among alternative courses of action, stating program objectives, macroplanning and microplanning, and program organization.

627 Behavioral Change in International Rural Modernization Spring. 3 credits. For students who have interests or experience in international rural or community development.

J. L. Compton.
An exploration of the social psychological aspects of socioeconomic development, focusing on the theoretical orientations of individual modernity, values-beliefs-motives, achievement motivation, entrepreneurship, innovativeness, expectancies, and self-efficacy and the applied orientations of communication-diffusion of innovation-adoption behavior, nonformal education, community development, planned change, and change agency.

628 Community Education Fall. 3 credits. For students who have interest or experience in education or development programs where community is an important concern.

W 2:30-5. J. L. Compton.
An examination of the concept of community, changes in community life, the analysis of community, alternative strategies for community development, patterns of response to community by such public institutions as community colleges, cooperative extension, social work, and community schools, and such functional dimensions of community education programming as participatory decision making, paraprofessionals, volunteers, leadership development, council formation and function, interagency coordination, and change agent roles.

629 Comparative Extension Education Spring. 3 credits. Prerequisite: Education 627 or permission of instructor.

R 1:25-4:25. J. L. Compton.
Extension education in the developing nations will be studied using, as an analytical frame of reference, a hypothetical model comprised of such components as community organization, community-based learning, indigenous facilitators and leaders, extension generalists and specialists, residential training, and research-training linkages. Case materials on alternative extension models and intercounty experiences will provide an empirical base.

630 Special Problems in Agricultural and Occupational Education Fall and spring; may also be offered in Summer Session. 1-3 credits. S-U grades optional.

Hours to be arranged. R. W. Tenney and staff.
The course provides an opportunity for graduate-level study of individually selected problems and issues in agricultural and occupational education. Designed for experienced teachers.

632 Teaching Agricultural and Occupational Education Spring. 3 credits. Prerequisite: an introductory course in teaching methods or permission of instructor.

M 2:30-5. A. L. Berkey.

The focus of the course is on the selection, use, and evaluation of methods and materials for teaching occupational subjects. Methods for both group and laboratory instruction are covered. Opportunity is provided through use of modules for students to develop teaching competencies based on their individual needs and interests. Development of self-evaluation skills is included. A class project on the selection or development of instructional materials is required.

633 Curriculum in Agricultural and Occupational Education Fall. 3 credits.

M 1:25-3:30; labs to be arranged. W. E. Drake.
Current situations affecting occupational education curricula are examined. Principles, objectives, and sources of information are developed for planning curricula. Strategies for developing occupational courses are examined. Consideration is given to planning, developing, and managing work experience programs. Participants have an opportunity to observe ongoing programs at the secondary and two-year-college levels and pursue individual interests in curriculum improvement.

634 Adult Education Programs: Organization and Direction Fall. 3 credits.

F 1:25-4:20. H. R. Cushman.
Alternative procedural models for organizing and conducting adult occupational education courses are presented. Guidelines and procedures for implementing the models in secondary and postsecondary school settings are emphasized.

635 Teacher Preparation in Agriculture Fall. 3 credits. Prerequisite: teaching experience in agriculture.

W 1:25-3:20. A. L. Berkey.
For persons with teaching experience interested in the preparation of occupational teachers. Involvement in the Cornell program of teacher preparation in agriculture is expected.

636 Occupational Education Program: Administration and Supervision Spring. 3 credits.

W 2:30-4:25; special sessions to be arranged. J. P. Bail.
Practices and procedures of organizing, administering, and supervising programs of occupational education at the secondary and postsecondary level are stressed. The role of the director in providing leadership in improving instruction, designing programs, and using resources at federal, state, and local levels is considered.

639 Evaluating Programs in Occupational Education Spring. 3 credits.

T 1:25-3:20; labs to be arranged. W. E. Drake.
This course examines objectives, criteria, and strategies for evaluating programs of occupational education in secondary and postsecondary schools. Evaluation models, case studies, and evaluation as a function of program planning are considered. Participants examine the roles of supervision in evaluation and have an opportunity to develop and apply evaluative instruments. Field trips and resource persons provide opportunities to observe actual evaluation problems and procedures.

645 Seminar in Curriculum Theory and Research Spring. 3 credits. Prerequisite: Education 445 or 545 or permission of instructor.

Hours to be arranged. G. J. Posner.
Theoretical issues in curriculum and appropriate areas for curriculum research are discussed.

669 Studies in Educational Administration Spring. 3 credits. S-U grades only.

W 3:35-6. E. J. Haller.
An analysis and critique of current research in educational administration. Discussion of research priorities and strategies in the conceptual area of educational governance. For graduate students interested in conduct of research on problems of educational governance.

673 Seminar in Dewey's Philosophy of Education Fall. 3 credits. Prerequisite: work in philosophy and permission of instructor. S-U grades optional. R 3-5. D. B. Gowin.

A detailed analysis of some selected major Dewey works (*Democracy and Education*, *Experience and Education*, *Art as Experience*). One objective of the seminar is to help students learn how to read Dewey and to compare and apply his ideas about education to current problems and issues.

[678 Economics of Rural Education Spring. 3 credits. Prerequisite: Education 478 or permission of instructor. Offered in alternate years. Not offered 1980-81.

T R 12:20-1:50. D. H. Monk.
The application of economics to the analysis of current issues concerning manpower planning and human capital development and utilization in rural areas. The course concentrates on the case of rural education in developing as well as industrialized nations. Attention is given to both formal and nonformal types of education.]

679 Economics of Higher Education Spring. 3 credits. Prerequisite: Education 478 or permission of instructor. Offered in alternate years.

T R 12:20-1:50. D. H. Monk.
Applications of economics to the study of the planning, financing, and administration of higher educational organizations. Topics include a critical assessment of current approaches to macrolevel planning as well as the analysis of special problems associated with the financing and administration of particular types of colleges and universities.

711 Seminar in Educational Psychology Fall. 3 credits. Prerequisite: permission of instructor before first meeting. S-U grades optional. W 4:30-6:30. M. D. Glock.

The seminar has varied emphasis from year to year, focusing on theoretical issues in the teaching, measurement, and evaluation of reading.

716 Seminar in Educational Research and Evaluation Fall or spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional.

Hours to be arranged. J. Millman.
An intensive study of the literature in a particular area of research methodology. Topics in recent years have included procedures and issues in educational evaluation, the interface of instruction and measurement, and the design of educational experiments. Current topic to be announced.

730 Seminar in Agricultural and Occupational Education Spring. 2 credits. S-U grades optional. R 2:30-4:25. Staff.

For master's degree candidates who have had teaching experience and doctoral candidates with majors or minors in agricultural and occupational education. Emphasis is on current problems and research and includes discussion of student research proposals.

771 Seminar in the Sociology of Education Fall. 3 credits. S-U grades optional.

Hours to be arranged. E. J. Haller.
Intensive study of a selected topic in the sociology of education, with consideration of its organizational and policy implications.

772 Seminar in Philosophy of Education Spring. 3 credits. S-U grades optional. Prerequisite: permission of instructor.

Hours to be arranged. K. A. Strike.
Topics to be announced.

800 Master's Level Thesis Research Fall or spring. Credit arranged. S-U grades optional. Each registration must be approved by a faculty member who will assume responsibility for guiding the work.

Staff.
Limited to students working on theses or other research and development projects.

900 Doctoral Level Thesis Research Fall or spring. Credit to be arranged. S-U grades optional. Each student, before course enrollment, must obtain the approval of a faculty member who will assume responsibility for guiding the work.

Staff.
Limited to students working on theses or other research and development projects.

Related Course in Another Department

Historical Roots of Modern Psychology (Psychology 490)

Entomology

E. H. Smith, chairman; W. L. Brown, Jr., E. W. Cupp, J. E. Dewey, G. C. Eickwort, P. P. Feeny, J. G. Franclemont, emeritus, G. G. Gyrisco, H. H. Hagedorn, R. G. Helgesen, W. T. Johnson, J. P. Kramer, R. A. Morse, A. A. Muka, L. L. Pechuman, B. L. Peckarsky, D. Pimentel, E. M. Raffensperger, R. B. Root, A. Sawyer, E. T. Schmidtman, M. Semel, M. J. Tauber, W. M. Tingey, Q. D. Wheeler, C. F. Wilkinson, R. G. Young

Courses by Subject

Apiculture: 260, 262, 264
Behavior: 662
Ecology: 370, 455, 457, 471, 664, 672, 695
Introductory courses: 200, 212
Medical entomology and pathology: 452, 453
Morphology: 322
Pest management: 241, 342, 440, 443, 640, 677
Physiology and toxicology: 483, 685, 687, 690
Taxonomy, araneology, and acarology: 331, 621, 631, 632, 633, 634, 635

200 Insects and Man Fall. 2 credits. S-U grades optional. Intended for students in all colleges.

Lecs, T R 11:15. E. M. Raffensperger.
A presentation of the insects, with attention to their roles in nature and in civilization. Biological, historical, social, economic, and cultural aspects are discussed.

212 Insect Biology Fall. 3 credits. Prerequisite: Biological Sciences 101-102 (may be taken concurrently) or equivalent.

Lecs, W F 11:15; lab, M T W R or F 2-4:25.
G. C. Eickwort.
Introduces the science of entomology by focusing on basic principles of systematics, morphology, physiology, behavior, and ecology of insects. The lab in early fall includes field trips to collect and study insects in the natural environment. A small collection stressing ecological categories is required.

241 Applied Entomology Spring. 3 credits. Prerequisite: Biological Sciences 101-102 or equivalent.

Lecs, T R 10:10; lab, M T W R or F 2-4:25.
E. M. Raffensperger.
A compendium of the insects associated with crops and farm animals. Discussions of insect pest management requirements on farm and garden, along with descriptions of control methods, materials, and equipment.

260 Introductory Beekeeping Fall. 2 credits. T R 11:15. R. A. Morse.

Introduces the fundamentals of beekeeping, including the life history, instincts, and general behavior of honey bees. Attention is given to the biology of the honey bee. Some lectures are devoted to pollination of agricultural crops and the production of honey and beeswax.

262 Communication and Social Behavior of the Honey Bees Fall. 1 credit. Limited to 10 students. Prerequisite: permission of instructor.

S afternoon or weekend laboratories to be arranged; evening seminar-lecture to be arranged. R. A. Morse.

Intended for those interested in the honey bee society as a system for the study of social behavior. Participants will present topics they are interested in. Laboratories will allow direct observation of living bees and introduce some important research techniques. The need for fair weather requires that laboratory scheduling be flexible.

264 Practical Beekeeping Fall. 1 credit. Limited to 20 students. Prerequisite: Entomology 260 (may be taken concurrently).

Lab, R or F 2-4:25. R. A. Morse.
Fourteen labs to acquaint students with practical methods of colony management. Labs involve actual work with package bees and mature colonies. Three labs are concerned with apple pollination and methods of moving colonies into orchards.

[322 Insect Morphology Fall. 5 credits. Prerequisite: Entomology 212 or 241. Offered alternate years. Not offered 1980-81.

Lecs, M W F 10:10; labs, M F or T R 1:25-4:25. G. C. Eickwort.

An introduction to the external and internal anatomy of insects, with emphasis on the comparative and functional aspects. The lab is devoted largely to dissection.]

331 Introductory Insect Taxonomy Spring. 3 credits. Prerequisite: Entomology 212.

Lecs, R 10:10; labs, T R 2-4:25. Field trips are taken in the late spring. Q. D. Wheeler.
An introduction to the systematics and distribution of insects. Lab practice in the identification of orders, families, and representative genera of insects; methods of collection and preparation of insect specimens.

342 Special Topics in Economic Entomology

Hours to be arranged. Staff.
Topics to be announced.

370 Pesticides in the Environment Fall. 2 credits. Prerequisites: Biological Sciences 101-102 or equivalent.

Lecs, T R 9:05. R. J. Kuhr.
A survey of the different types of pesticides, their uses, their distribution in the environment, and their effects on various components of the environment. For students whose main emphasis is not in pesticide usage.

440 Insect Pest Management Spring. 4 credits.

Prerequisites: Entomology 212 or 241, and Entomology 400 or Biological Sciences 360, or permission of instructor.
Lecs, M W F 9:05; lab, M 1:25-4. R. G. Helgesen.
A lecture and lab introduction to principles and techniques of insect pest management as these relate to the diverse problems in contemporary economic entomology.

443 Pathology and Entomology of Trees and Shrubs (also Plant Pathology 443)

See Plant Pathology 443 for course description.

452 Medical Entomology Fall. 3 credits.

Prerequisites: either Entomology 212 and Veterinary Medicine 330 or permission of instructor.
Lecs, T R 10:10; lab, R 1:25-4:25. E. W. Cupp.
A survey of arthropods of public health and veterinary importance, with emphasis on transmission dynamics of pathogens, the bionomics of vector populations, and current control concepts. Morphology and taxonomy of selected groups are examined in the laboratory, with additional exercises in vector-pathogen relationships and epidemiological techniques.

453 Insect Pathology Spring. 4 credits.

Prerequisites: Entomology 212 or equivalent, a course in microbiology, or permission of instructor.

Lecs, M W 10:10; lab, R 1:25–4:25. J. P. Kramer.
A survey of the diseases of insects caused by viruses, bacteria, fungi, and protozoans and a consideration of the role of microbial diseases in natural and applied insect control. Lab investigations center around living insect—pathogen associations and the consequences of these associations for both insect and microbe.

[455 Insect Ecology, Lectures (also Biological Sciences 455)] Fall. 2 credits. Prerequisites:

Biological Sciences 360 and Entomology 212, or their equivalents. Recommended: concurrent enrollment in Biological Sciences 457. Offered alternate years. Not offered 1980–81.

Lecs, W F 11:15. R. B. Root.

Ecological and evolutionary principles are integrated by thorough examination of outstanding investigations. Topics discussed include the factors responsible for the great diversity of insects, adaptive syndromes associated with climate, natural history of arthropod guilds, impact of insects on terrestrial vegetation, population regulation, and the contrast between natural and managed ecosystems.]

[457 Insect Ecology, Laboratory (also Biological Sciences 457)] Fall. 2 credits. Limited to 16

students. Prerequisite: concurrent enrollment in Biological Sciences 455. Offered alternate years. Not offered 1980–81.

Lab, W 1:25–4:25; F or S field trips to be arranged during the field season. R. B. Root.

Field exercises focus on insect natural history and methods of sampling populations. Laboratories devoted to rearing insects, estimating life-table parameters, and analyzing communities.]

471 Ecology and Systematics of Freshwater

Invertebrates Spring. 4 credits. Prerequisite: Entomology 212. Recommended: Biological Sciences 360–462–464.

Lecs, T R 9:05; labs, M W or T R 1:25–4:25.

B. L. Peckarsky.

The lecture explores the life histories, behavior, feeding ecology, and limitations to distributions of macroscopic freshwater invertebrates with an emphasis on insects. The laboratory involves field collections and laboratory identification of invertebrates stressing the use of keys. Students may elect to conduct ecological field projects, or to study the systematics of freshwater invertebrates in more depth.

483 Insect Physiology Spring. 4 credits.

Prerequisite: Entomology 212 and a course in biochemistry.

Lecs, M W F 11:15; lab, W or F 1:25.

H. H. Hagedorn.

An introduction to insect physiology, with emphasis on development and organ systems.

497 Special Topics for Undergraduates Fall or

spring. Credit to be arranged. Prerequisite: permission of instructor. Undergraduates must attach to their course enrollment material written permission from the staff member who will supervise the work.
Staff.

499 Undergraduate Research Fall or spring.

Credit to be arranged. Prerequisite: permission of instructor. Undergraduates must attach to their course enrollment material written permission from the staff member who will supervise the work.
Staff.

618 Techniques of Biological Literature Fall. 2

credits. Offered alternate years.

Lecs, T R 9:05. J. G. Franclemont.

The history of the development of entomological literature and a critical study of the biologists' works of reference. Practice in the use of indexes and use and preparation of bibliographies.

[621 Acarology Fall. 4 credits. Prerequisites: Entomology 212 and permission of instructor. Offered alternate years. Not offered 1980–81.

Lecs, M F 10:10; labs, M F 1:25–4:25.

G. C. Eickwort.

An introduction to the taxonomy, morphology, and bionomics of mites and ticks, with emphasis on taxa of economic importance. A collection is required.]

[631 Taxonomy of the Smaller Orders of Insects

Fall. 3 credits. Prerequisite: Entomology 331. Offered alternate years. Not offered 1980–81.

Disc, F 10:10; labs, F 2–4:25 and 1 other by arrangement. W. L. Brown.

Discussions of the classification, evolution, and bionomics of the orders and families of insects, excluding the larger orders of Holometabola. Lab studies on the literature and on the characters and classification of representative genera and species. Continuation of taxonomy of Holometabola is in Entomology 632, 633, and 634.]

[632 Taxonomy of the Immature Stages of

Holometabola Fall. 3 credits. Prerequisite: Entomology 631 or permission of instructor. Offered alternate years. Not offered 1980–81.

Lec, W 10:10; labs, W F 2–4:25. Staff.

Lectures on structure and habits of insect larvae. Lab studies of the literature, comparative morphology, and identification of the immature stages of the Holometabola.]

[633 Taxonomy of the Coleoptera and

Lepidoptera Spring. 3 credits. Prerequisite: Entomology 331. Offered alternate years. Not offered 1980–81.

Lec, W 10:10; labs, W F 2–4:25. Staff.

Lab studies on the literature and on the characteristics and classification of representative genera and species of these orders.]

[634 Taxonomy of the Diptera and Hymenoptera

Spring. 3 credits. Prerequisite: Entomology 331.

Offered alternate years. Not offered 1980–81.

Lec, W 10:10; labs, W F 2–4:25, and 1 other by arrangement. W. L. Brown.

Lab studies on the literature and on the characters and classification of representative genera and species of these orders.]

635 Araneology Fall. 2 credits. Prerequisites:

Entomology 212 and permission of instructor. Offered alternate years.

Lec and lab, R 2–4:25. D. B. Zepp.

Introduction to the systematics, morphology, physiology, behavior, and ecology of spiders and the other arachnids, with emphasis on identification and biology. A collection is required.

640 Pest Management Systems Fall. 4 credits.

Prerequisites: Biological Sciences 360, Entomology 340 or Plant Pathology 404, and a course in calculus. Recommended: an introductory course in computer science. Offered alternate years.

Lecs, M W F 9:05; disc, W 2:30–4:25. A. J. Sawyer.
Quantitative aspects of the development of pest and agricultural resource management systems. A major portion of the course deals with predictive simulation models and quantitative research. Other topics include philosophy, use of literature, systems analysis, management and design, and communications and monitoring systems.

662 Insect Behavior Seminar Spring. 1 credit.

Prerequisites: permission of instructors and either Entomology 212 and Biological Sciences 321 or equivalents.

Hours to be arranged. G. C. Eickwort, M. J. Tauber.

664 Seminar In Coevolution Between Insects and

Plants Spring. 2 credits. Limited to 15 students.

Prerequisites: entomology, ecology, evolution, organic chemistry, and written permission of instructor. S-U grades optional. Offered alternate years.

One evening a week, to be arranged. P. P. Feeny.
For graduate students and seniors. Presentations and discussions by students on the evolution of patterns of interaction between plants and insects, emphasizing critical evaluation of concepts and evidence.

672 Seminar in Aquatic Ecology Spring. 1 credit.

Prerequisites: permission of instructor and either Entomology 471 or Biological Sciences 462, 464. Offered alternate years.

Hours to be arranged. B. L. Peckarsky.

Discussion and analysis of current topics in the ecology of streams and lakes, including synthesis of key papers in the literature. Reports on personal research or ideas by students will be encouraged.

[677 Biological Control Fall. 3 credits.

Prerequisites: Entomology 212, Biological Sciences 360, and permission of instructor. Not offered 1980–81.

Lecs, T R 9:05; lab, T 2–4:25. M. J. Tauber.

Theory and method of biological control of arthropod pests and weeds. Lab includes studies with living parasites and predators.]

685 Seminar in Insect Physiology Spring.

1 credit. Prerequisites: Entomology 483 (may be taken concurrently) and permission of instructor.

Hours to be arranged. H. H. Hagedorn.

690 Insect Toxicology and Insecticidal

Chemistry Spring. 4 credits. Prerequisites: general chemistry and organic chemistry. Undergraduate students by permission of instructor. Offered alternate years.

Lecs, M W F 9:05; lab, day to be arranged, 1:25–4:25. C. F. Wilkinson.

The chemistry of insecticides and their metabolism and mode of action in insects and mammals.

707 Special Topics for Graduate Students Fall or

spring. Credit to be arranged. Prerequisite: permission of instructor.

Staff.

708 Graduate Research Fall or spring. Credit to

be arranged. Prerequisite: permission of instructor. Not for thesis research.

Staff.

709 Teaching Entomology Credit to be arranged.

Staff.

Teaching entomology or for extension training.

800 Masters Level Thesis Research Credit to be

arranged. Prerequisite: permission of instructor. S-U grades optional.

Staff.

900 Doctoral Level Thesis Research Credit to be

arranged. Prerequisite: permission of instructor. S-U grades optional.

Staff.

Jugatae Seminar Fall and spring.

M 4–5.

A seminar conducted by Jugatae, the entomology club of Cornell University, to discuss topics of interest to its members and guests.

Floriculture and Ornamental Horticulture

C. F. Gortzig, chairman; M. I. Adleman, N. L. Bassuk, A. Bing, J. W. Boodley, E. J. Carter, R. L. Dwelle, A. M. Elliot, C. C. Fischer, R. T. Fox, G. L. Good, T. H. Johnson, R. J. Lambert, R. W. Langhans, A. S. Lieberman, L. J. Mirin, R. G. Mower, F. B. Negm, A. M. Petrovic, E. F. Schaufier, J. G. Seeley, P. J. Trowbridge

Courses by Subject

Commercial floriculture crop production: 424, 425
Freehand drawing and illustration: 109, 111, 210, 211, 214, 316, 417

Horticultural physiology: 401-411, 402, 601

Introductory courses: 100, 105, Landscape

Architecture 140, Vegetable Crops 103

Landscape architecture (professionally accredited program): see pages 24 and 48.

Landscape horticulture: Landscape Architecture 140, 220, 221, 311, 340, 425, 431, 432, 531, 532.

Nursery management: 317

Plant materials: 213, 248, 312, 313, 322, 450

Retail floriculture: 105, 325

Special problems in floriculture and ornamental horticulture: 497

Turfgrass management: 314, 318

100 Introductory Floriculture and Ornamental Horticulture Fall. 3 credits. Principally for freshmen. S-U grades optional for students not specializing in floriculture and ornamental horticulture. Field trip costs about \$25 plus room and meals.

Lecs, M W 8; lab, T or W 2-4:25. J. W. Boodley. An introduction to basic plant physiology and plant processes, control of the plant environment, and the floriculture and ornamental horticulture industry and opportunities. A required field trip to visit commercial enterprises is made.

105 Floral Design Fall or spring. 2 credits. Each lab limited to 22 students. Prerequisite: permission of instructor; preference given to plant science majors, then to students in education, design, and journalism studies. Students whose careers will involve using this horticultural expertise should apply. There is a \$25 charge to purchase instructional plant materials that the student will keep.

Lec-lab, T W or R 1:25-4:25. C. C. Fischer. A study of the established floral design techniques of this country presenting the principles and the mechanics of the art to prepare the student to design for varying themes and occasions. Other aspects include selection, preparation, and factors affecting keeping quality of plant materials, emphasizing the economical use of all supplies.

213 Woody Plant Materials Spring. 4 credits.

Lecs, T R 9:05; lab, T 1:30-4:30 (two sections to be arranged) and W or F 2-4:25. R. G. Mower.

A study of the trees, shrubs, and vines used in landscape plantings. Emphasis is on winter identification and their values for use as landscape material.

312 Garden and Interior Plants I Fall. 3 credits.

Lecs, T R 10:10; lab, T 1:30-4:30 (two sections to be arranged). R. G. Mower.

A study of ornamental plants used in garden and interior situations. The first seven weeks cover primarily herbaceous annuals and perennials, with the lab devoted to various practical gardening activities. The remainder of the semester covers the major kinds of foliage and flowering plants used in the home and other interior landscape situations. Emphasis is on identification, use, and general cultural requirements.

313 Woody Plant Materials for Landscape Use

Fall. 3 credits. Limited to 30 students. Primarily for landscape architecture majors.

Lec, W 10:10; lab, F 9:05-12:05. R. G. Mower.

A study of the trees, shrubs, vines, and ground covers used in landscape plantings in the northeastern United States. Emphasis is on leaf identification and on characteristics that determine their usefulness as landscape subjects. Opportunity for independent study is provided.

314 Turfgrass Management Fall. 3 credits.

Prerequisites: Agronomy 200 and Biological Sciences 242 or permission of instructor.

Lecs, M F 12:20; lab F 1:25-4:25. A. M. Petrovic.

The scientific principles, practices, and materials for the construction and maintenance of lawn, sports, and utility turfgrass areas. Environmental effects on growth are also studied.

317 Nursery Crop Production and Maintenance

Fall. 4 credits. Prerequisite: Floriculture 401.

Lecs, M W F 9; lab, M 12:20-2:15, 2:30-4:25. Field trips are included in lab sessions. G. L. Good.

Problems of commercial propagation and growth of nursery plants to marketable stage including harvesting, storing, and packaging nursery stock. Some consideration is given to the planting and culture of landscape plants.

318 Advanced Turfgrass Management Fall.

2 credits. Prerequisites: Floriculture 314 or equivalent, and permission of instructor. Cost of field trip, \$10 plus room and meals.

Hours to be arranged. A. M. Petrovic.

A continuation of Floriculture 314, with emphasis on applying scientific principles to management of golf courses, athletic fields, parks, industrial grounds, and sod production. A weekend inspection trip is taken to experimental test plots and special turfgrass areas.

322 Garden and Interior Plants II Spring.

3 credits. Prerequisite: Floriculture 312 or permission of instructor.

Lecs, M W 11:15; lab, M 1:30-4:30 (two sections to be arranged). R. G. Mower.

A continuation of Floriculture 312. The first seven weeks are devoted to a further study of interior plants with emphasis on specialized groups of interior plants as orchids, cacti and succulents, gesneriads, ferns, palms, and bromeliads. The second seven weeks are devoted to outdoor herbaceous plants such as tulips, daffodils, crocus, iris, as well as other spring-blooming bulbs and perennial plants. Outdoor labs emphasize practical gardening activities appropriate to the spring season.

325 Flower-Store Management Fall. 3 credits.

Prerequisites: Floriculture 105 and permission of instructor. Lab materials charge, \$25. Cost for field trips, \$15 plus room and meals.

Lecs, W F 11:15-12:20; lab, F 1:25-4:25. R. T. Fox. Lectures devoted to flower-shop management, business methods, merchandising, and marketing of floricultural commodities. Labs include the application of subject matter and the principles of commercial floral arrangement and design. Required field trips made to flower shows and to wholesale and retail florist establishments.

342 Taxonomy of Cultivated Plants (also

Biological Sciences 342) Spring. 4 credits.

Lecs, M W 10:10; labs, M W 2-4:25.

J. W. Ingram, Jr.

A study of ferns and seed plants, their relationships, and their classification into families and genera, emphasizing cultivated plants. Emphasis is on gaining proficiency in identifying and distinguishing families and to preparing and using analytical keys; attention is also given to the economic importance of taxa, to the basic taxonomic literature, and to the elements of nomenclature.

401-411 Physiology of Horticultural Plants Fall.

401 (lec), 2 credits; 411 (lab), 1 credit. Each lab limited to 40 students. Prerequisite: Biological Sciences 242 or 342 or permission of instructor.

Lecs, T R 8; lab, R 1:25-4:25. Staff.

Application of physiology to germination of seeds, rooting of cuttings, manipulation of bulbs, and propagation of plants by budding and grafting. Stress on basic mechanisms concerning initiation and development of roots and shoots.

402 Physiology of Horticultural Plants Spring.

4 credits. Prerequisite: Biological Sciences 242 or 342 or permission of instructor.

Lec, M W F 8; lab to be arranged. F. B. Negm.

A study of the physiology of growth and development of horticultural plants in response to their environment.

424 Principles of Florist Crop Production Spring.

4 credits. Limited to 40 students, with 20 per lab section. Preference given to juniors. Prerequisites: Floriculture 401 and Biological Sciences 242, 342 (may be taken concurrently), or equivalent; or permission of instructor. Cost for field trips, \$20 plus meals.

Lecs, M W F 9:05; lab, M or R 2-4:25. J. G. Seeley. Commercial production of florist crops. Emphasis on principles of culture of ornamental plants as influenced by greenhouse environment. Field trips are made to commercial greenhouses.

425 Greenhouse Production Management

Spring. 4 credits. Primarily for seniors. Prerequisite: an elementary course in horticulture or equivalent. Cost for field trips, \$100.

Lecs, T R 10:10-12:05. Two field trips are taken.

R. W. Langhans.

Intended to provide the latest information on efficient operation and administration of a commercial greenhouse, outside the sphere of production methods for specific crops. Consideration is given to the industry, centers of production, competition, location, types of structures, heating, ventilation, cooling, fertilizing, and watering systems, and business analysis and management.

450 Special Topics on Ornamental Plants Fall or

spring. Credit to be arranged. Limited to 15 students. Primarily for upperclass floriculture and ornamental horticulture majors. Prerequisites: Floriculture 213, 312, or 313 or the equivalent, and permission of instructor.

Hours to be arranged. R. G. Mower.

Topical subjects in plant materials. Independent and group study of important groups of woody and herbaceous plant materials not considered in other courses. The topic is given in the supplementary announcement.

497 Special Problems in Floriculture and

Ornamental Horticulture 1 or more credits. S-U grades optional. Prerequisite: students must satisfy the staff member under whom the work is to be taken that their background warrants their choice of problems. Undergraduates must attach to their course enrollment material written permission from the staff member who will supervise the work and assign the grade.

C. F. Gortzig and staff.

Work on problems under investigation by the department or of special interest to the student.

600 Seminar Fall or spring. For department staff

and graduate students. S-U grades only. R 12:10.

601 Current Topics in Floricultural and Ornamental Horticultural Physiology Spring. Variable credit. Prerequisite: permission of instructor.

Hours to be arranged. F. B. Negm.

Discussions of modern concepts, research, and commercial problems as reflected in current horticultural literature.

Freehand Drawing and Illustration

109 Drawing for Landscape Architects Fall.

3 credits. Primarily for department majors; others admitted with permission of instructor. Limited to 25 students.

Lec, R 10:10; studio, T 9:05-11, R 1:25-4:25.

A. Elliot.

Emphasizes the development of a graphic language and an approach to freehand perspective. Outside sketchbook assignments.

24 Agriculture and Life Sciences

111 Freehand Drawing

Fall or spring. 3 credits. Each section limited to 25 students. Prerequisite: permission of instructor. S-U grades optional. Credit may not be received for both Floriculture 109 and 111.

Fall: M W F 10:10–12:05; R. J. Lambert. Spring: Lec, T or W 10:10; 5 additional studio hours a week scheduled in 2- or 3-hour periods during M T W R F 9:05–12:05, T 2–4:25; A. Elliot.

Objective is to develop accuracy of observation and skill in delineation. Practice is given in outdoor sketching and still-life and figure drawing. Principles of freehand perspective are taught and applied. Outside sketchbook assignments.

210 Perspective for Landscape Architects

Spring. 3 credits. Primarily for department majors.

T R 1:25–4:25; R. J. Lambert. Practice in perspective construction from plans and elevations, rendering techniques, and basic design principles. Outside sketchbook assignments.

211 Freehand Drawing and Illustration

Fall. 2 credits. Prerequisite: Floriculture 111 or equivalent. S-U grades optional.

6 studio hours scheduled in two- or three-hour units between 9:05 and 12:05 M T W R F. R. J. Lambert. Progression to the organization of complete illustrations. Subject matter largely from sketchbooks, still life, and imagination. Composition, perspective, and ways of rendering in different media are considered.

214 Watercolor

Spring. 2 credits. Prerequisite: Floriculture 111 or equivalent. S-U grades optional.

6 studio hours scheduled in two- or three-hour units between 9:05 and 12:05 M T W R F. R. J. Lambert. A survey of watercolor techniques. Subject matter largely still life, sketchbook, and on-the-spot outdoor painting.

316 Advanced Drawing

Fall or spring. 2 credits. Prerequisite: Floriculture 211 or permission of instructor. S-U grades optional.

6 hours to be arranged. A. Elliot, R. J. Lambert. For students who want to attain proficiency in a particular type of illustration or technique.

417 Scientific Illustration

Fall. 2 credits. Prerequisite: Floriculture 211 or 316 or equivalent. S-U grades optional for graduate students only.

6 studio hours scheduled between 9:05 and 12:05 M T W R. A. Elliot. A survey of methods of illustration. Training in techniques of accurate representation in media suitable for reproduction processes, including pen and ink, scratchboard, wash, and mixed media.

Landscape Architecture

M. I. Adleman, program coordinator; E. J. Carter, R. L. Dwelle, T. H. Johnson, A. S. Lieberman, L. J. Mirin, P. J. Trowbridge

The Landscape Architecture Program at Cornell is sponsored by the College of Agriculture and Life Sciences through the Department of Floriculture and Ornamental Horticulture and the College of Architecture, Art, and Planning.

140 Introduction to Landscape Design

Fall or spring. 3 credits.

Lecs, M W F 9:05; R. L. Dwelle. An introduction to landscape design as well as interrelated horticultural considerations associated with the built environment. Guest lecturers in landscape architecture, ornamental horticulture, and related fields are scheduled throughout the semester.

Design Studios

201 Design I: Basic Landscape Architectural Design

Fall. 5 credits. Limited to landscape architecture majors. Cost of drafting equipment (to be used throughout the 6-studio sequence) and supplies, about \$200. Basic expenses for field trip, about \$125.

Lec, M 12:20; studio, M W F 1:25–4:25.

T. H. Johnson.

An introduction to the principles of landscape architectural design. The course introduces graphics and drafting, two- and three-dimensional design, color, abstraction, form, space and spatial sequence, uses of plant material, site inventory and analysis, and the site design process. This is the first course in a sequence of 6 studio courses required for specialization in landscape architecture. Participation in the program's 5-day field trip is required.

202 Design II: Basic Landscape Architectural Design

Spring. 5 credits. Prerequisite: Landscape Architecture 201. Cost of supplies, about \$100.

Lec, F 9:05; studio, M W F 10:10–12:35.

M. I. Adleman.

A continuation of the exposure to basic problem solving and the design process, with emphasis on the development of site design and graphic skills. Projects deal with the organization of outdoor space and the siting of buildings as well as the interrelationships of vehicular and pedestrian circulation, parking, open space, earth form, and vegetation.

301 Design III: Intermediate Landscape Architectural Design

Fall. 5 credits. Prerequisite: Landscape Architecture 202. Cost of supplies, about \$100. Basic expenses for field trip, about \$125.

Lec, F 9:05; studio, M W F 10:10–12:35. Required 5-day field trip. P. J. Trowbridge.

Application of planning and urban design techniques to environmental problems. Timely issues are investigated. Site development problems at several scales and land-use intensities are examined.

302 Design IV: Intermediate Landscape Architectural Design

Spring. 5 credits. Prerequisite: Landscape Architecture 301. Cost of supplies, about \$100.

Lec, M 12:20; studio, M W F 1:25–4:25.

T. H. Johnson.

Design exercises focus on the synthesis of conceptual ideas into three-dimensional compositions. Ideas from synectics, organizational systems, activity systems, historic spaces, and sculptures are used to compose hard space, soft space, regional space, and total energy environments.

401 Design V: Advanced Landscape Architectural Design

Fall. 5 credits. Prerequisites: Landscape Architecture 302 and concurrent registration in Landscape Architecture 425. Cost of supplies, about \$100. Basic expenses for 5-day field trip, about \$125.

Lec, M 12:20; studio, M W F 1:25–4:25. Required 5-day field trip and a 2-day field trip. M. I. Adleman. Project-planning studies emphasizing the planting design component of site development. Design problems focus on the functional uses and spatial interrelationships of plants in the landscape. Several field exercises deal with aspects of planting implementation normally specified by the landscape architect. A 2-day field trip is made to selected sources of nursery stock.

402 Design VI: Advanced Landscape Architectural Design

Spring. 5 credits. Prerequisite: Landscape Architecture 401. Cost of computer time, supplies, and reproductions about \$100.

Lec, F 9:05; studio, M W F 10:10–12:35.

P. J. Trowbridge.

An application of inventory and analysis methods to timely problems in both urban and rural environments. Several documentation formats are investigated, including computer mapping techniques.

*501 Graduate Landscape Architectural Design Studio

Fall. 5 credits.

L. J. Mirin and staff.

502 Graduate Landscape Architectural Design Studio

Spring. 5 credits.

Lec, T 12:20; studio, T R 1:30–4:25. T. H. Johnson. Design exercises focusing on the synthesis of conceptual ideas into three-dimensional compositions. Ideas from synectics, organizational systems, activity systems, historic spaces, and sculptures are used to compose hard space, soft space, regional space, and total energy environments.

*601 Graduate Landscape Architectural Design Studio

Fall. 5 credits.

Staff.

Landscape History and Theory

220 Principles of Landscape Architecture

Fall. 2 credits.

Lecs, M W 9:05. P. J. Trowbridge.

An introduction to the basic principles involved in inventory and analysis techniques as they relate to design implementation in the outdoor environment. Case studies depicting application of these principles at all scales of land planning and design are presented. American landscape history and basic design theory as applied to the practice of landscape architecture are emphasized.

221 Principles of Landscape Architecture

Fall. 1 credit. Prerequisite: concurrent registration in Landscape Architecture 220.

Sem, hours to be arranged. P. J. Trowbridge and staff.

Discussion of 220 lecture material at greater depth. Paper required.

425 Plants and Design

Fall. 2 credits. Floriculture 213 or 313. Landscape architecture majors must register concurrently in Landscape Architecture 401.

Lecs, T R 9:05. M. I. Adleman.

A study of planting design principles relating to the functional uses and spatial interrelationships of plants in the man-made environment. Site, horticultural, and maintenance determinants affecting the selection and use of plant materials, as well as planting specifications, cost estimates, and planting implementation processes are included.

*520 Contemporary Issues in Landscape Architecture

Fall. 2 credits.

Lec, T 11:15. L. J. Mirin.

*521 History of Landscape Architecture I

Fall. 4 credits.

Lecs, T R 11:15. L. J. Mirin.

522 History of Landscape Architecture II

Spring. 3 credits.

Lecs, T R 11:15. L. J. Mirin.

Landscape Materials and Construction

310 Site Construction I

Spring. 4 credits. Prerequisite: permission of instructor. Recommended: surveying. Lab fees, \$15.

Lecs, M W 9:05; studio, T R 9:05–11.

P. J. Trowbridge.

Lectures, short exercises, and projects dealing with land-form design and the preparation of grading plans, calculation of earthwork, and layout of circulation systems, parking, and site utility systems.

*Offered through the College of Architecture, Art, and Planning.

311 Site Construction II Fall. 4 credits.
Prerequisite: permission of instructor. Lab fees, \$15.
Lecs, T R 1:25-2:15; studio, T R 2:30-4:25.
T. H. Johnson.

The nature of construction materials and methods of construction used by landscape architects to implement project design proposals. Course includes field trips, lab demonstrations, lectures, and studio work on models; details; and a construction documentation package for a design project.

340 Landscape Design for Nurserymen and Landscape Contractors Fall or spring. 3 credits. Limited to 15 students. Priority given to landscape horticulture majors. Prerequisite: Floriculture 213.
Lec, M 12:20; studio, M W 1:25-4:25. R. L. Dwelle.
Fundamentals of landscape design applied to residential and other small-scale site-planning projects. Work in the studio introduces basic design process, site design principles, construction materials, planting design, and graphics.

431 Introduction to Parks and Recreation Fall. 2 credits.

W 7-9 p.m. E. J. Carter.
This course deals with the park development process and the relationship of parks and recreation facilities to urban, suburban, and rural recreation needs; physical and fiscal resources; overall municipal development efforts; the planning and design profession. Included also are the history of parks and environmental planning issues. The course consists of lectures, discussions, readings, and short papers.

432 Issues in Parks and Recreation Spring. 2 credits.

W 7-9 p.m. E. J. Carter.
The focus is on metropolitan park and open space systems: how such systems help to shape our cities; how they are reflective of the history of attitudes toward recreation, natural systems, and the urban environment; and the role of park and recreation considerations within the comprehensive community planning process. The course consists of lectures and case study presentations, discussions, readings, and short papers.

***530 Urban Landscape Planning and Design** Spring. 3 credits.
L. J. Mirin.

[531 Regional Landscape Inventories and Information Systems: An International Perspective Fall. 3 credits. Primarily for graduate students and upperclass students in landscape architecture. Also open to students in architecture, city and regional planning, ecology, international studies, international agriculture, natural resources, and environmental horticulture. Prerequisites: basic courses in landscape architecture, ecology and systematics, and agronomy and permission of instructor. Not offered 1980-81.

Lecs, M W F 10:10. A. S. Lieberman.
Reading-seminar course exploring major current methodologies, approaches, academic and research centers for landscape inventory and analysis, and supporting land-use and natural resource information systems. Case studies in regional landscape planning in North America, Europe, Australia, and the Middle East.]

[532 Analysis and Use of Vegetation in Comprehensive Land Planning Spring. 3 credits. Primarily for graduate students and upperclass students in landscape architecture. Also open to students in architecture, city and regional planning, ecology, international studies, international agriculture, natural resources, and environmental horticulture. Prerequisites: basic courses in landscape architecture, ecology and systematics, and agronomy and permission of instructor. Not offered 1980-81.

Lecs, M W F 10:10. A. S. Lieberman.

An exploration of vegetation analysis techniques and methods applied to comprehensive land-use planning, followed by consideration of the environmental uses of plants in regional landscape planning. The landscape functions of vegetation at the regional scale are addressed through review of case studies in North America, Europe, the Middle East, and Australia.]

Independent Study

555 Independent Study in Landscape Architecture Fall or spring. 1-3 credits (may be repeated for credit). Limited to students in the Landscape Architecture Program with permission of the faculty member directing the study. S-U grades optional.

Staff.
Work on special topics by individuals or small groups.

***621 Summer Internship Seminar** Fall. 2 credits.

Hours to be arranged. L. J. Mirin.
Primarily for landscape architecture graduate students.

622 Graduate Seminar in Landscape Architecture Spring. 2 credits. Prerequisite: Landscape Architecture 502 (may be taken concurrently).

T 12:20-1:15. T. H. Johnson.
A review of modern designers and their values within the contemporary landscape.

***650 Fieldwork/Workshop in Landscape Architecture** Fall or spring. Credit to be arranged.
Hours to be arranged. Staff.

800 Thesis Research and Preparation in Landscape Architecture Fall or spring. Credit to be arranged. Limited to M.L.A. degree candidates. Prerequisite: permission of graduate field members concerned.

Hours to be arranged. Staff.

Related Courses in Floriculture and Ornamental Horticulture

Woody Plant Materials (Floriculture 213)

Drawing for Landscape Architects (Floriculture 109)

Perspective for Landscape Architects (Floriculture 210)

Turfgrass Management (Floriculture 314)

Food Science

J. E. Kinsella, chairman; J. G. Babish, R. C. Baker, D. K. Bandler, D. M. Barbano, D. H. Beermann, D. C. Graham, R. B. Gravani, L. F. Hood, W. K. Jordan, F. V. Kosikowski, R. A. Ledford, F. W. Liu, R. P. March, D. D. Miller, N. N. Potter, J. M. Regenstein, G. E. Rehkugler, J. W. Sherbon, W. F. Shipe, Jr., J. R. Stouffer, G. H. Wellington, R. R. Zall

100 Introductory Food Science Fall. 3 credits.
M W F 10:10. N. N. Potter.

A comprehensive introduction to food science and technology—its scope, principles, and practices. Topics are: constituent properties, methods of preservation, the major food groups including their handling and processing, and current problems such as chemical additives and world feeding needs. Interrelationships between chemical and physical properties, processing, nutrition, and food quality are stressed.

*Offered through the College of Architecture, Art, and Planning.

101 Topics in Food Science Fall. 1 credit. Limited to food science majors taking Food Science 100. Prerequisite: Food Science 100. A required companion course to Food Science 100.
Lec and disc, F 11:15. N. N. Potter and staff. Members of the staff lecture and lead discussion on selected topics.

150 Food Choices and Issues Spring. 2 credits. S-U grades optional.

Lecs, T R 12:20. W. F. Shipe, staff, and invited speakers.
A series of lectures dealing with current topics relating to foods. Attempts are made to dispel misconceptions about foods and the factors affecting them.

210 Food Analysis Spring. 3 credits. Prerequisite: Chemistry 104 or 208.

Lecs, W F 12:20; lab, R or F 1:25-4:25.
J. W. Sherbon.
Designed to acquaint the student with chemical tests used by food analysts. Emphasis is on understanding and use of good analytical techniques, including gravimetric, volumetric, and spectrophotometric methods. Procedures for screening, routine quality control, and official tests for fats, proteins, carbohydrates, and selected minor nutrients are introduced.

220 Food Science for Industry Fall. 2 credits.

Lec and lab, F 12:20-4:25. R. C. Baker.
Provides understanding of food industry operations. Half the labs are production of food products (sausages, pastries, etc.) by students and half are visits to commercial plants producing those products. One or two longer field trips may be offered.

247 Postharvest Food Systems Fall. 2 credits.

Prerequisite: freshman chemistry. Recommended: Food Science 100. S-U grades optional.
T R 10:10. M. C. Bourne.
This interdisciplinary course describes various courses of postharvest food losses in developing countries and methods available to reduce the losses. Designed for all students in agriculture. Emphasis on cereal grains. Biology and control of rodents, birds, insects, and molds in stored foods, chemical causes of quality loss, simple drying and storage practices, effects of climate. Economic and social factors affecting food preservation and storage technology are discussed.

300 Physical Chemistry of Goods I Fall. 3 credits.

Not open to graduate students. Prerequisite: Mathematics 111 or equivalent.
Lecs, M W 11:15; disc, F 12:30-2:15 or 2:30-4:15.
An introduction to the principles of molecular structure, energetics, and kinetics is offered, with applications of these principles to food systems and similar biological materials. Topics include thermodynamics, properties of solutions, phase equilibria, reaction mechanisms, and transport phenomena.

301 Nutritional Aspects of Raw and Processed Foods (also Nutritional Sciences 301) Spring.

3 credits. Prerequisite: Nutritional Sciences 115 or permission of the instructor.
M W F 9:05. D. Miller.
An evaluation of the nutritional qualities of human foods with an emphasis on changes that occur during processing and storage. Topics including food processing methods, dietary trends, vegetarian diets, fabricated foods, fast foods, and food additives will be discussed in the context of their potential impact on nutrition and health.

302 Introduction to Food Engineering Fall.

4 credits. Prerequisites: Food Science 100 and physics.
Lecs, M W F 10:10; lab, M 1:25-4:25. W. K. Jordan.
Engineering aspects of dairy and food plant operations.

304 Food Sanitation As Related to Public Health

Spring. 3 credits. Prerequisite: Food Science 100.

Lecs, T R 10:10; lab, R 1:25. R. R. Zall.

Deals with the sanitary principles and control measures essential in producing and processing wholesome and safe foods. Rules and regulations of the U. S. Public Health Service, the Food and Drug Administration, the U. S. Department of Agriculture, and other organizations important to the food industry are covered.

[311 Milk and Frozen Desserts

Fall. 2 credits. Prerequisite: Food Science 100 or equivalent or permission of instructor. Offered alternate years. Not offered 1980-81.

Lec, W 12:20; lab, W 1:25. W. K. Jordan, R. R. Zall. Deals with the principles and practices of processing fluid milk products and frozen desserts. The chemical, microbiological, and technological aspects of processing these dairy products are considered. Field trips to processing plants supplement the lectures and lab work.]

351 Milk Quality

Spring. 1 credit. Prerequisite: Animal Science 350 (may be taken concurrently) or permission of instructor.

Lec, F 12:20. D. K. Bandler, R. R. Zall.

Aspects of farm sanitation and milk handling as they apply to milk quality. Quality control tests, farm bacteriology, cleaning, and sanitizing. Special problems of marketing fresh and manufactured dairy products.

394 Food Microbiology Lectures

Spring. 2 credits. Prerequisites: Microbiology 290 and 291.

MW 12:20. R. A. Ledford.

The major families of microorganisms of importance in foods are studied systematically, with emphasis on the roles of these organisms in food preservation, food fermentations, and public health.

395 Food Microbiology Laboratory

Spring. 2 credits. Graduate students must have permission of the instructor.

MW 2-4:25. R. A. Ledford.

Work includes study of the physiological characteristics of representative food microorganisms, practice in using general and special methods for microbiological testing and control of food products, and practice in isolating and characterizing organisms of importance in foods.

[401 Concepts of Product Development

Spring. 2 credits. Prerequisite: Food Science 100 or equivalent. S-U grades optional. Offered alternate years. Not offered 1980-81.

MW 10:10. L. F. Hood.

A discussion of the sequence of events involved in developing and marketing new food products. Topics include packaging and labeling, food additive and ingredient regulations, taste panels, market testing, market research, and patents.]

[402 Product Development Laboratory

Spring. 2 credits. Limited to food science majors. Prerequisite: concurrent registration in Food Science 401 and permission of instructor. S-U grades optional. Offered alternate years. Not offered 1980-81.

Labs, W F 1:25-4:25. L. F. Hood.

Emphasis is on gaining practical experience in the development of new foods.]

403 International Food Science and

Development Fall. 3 credits. Offered alternate years.

Lecs, T R 11:15; disc, R 1:25-4:25.

F. V. Kosikowski.

A critical evaluation of man's needs for food in the world and the international food technologies, organizations, and policies to meet such needs. Novel extrusion, ultrafiltration, and fermentation food processes and basic nutrient foods for developing countries are described. The making of

representative high energy and protein foods, including soybean milk, tofu, sufu and tempeh will be demonstrated in the laboratory.

[404 Food Processing I — Drying, Freezing, Heat

Preservation Spring. 3 credits. Prerequisite: Food Science 100 or equivalent. Offered alternate years. Not offered 1980-81.

Lecs, T R 11:15; lab, T 1:25-4:25. N. N. Potter. Deals with the principles and practices of drying, freezing, canning, and other heat treatments applied to foods. Current processing methods and their relations to the chemistry, microbiology, and technology of the ingredients and final products are discussed.]

405 Food Processing II — Concentrating,

Separating, Mixing Spring. 3 credits. Prerequisites: 302 and Microbiology 290 and 291. Offered alternate years.

Lecs, T R 11:15; lab, T 1:25-4:25. W. K. Jordan, R. R. Zall.

Deals with the principles and practices of evaporation, reverse osmosis, homogenization, size reduction, waste management, and other unit operations important to the food industry.

[406 Food Processing III Lecture — Fermentations

Fall. 3 credits. Prerequisite: background in microbiology. Offered alternate years. Not offered 1980-81.

Lecs, T R 11:15; disc, R 1:25-4:25.

F. V. Kosikowski.

Principles and practices of viniculture and enology, cheese technology, and related fermentations leading to important foods from fruits, grains, vegetables and milk, animal, and microbial sources. Taste evaluations and illustrated descriptions of wines, beers, cheeses, fermented milks, and exotic fermented foods are included.]

407 Processing Fats and Oils

Fall. 3 credits. Offered in even years.

Lecs, W F 9:05; lab, F 1:25-4:25. J. E. Kinsella.

Sources, composition, and properties of edible fats and oils are discussed. Effects of lipids on food quality and storage stability and factors affecting chemical and physical stability of food fats are described. Chemical technology of emulsions, shortenings, edible oils, margarine, and butter is taught.

[408 Food Processing Fermentations

Laboratory Fall. 2 credits. Enrollment limited. Prerequisite: concurrent registration in Food Science 406. Offered alternate years. Not offered 1980-81.

Lab, T 1:25-4:25. Required short field trips.

F. V. Kosikowski.

Laboratory exercises and demonstrations in the making of wines, beers, cheeses, fermented milks, and vegetable foods. Field trips provide additional experience.]

409 Food Chemistry

Fall. 3 credits. Prerequisite:

Biological Sciences 330 or 331.

Lecs, T R 8-9:25. W. F. Shipe, L. F. Hood,

J. E. Kinsella, J. M. Regenstein.

Deals with the relationship between the chemical composition and properties of foods. Attention is given to the interactions among the components of food.

410 Sensory and Objective Evaluations of

Foods Spring. 3 credits. Prerequisite: statistics.

Lecs, M W F 11:15. W. F. Shipe.

Deals with the sensory techniques used in evaluating the flavor, color, and texture of foods and the effects of these properties on consumer acceptance. Objective methods for measuring these qualities and appropriate statistical methods for analyzing the subjective and objective results and establishing a quality-control program.

411 Food Mycology

Fall. 3 credits. Prerequisite:

Microbiology 290 or 291 or equivalent.

Recommended: Microbiology 394. Offered alternate

years.

Lecs, T R 10:10; lab, W 1:25-4:25. D. C. Graham.

To acquaint students with important fungi, from the standpoint of their beneficial as well as their harmful effects in food production, preservation, and spoilage. Labs deal with morphology, culture and isolation, identification of fungi, and isolation and quantification of fungal toxins.

[413 Function of Food Ingredients

Spring. 1 credit. Prerequisite: Food Science 409. S-U grades optional. Offered alternate years. Not offered 1980-81.

Lec, F 10:10. L. F. Hood.

Intended for food science majors anticipating product development, production, or quality-control assignments in the food industry. Functional properties of classes of ingredients and their potential interactions with other food constituents are discussed. Guest lecturers from ingredient suppliers participate.]

415 Principles of Food Packaging

Fall. 3 credits.

Lecs, M W F 9:05.

Intended primarily for students in food science and related fields. The basic properties of some packaging materials and systems are discussed and applied to specific packaging systems for meats, dairy products, fruits and vegetables, fats and oils, etc.

419 Food Chemistry Laboratory

Spring. 2 credits. Prerequisites: Biological Sciences 330 or 331 and Food Science 409.

Lab, T 1:25-4:25. D. Miller.

Intended to complement Food 409 in developing an understanding of the chemistry of food. Lab exercises deal with the chemical properties of food components and changes these components undergo in processing and storage. The relationship between the chemical composition of foods and functional, nutritional, and organoleptic properties are stressed.

497 Special Topics in Food Science

Fall or spring. 3 credits maximum. Prerequisite: permission of instructor. S-U grades optional.

Staff.

For the food science student. May include individual tutorial study, a special lecture topic selected by a professor or a group of students, or selected lectures of a course already offered. As topics may be changed, the course may be repeated for credit.

499 Undergraduate Research in Food Science

Fall or spring. 2 credits. S-U grades optional. Students must attach to their course enrollment

material written permission from the staff member who will supervise the work and assign the grade. Except for students enrolled in the honors program, credit will be limited to 4 credits.

Hours to be arranged. Staff.

Independent study.

600 Seminar Fall or spring. 1 credit. Required of all food science graduate students. S-U grades only.

[601 Food Protein Chemistry

Fall. 3 credits.

Limited to graduate students and to seniors with

permission of the instructor. Prerequisite: Food

Science 300 or its equivalent. Students who have

already had Biological Sciences 631 may not take

this course for credit. Offered alternate years. Not

offered 1980-81.

Lec, M W F 10:10. J. M. Regenstein.

The chemistry and physical chemistry of proteins are discussed. Important proteins of food systems are examined in terms of methodology currently used in protein chemistry for characterization and purification. Interactions of proteins with other food components are also covered.]

[602 Food Lipids Spring. 2 credits. Limited to graduate students. Offered alternate years. Not offered 1980-81.

T R 12:20. J. E. Kinsella.

Disposition of lipid materials in foods and how lipids influence the chemical and physical attributes of various foods. Effects of storage, heating, refrigeration, and enzymes on food lipids and the chemical mechanisms of oxidation. Importance of lipids to food flavors.]

[603 Food Carbohydrates Spring. 2 credits.

Limited to qualified seniors and graduate students. Prerequisite: Biological Sciences 330 or equivalent. Offered alternate years. Not offered 1980-81.

Lecs, T R 10:10. L. F. Hood, R. S. Shallenberger. A consideration of the chemistry of carbohydrates in foods including sugars, starches, pectins, gums, and cellulose. Emphasis is on their intrinsic chemistry, their origins in raw materials, and the subsequent changes occurring during processing and storage.]

604 Chemistry of Dairy Products Fall. 2 credits.

Prerequisites: qualitative and quantitative analysis and organic chemistry. Offered alternate years.

Lecs, T R 12:20. D. M. Barbano.

A study of milk constituents and physical properties. Deals with milk enzymes, lactose, milk fat, milk proteins, and minor constituents and includes biological variations and processing effects.

605 Application of Physical Chemistry to Foods

Fall. 1 credit. Not open to students who have completed or are registered in Food Science 710.

Prerequisite: physical chemistry or concurrent registration in Food Science 300.

Lec, F 11:15.

The application of physical chemical principles to important food systems, with emphasis on emulsions.

606 Instrumental Methods Fall. 5 credits.

Prerequisite: permission of instructor.

Lec, M W F 8; lab, W or R 1:25-4:25.

J. W. Sherbon.

Deals with instrumental methods widely used in research and industry. The major emphasis is on chromatography, spectroscopy, electrophoresis, thermal analysis, and the use of computers. The stress is on the theoretical and practical aspects of the material presented.

[608 Food Color and Food Pigments Fall.

1 credit. Prerequisite: organic chemistry. Offered alternate years. Not offered 1980-81.

Lec, F 12:20. J. P. VanBuren.

An introduction to theories of color perception and color spaces, followed by a survey of chemical and physical properties of the major food pigments and their stability during processing and storage. Color and pigments of selected commodities are examined.]

[609 Rheology Fall. 1 credit. Offered alternate

years. Not offered 1980-81.

Lec, T 12:20. M. C. Boume.

Fundamental concepts of rheology applied to foods, with emphasis on objective methods for measuring textural properties. Principles and practice involved in measuring texture, viscosity, texture profiling, and consistency; instrumentation and correlations between objective and sensory methods of texture measurements. Examples of rheological problems in each major food group.]

610 Introductory Chemical Toxicology Fall.

1 credit. Prerequisites: biochemistry and animal physiology. Offered alternate years.

Lec, F 11:15. G. S. Stoewsand.

An introduction to the concepts and essentials of toxicology, especially as related to foods; physiologically active compounds in natural and processed foods; antinutritive substances; intentional food additives; potential contaminants; safety

evaluation and regulation of foods. Writing or a brief student lecture is assigned, to widen knowledge of current research.

[614 Mathematical Evaluation of Processed

Packaged Foods Spring. 3 credits. Offered alternate years. Not offered 1980-81.

Lec and disc, R 2-4:25.

Mathematical methods used to evaluate the thermal processing of packaged foods are presented in depth. These techniques are used in predicting shelf life and nutrient loss.]

615 Secondary Plant Metabolites in Foods Fall.

1 credit. Prerequisite: Biological Sciences 330 or 331. Offered alternate years.

Lec, F 12:20. G. Hrazdina.

Deals with the biochemistry of secondary plant metabolites (e.g., sulphur-containing compounds, alkaloids, flavonoids, terpenes) and their importance to food products. Emphasis is on the chemical properties of these compounds, their reactions, their occurrence in edible plants, and their influence on food products.

710 Physical Chemistry of Foods II Fall.

3 credits. Prerequisite: Mathematics 111 or equivalent. Not open to students who have had physical chemistry or Food Science 300. Limited to graduate students.

Lec, M W F 11:15.

The application of physical chemical principles to important systems, with emphasis on emulsions. In addition, an introduction to the principles of molecular structure, energetics, and kinetics is offered, with applications of these principles to understanding foods and other biological materials.

Related Courses in Other Departments

Marketing (Agricultural Economics 240)

Food Industry Management (Agricultural Economics 443)

Introduction to Agricultural Engineering and Computing (Agricultural Engineering 151)

Engineering Design and Analysis of Food Processing Equipment (Agricultural Engineering 466)

Meat and Meat Products (Animal Science 290)

Commercial Meat Processing (Animal Science 392)

Advanced General Microbiology Lectures (Microbiology 390)

Postharvest Handling and Marketing of Vegetables (Vegetable Crops 312)

International Agriculture

300 Perspectives in International Agriculture and Rural Development Fall. 2 credits. S-U grades optional.

F 1:25-3:20. Staff.

A forum to discuss both contemporary and future world food issues and the need for an integrated, multidisciplinary team approach in helping farmers and rural development planners adjust to the ever changing food needs of the world.

600 Seminar: International Agriculture Fall and spring. Noncredit. S-U grades only.

Third and fourth Wednesdays of each month, 4-5. Staff.

The seminar focuses on developing an understanding of the nature and interrelatedness of

agricultural development and the social sciences, plant and animal sciences, foods and nutrition, and natural resources.

601 Agricultural Development in Southeast Asia

Spring. 2 credits. S-U grades optional.

F. H. Golay, G. Levine.

Major aspects of agricultural development in Southeast Asia are considered from economic, social, and technological points of view.

602 Special Studies of Problems of Agriculture in the Tropics Spring. 3 credits. Prerequisites: an

international agriculture course and permission of instructors. Cost of field-study trip, \$400 for lodging, meals, personal expenses, and a portion of transportation.

R 2:30-4:25. Staff.

Oriented to provide students an opportunity to observe agricultural development in a tropical environment and promote interdisciplinary exchange among staff and students. The two-week field-study trip during January to Latin American countries is followed by discussions and assignments dealing with problems in agriculture and livestock production in the context of social and economic conditions.

603 Administration of Agricultural and Rural Development (also Government 692 and B&PA NCE 514) Spring. 3 credits. S-U grades optional.

T 2:30-5:30. M. L. Barnett, J. L. Compton,

M. J. Esman, N. T. Uphoff, L. W. Zuidema

An intercollege course designed to provide graduate students a multidisciplinary perspective on the administration of agricultural and rural development activities in developing countries. The course is oriented to students trained in agricultural and social sciences who are likely to occupy administrative roles during their professional careers.

604 Seminar on African Agriculture and Rural Development Fall. 2 credits. S-U grades optional.

M 1:25-3:20. Staff.

Strategies for increasing food production and raising rural incomes in Africa. Topics include cropping systems in Africa and the role of agricultural technology in increasing yields, improving livestock production, strategies for improving human nutrition, food storage and mechanization, rural employment projects, alternative rural development strategies, and experience with World Bank and other internationally funded rural development projects.

650 Special Topics in International Agricultural and Rural Development Fall and spring.

1-3 credits. S-U grades optional.

Staff.

A seminar on current themes of agricultural and rural development. Specific content varies each semester.

703 Seminar for Special Projects in Agricultural and Rural Development Spring. 1 credit. Required

for graduate students enrolled in the M.P.S. (Agr.) degree program and majoring in international agricultural and rural development; others with permission of the program director. S-U grades only.

Hours to be arranged. Staff.

The seminar provides students the opportunity to present their special projects. It also serves as a forum for discussion of current issues in low-income agricultural and rural development, with particular attention to interdisciplinary complexities.

899 International Agricultural and Rural Development Project Paper Fall and spring.

1-6 credits. Limited to M.P.S. candidates in international agriculture and rural development. S-U grades only.

Staff.

Related Courses in Other Departments

Economics of Agricultural Geography
(Agricultural Economics 150)

Agricultural Trade Policy (Agricultural Economics 430)

Economics of Agricultural Development
(Agricultural Economics 464)

Food, Population, and Employment (Agricultural Economics 660-661)

Microeconomic Issues in Agricultural Development (Agricultural Economics 664)

Seminar on Latin American Agricultural Policy
(Agricultural Economics 665)

Seminar in Agricultural Development (Agricultural Economics 666)

Seminar on Agricultural Trade Policy (Agricultural Economics 730)

Export Marketing (Agricultural Economics 743)

Production of Tropical Crops (Agronomy 314)

Geography and Appraisal of Soils of the Tropics
(Agronomy 401)

Management Systems for Tropical Soils
(Agronomy 480)

Livestock Production in Warm Climates (Animal Science 400)

[Forages of the Tropics for Livestock Production
(Animal Science 403)]

Intercultural Communication (Communication Arts 601)

Communication in the Developing Nations
(Communication Arts 624)

Designing Extension and Continuing Education Programs (Education 624)

Behavioral Change in International Rural Modernization (Education 627)

Comparative Extension Education Systems: Structural-Functional Perspectives (Education 629)

Postharvest Food Systems (Food Science 247)

International Food Science and Development
(Food Science 403)

Political Economy of Change: Rural Development in the Third World (Government 648)

Regional Landscape Inventories and Information Systems: An International Perspective
(Landscape Architecture 531)

[Analysis and Use of Vegetation in Comprehensive Land Planning (Landscape Architecture 532)]

National and International Food Economics
(Nutritional Sciences 457)

International Nutrition Problems, Policy, and Programs (Nutritional Sciences 680)

Seminar in International Nutrition and Development Policy (Nutritional Sciences 695)

Special Topics in International Nutrition
(Nutritional Sciences 699)

Plant Diseases in Tropical Agricultural Development (Plant Pathology 655)

[Economic Fruits of the World (Pomology 208)]

Rural Sociology and World Development Problems (Rural Sociology 105)

Rural Development and Cultural Change (Rural Sociology 355)

Subsistence Agriculture in Transition (Rural Sociology 357)

Contemporary Sociological Theories of Development (Rural Sociology 606)

Social Organization of Agriculture (Rural Sociology 650)

Macrosocial Accounting (Rural Sociology 715)

Social Movements in Agrarian Society (Rural Sociology 723)

Applications of Sociology to Development Programs (Rural Sociology 751)

Sociotechnical Aspects of Irrigation (Rural Sociology 754)

Landscape Architecture

The Landscape Architecture Program at Cornell is sponsored by the College of Agriculture and Life Sciences through the Department of Floriculture and Ornamental Horticulture and the College of Architecture, Art, and Planning. See pages 24 and 48.

Microbiology

R. P. Mortlock, chairman; E. A. Delwiche, N. C. Dondero, W. C. Ghiorse, E. P. Greenberg, C. M. Rehkugler, P. J. VanDemark, S. H. Zinder

290 General Microbiology Lectures Fall or spring. 3 credits. Prerequisites: Biological Sciences 101-102 and Chemistry 104 or 208. Recommended: concurrent registration in Microbiology 291.

M W F 11:15. Fall, W. C. Ghiorse; spring, P. J. VanDemark.
A study of the basic principles and relationships in the field of microbiology, with fundamentals necessary for further work in the subject.

291 General Microbiology Laboratory Fall or spring. 2 credits. Prerequisite: Microbiology 290 (may be taken concurrently).

M W 2-4:25 or 7-9:30 p.m. or T R 8-10:30, 11:15-1:45, or 2-4:25. Fall, W. C. Ghiorse; spring, P. J. VanDemark.

A consideration of the basic principles and techniques of laboratory practice in microbiology and fundamentals necessary for further work in the subject.

292 General Microbiology Discussion Spring. 1 credit. Prerequisite: Microbiology 290 (may be taken concurrently). S-U grades only.

Hours to be arranged. P. J. VanDemark.
A series of discussion groups in specialized areas of microbiology to complement Microbiology 290.

314 Tissue Culture Techniques and Applications Fall. 2 credits. Prerequisites: Microbiology 290 and 291 or permission of instructor.

F 1:25-3:30; 3 lab exercises scheduled on a rotating basis, F 3:30-5:30. C. M. Rehkugler.
A series of lectures and demonstrations dealing with cell culture methods, especially those required to culture cells of plants and animals from different tissue origins. The application of cell culture to the study of bacterial diseases, virus replication, and the production of biologicals are considered.

[390 Advanced General Microbiology Lectures Fall. 2 credits. Prerequisites: Microbiology 290 and 291 and organic chemistry. May be taken independently of Microbiology 391 and in sequence with or independently of Microbiology 392. Offered alternate years.

M W 11:15. E. A. Delwiche, N. C. Dondero.
A consideration of the morphological, taxonomic, cultural, and physiological characteristics of important groups of heterotrophic microorganisms. Included will be (1) spore-forming bacteria, propionic acid bacteria, and gram-negative cocci and (2) pseudomonads, enterics, and related forms.]

[391 Advanced General Microbiology Laboratory Fall. 2 credits. Limited to 20 students. Prerequisite: Microbiology 390 (may be taken concurrently). Offered alternate years.

M W 2-4:25. E. A. Delwiche, N. C. Dondero.
Intended as a lab complement to Microbiology 390. The isolation, characterization, and study of the groups of heterotrophic microorganisms included in Microbiology 390.]

392 Advanced General Microbiology Lectures Fall. 2 credits. Prerequisites: Microbiology 290 and 291 and organic chemistry. May be taken independently of Microbiology 393 and in sequence with or independently of Microbiology 390. Offered alternate years.

M W 11:15. P. J. VanDemark, E. P. Greenberg.
A consideration of the morphological, taxonomic, cultural, and physiological characteristics of important groups of heterotrophic microorganisms. Included are (1) lactic acid bacteria and (2) marine bacteria, thermophilic bacteria, and halophilic and halotolerant bacteria.

393 Advanced General Microbiology Laboratory Fall. 2 credits. Limited to 20 students. Prerequisite: Microbiology 392 (may be taken concurrently). Offered alternate years.

M W 2-4:25. P. J. VanDemark, E. P. Greenberg.
Intended as a lab complement to Microbiology 392. The isolation, characterization, and study of the groups of heterotrophic microorganisms included in Microbiology 392.

336 Applied and Industrial Microbiology Fall. 3 credits. Prerequisites: Microbiology 290 and organic chemistry.

T R 10:10-11:25. E. A. Delwiche, N. C. Dondero, and staff.
A survey of the microbiology of industrial fermentations and public health aspects of water and wastewater.

422 Aquatic Microbiology Spring. 3 credits. Prerequisites: Microbiology 290 or Agronomy 406, and organic chemistry.

T R 10:10-11:25. N. C. Dondero.
A consideration of the relation of microorganisms, especially the bacteria, to aquatic environments, both natural and artificial. The microbiology of wastewaters is included. Attention is given to fundamental biological concepts and to applied aspects of the occurrence and activities of microorganisms in water.

424 Microbial Ecology Spring. 3 credits. Prerequisite: an elementary course in some facet of microbiology. Offered alternate years.

M W F 10:10. M. Alexander.
An introduction to the basic principles of microbial ecology. Attention is given to the behavior, activity, and interrelationships of bacteria, fungi, algae, and protozoa in natural ecosystems.

480 Microbial Physiology Lectures Spring. 3 credits. Prerequisites: Microbiology 290 and 291 and biochemistry. S-U grades optional. M W F 11:15. R. P. Mortlock.

The concern is with the physiological functions of microorganisms. Particular consideration is given to the dynamics of growth, the nutrition and energy metabolism of developing cultures, and the interactions of the physical and chemical environments with the growth process. Composition and structure of microorganisms, metabolism, and various microbial processes such as transport and regulation are discussed.

481 Microbial Physiology Laboratory Spring. 3 credits. Limited to 12 students. Prerequisites: Microbiology 480 (may be taken concurrently) and permission of instructor. S-U grades optional. T R 12:20-4:25. R. P. Mortlock.

The lab component of Microbiology 480. Experiments designed by the instructor and students to explore fundamental concepts, techniques, and instrumentation in microbial physiology.

484 Cytology of Prokaryotes Lectures Spring. 3 credits. Prerequisites: Microbiology 290 and 291, biochemistry. S-U grades optional. Offered alternate years. M W F 9:05. W. C. Ghiorse.

An in-depth survey of structure, function, and life cycles of prokaryotic organisms. Form, organization, and function within the prokaryotic domain are considered with respect to aggregates of cells, individual cells, sub-cellular organelles, and macromolecular architecture.

485 Cytology of Prokaryotes Laboratory Spring. 1 credit. Enrollment limited. Prerequisite: concurrent registration in Microbiology 484 and permission of instructor. Offered alternate years. Hours to be arranged. W. C. Ghiorse.

Cytological techniques, including preparations for light and electron microscopy, that are especially applicable to the study of prokaryotic cells.

486 Selected Topics in Microbial Metabolism Spring. 2 credits. Primarily for upperclass and graduate students. Prerequisites: beginning courses in general microbiology, biochemistry, and organic chemistry. S-U grades optional. T R 11:15. E. A. Delwiche.

Selected topics pertaining to the energy metabolism, oxidative and fermentative abilities, and biosynthetic capacities of microorganisms. Where possible and appropriate, the subject matter compares the various microbial forms.

497 Special Topics Fall. 1 credit. Limited to upper class students specializing in microbiology, who may desire to take Microbiology 499. Prerequisite: permission of instructor. S-U grades only. The course cannot be used to fulfill the specialization requirement. Hours to be arranged. Staff.

498 Teaching Experience Fall or spring. 1-3 credits. Enrollment limited. Prerequisites: previous enrollment in the course to be taught or equivalent, and written permission of instructor. S-U grades option with permission of instructor. Hours to be arranged. Staff.

Designed to give qualified undergraduate students teaching experience through actual involvement in planning and teaching microbiology courses under supervision of departmental faculty. This experience may include leading a discussion group, preparing, assisting, or teaching a microbiology laboratory, or tutoring. Microbiology courses currently offering such experience include 291 and 292. This course cannot be used to fulfill the specialization requirement.

499 Research in Microbiology Fall or spring. Variable credit. Undergraduates must attach to their course enrollment material written permission of the

staff member who will supervise the work and assign the grade. This course cannot be used to fulfill the specialization requirement.

Hours to be arranged. Staff.

691 Graduate Seminar in Microbiology Fall and spring. 1 credit each semester. All graduate students majoring in microbiology must enroll each semester. Hours to be arranged. Staff.

694 Bacterial Diversity Spring. 4 credits. Prerequisites: either Microbiology 390, 392, or 480, and Biological Sciences 330 or 331 or equivalent. M W 12:20-4:25. E. P. Greenberg.

Physiology, ecology, and morphology of selected groups of bacteria, including the methanogenic bacteria, spirochetes, nitrogen-fixing bacteria, photosynthetic bacteria, thermophilic bacteria, myxobacteria, and others. Behavior of bacteria in response to environmental stimuli.

699 Microbiology Seminar Fall and spring. Required of all graduate students majoring in microbiology and open to all who are interested. Hours to be arranged. Staff.

Related Courses in Other Departments

[Soil Microbiology Lectures (Agronomy 406)]

Advanced Soil Microbiology (Agronomy 606)

Insect Pathology (Entomology 453)

Food Microbiology Lectures (Food Science 394)

Food Microbiology Laboratory (Food Science 395)

Food Mycology (Food Science 411)

Basic Immunology Lectures (Veterinary Medicine 315)

Basic Immunology Laboratory (Veterinary Medicine 316)

Pathogenic Microbiology (Veterinary Medicine 317)

Microbial Genetics, Lectures (Biological Sciences 485)

Microbial Genetics, Laboratory (Biological Sciences 486)

[Advanced Immunology Lectures (Veterinary Medicine 705)]

[Advanced Immunology Laboratory (Veterinary Medicine 706)]

Advanced Work in Bacteriology, Virology, or Immunology (Veterinary Medicine 707)

Advanced Animal Virology Lectures (Veterinary Medicine 708)

Advanced Animal Virology Laboratory (Veterinary Medicine 709)

Immunopathology and Clinical Immunology (Veterinary Medicine 712)

Natural Resources

W. H. Everhart, chairman; R. A. Baer, H. B. Brumsted, J. W. Caslick, S. P. Gloss, L. S. Hamilton, E. E. Hardy, T. L. Hullar, J. W. Kelley, J. P. Lassoie, R. J. McNeil, R. A. Malecki, A. N. Moen, R. R. Morrow, Jr., R. T. Oglesby, M. E. Richmond, C. L. Schofield, D. A. Webster, B. T. Wilkins, W. D. Youngs

200 Principles of Conservation Fall. 3 credits. Limited to natural resources majors. Not open to students who have passed Natural Resources 201. Lects, M W F 10:10; 1-hour disc to be arranged. R. J. McNeil.

Principles of environmental conservation and application of those principles to the management of natural resources. Ecological concepts, a survey of the natural resources and their properties, and resource management concepts are considered. Social, political, legal, economic, and ethical aspects of environmental issues are discussed.

201 Environmental Conservation Spring. 3 credits. A survey course intended for students in any year and major. Not open to students who have passed Natural Resources 200. Lects, M W F 10:10; 1-hour disc to be arranged. R. J. McNeil.

People, natural resources, and environment. Ecological principles as applied to human use of environment; survival strategies of animals and the application of these concepts to human use and misuse of environment; a survey of natural resources and problems related to their management. Current issues such as air and water pollution, disposal of radioactive wastes, human population pressures, energy supply and management, and life-style are considered. Social, political, legal, economic, and ethical aspects of environmental concerns are introduced.

210 Introductory Field Biology Fall. 3 credits. Preference given to natural resources sophomores. Prerequisites: Either Biological Sciences 101 and 102 or equivalent. Expenses for field trip, no more than \$6.

Lec, W 10:10; lab, M W 1:25-4:25. Overnight field trips. T. Gavin.

Introduction to methods of inventorying, collecting, preserving, and identifying plants, animals, and their habitats. Principles and concepts of systematics and ecology are studied as they apply to both aquatic and terrestrial systems. Selected aspects of current ecological thinking relevant to problems of resource management, particularly the assessment of the distribution and abundance of organisms, are stressed. Observation and recording of field observations are emphasized.

250 Introductory Wildlife Biology Spring; first third of term. 1 credit. Prerequisites: Natural Resources 210 and junior standing.

Lec, M W F 8. A. N. Moen. Introduction to the biological characteristics of wildlife species, with analyses of these characteristics in relation to ecology and management.

251 Introductory Fishery Biology Spring; middle third of term. 1 credit. Prerequisites: Natural Resources 210 or permission of instructor.

Lec, M W F 8. Staff. Importance of basic life history, ecology, and measurable parameters as a bases for fishery management. Representative commercial and recreational fisheries will be used as examples.

252 Introductory Forestry Spring; last third of term. 1 credit. Prerequisites: Natural Resources 210 or permission of instructor.

Lec, M W F 8. R. R. Morrow. Appreciation of forests as a natural resource. Importance of ecology and measurement as bases for forest management. Introduction to tree biology and silviculture.

300 Natural Resources Inventories Spring. 3 credits.

Lecs, M W 12:20; lab, M T W 2. E. E. Hardy. Procedures for inventorying resources, the methods used, and theories of inventory development in relation to present needs. Examination of the processes used in generating currently used inventories, application of methods to improve

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existing inventories, and experience in developing inventories are undertaken. Land resource inventories are emphasized.

302 Forest Ecology Fall. 3 credits. Limited to seniors and graduate students. Cost of trip, no more than \$20.

Lecs, M W 11:15; lab, M 1:25-4:25. 1 weekend trip, S through M. Staff.
Understanding the wildland environment. Development of ability to identify and analyze what is present, what was present, what is likely to happen in various forest ecosystems. All lab sessions in the field. One required weekend trip to the Adirondacks or other major forest region.

303 Woodland Management Fall. 3 credits. S-U grades optional.

Lecs, T R 11:15; lab, R 1:25-4:25 (1 field trip will end at 5:30). R. R. Morrow.
Designed to give the student the basic information necessary to permit sound woodland management decisions. Field trips to woodlots emphasize variations in value and potential as well as biological growth. Introduction to tree identification, log scaling, timber estimating, tree marking, and stand improvement work. Planting, management, harvesting, marketing, and multiple use are discussed, as well as relationships of forestry to people and to the environment.

305 Maple Sirup Production Spring. 1 credit. S-U grades only. Limited to 20 students. Prerequisite: permission of instructor.

T 12:20-4:25 (4 preliminary seminars, followed by several half-days of fieldwork during the maple season). R. R. Morrow, A. Fontana.
Students work in most phases of the Arnot Forest maple operation and learn modern sap collecting techniques and quality control in making sirup. A 100-tap area is reserved for student installation of a tubing sap collection network.

320 Winter Energetics Spring. 1 credit.

Prerequisites: Natural Resources 250.
Lec, lab, and disc, all day M T W R F in residence at Arnot Forest. A. N. Moen.
Field measurements of weather and range conditions in the winter will be related to metabolism, nutrition, and behavior of free-ranging animals at the Arnot Forest during the last week of the January intersession period.

330 Ecological Integration Summer or fall. 3 credits.

Prerequisites: Natural Resources 250 or permission of instructor.
Lec, lab, and disc, all day M T W R F in residence at Arnot Forest. A. N. Moen.
Measurements and analyses of weather, watershed, plant community, and animal population characteristics in an integrated ecological way, stressing interrelationships within ecosystems. This course will be held at the Arnot Forest during the three-week summer session beginning the week after commencement.

407 Religion, Ethics, and the Environment

Spring. 3 credits. For juniors, seniors, and graduate students; others by permission. S-U grades optional.
T R 9:05; 1-hour disc to be arranged. R. A. Baer.
A study of the effects of Western religion and values on our understanding and treatment of nature. Historical overview, followed by consideration of selected themes, including progress, play and work, objectivity and subjectivity, human finitude and death, and knowledge as control. Also responsibility to future generations; limiting growth and questions of distributive justice; world population and global hunger; implications of environmental programs for minorities, the poor, and other nations; land use; and energy policy.

410 Principles of Wildlife Management Spring. 4 credits. Prerequisite: junior standing, Biological

Sciences 360, or permission of instructor. Cost of field trips, no more than \$6.

Lec, M W F 8; lab, F 1:25-4:25. One all-day Saturday and one overnight field trip are required. Students are also required to participate in a deer management project requiring additional fieldwork. T. Gavin.
Fundamental characteristics and mechanisms of wildlife populations and habitats. Includes ecological, social, and economic aspects of wildlife management. Lab includes survey of economically important North American species as well as field trips illustrating methods of habitat management.

411 Techniques in Wildlife Science Spring. 2 credits. Prerequisite: Natural Resources 410 or permission of instructor.

Lec, F 11:15; lab, F 1:25-4:25. J. W. Caslick.
An introduction to techniques used in wildlife research and management, with emphasis on field methods and northeastern game species.

414 Selected Topics in Wildlife Resource Policy

Spring. 2 credits. Intended for juniors and seniors. Prerequisite: Natural Resources 410 or equivalent. S-U grades optional. Cost of field trips, no more than \$25.

T 2-4:30. Several field trips usually taken weekdays; one overnight field trip to Albany. H. B. Brumsted.
A seminar devoted to analysis of selected current policy issues in wildlife management. Particular attention is given to citizen roles in policy development.

[430 Dynamics of Animal Populations Spring.

2 credits. For seniors and graduate students in natural resources; others by permission of instructor. Offered alternate years. Not offered 1980-81.
T R 10:10. W. D. Youngs.
A quantitative examination of the dynamics of animal populations. Interactive computing is used to assist in analysis and understanding of mortality, growth, population estimation, and population interaction.]

438 Fishery Resource Management Spring.

3 credits. Prerequisite: Natural Resources 440 or permission of instructor.
Lecs, T R 8. W. H. Everhart.
Principles and problems in the management of freshwater and marine fishery resources, considered in relation to problems of human population and management of other natural resources.

440 Fishery Science Fall. 3 credits.

For seniors majoring in fishery science; others by permission of instructor. Prerequisites: a year of statistics and calculus. Offered alternate years.
M W F 12:20. W. D. Youngs.
Principles and theories involved in dynamics of fish populations. Methods of obtaining and evaluating statistics of growth, population size, mortality, yield, and production are considered.

442 Techniques in Fishery Science Fall.

3 credits. Limited to 15 upperclass and graduate fishery students. Cost of field trips, no more than \$30.
T R 1:25-4:25. 1 or more weekend field trips.
D. A. Webster.
Emphasis is on methods of collecting fish and related data when information on population dynamics is of paramount importance. Labs include field experience in use of gear and instruments. Opportunities for additional experience in ongoing college fishery research program is provided.

443 Managing the Aquatic Environment Fall.

2 credits. Limited to 30 juniors and seniors not majoring in aquatic science.
Lecs, T R 10:10; S field trip. R. T. Oglesby.
The nature of aquatic environments and effects of humans on them are initial foci. Wise use of aquatic resources is surveyed in terms of human impacts on them, including the introduction of toxicants and nutrients, removal or addition of particular biotic

components, and modifications of the physical environment. Emphasis is on lakes, rivers, and estuaries.

490 Practicum in Natural Resources Analysis and Management

Fall. 5 credits. For seniors in natural resources; others by permission of instructors.
Hours to be arranged. Staff.
An in-depth exercise in planning the management of selected resources in a defined geographic area. Students work in groups under the supervision of a faculty committee with other faculty members acting as consulting experts. Student groups make oral and written reports on their management plans to a client panel of faculty members and outside evaluators.

494 Research in Fishery Science Fall or spring.

Credit to be arranged. S-U grades optional.
Hours to be arranged. J. L. Forney, S. P. Gloss, R. T. Oglesby, C. L. Schofield, D. A. Webster, W. D. Youngs.

495 Research in Wildlife Science Fall or spring.

Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional.
Hours to be arranged. Staff.

496 Research in Forestry Fall or spring. Credit to

be arranged. S-U grades; letter grade by permission of instructor.
Hours to be arranged. J. P. Lassoie, R. R. Morrow.

498 Research in Resource Analysis and Planning

Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional.
R. A. Baer, H. B. Brumsted, E. E. Hardy, T. L. Hullar, J. W. Kelley, R. J. McNeil, B. T. Wilkins.

500 Thesis Research and Professional Projects

Fall and spring. Credit to be arranged. Limited to graduate students working on thesis research or professional master's projects. S-U grades only. Staff.

600 Waterfowl Biology Fall. 3 credits.

Prerequisite: permission of instructor.
Lec-labs, T R 1:25-3:50; several field trips.
R. A. Malecki.
An introduction to waterfowl and selected webless migrants. Emphasis is on the waterfowl resource in North America; identification of species, their ecological relationships, population dynamics, and management.

601 Seminar on Selected Topics in Fishery Biology

Fall or spring. 1 credit.
Hours to be arranged. Staff.

602 Seminar in Natural Resource Analysis for Ecologically Based Planning Spring. 2 credits. S-U grades only.

W 2-4:30. Staff.
Multidisciplinary graduate seminar. Theme changes each year but usually involves a case study of a specific area of land and water. Fieldwork usually required. Engineers, economists, sociologists, soil scientists, foresters, planners, and wildlife and fishery biologists are invited to bring expertise to the planning table.

603 Habitat Ecology Spring. 1 or 2 credits.

Limited to 12 seniors and graduate students majoring in natural resources of biological sciences. Prerequisite: permission of instructor. Cost of field trips, no more than \$10.
F 12:20. M. E. Richmond.
This course requires an understanding of broad ecological concepts relative to plant-wildlife interactions. The concept of habitat is addressed from the standpoint of island biogeography, and the interactions of habitat size, shape, location, degree of edge, and temporal change are explored. Major land

forms and plant-animal communities of the northeastern United States will be visited during weekend field trips. Paper required.

604 Seminar on Selected Topics in Resource Policy and Planning Fall. 1 credit. S-U grades only. Hours to be arranged Staff.

Primarily for graduate students majoring or minoring in natural resources conservation.

[605 Ecology and Management of Disturbed Aquatic Systems Spring. 3 credits. Limited to 20 seniors and graduate students. Recommended for students specializing in the aquatic sciences. Prerequisite: limnology or oceanography. Offered alternate years. Not offered 1980-81

Lecs, T R 10:10; disc, W or F 1:25-3:25; at least 1 S field exercise. R. T. Oglesby.

Lectures and readings focus on responses of aquatic ecosystems to stress and on significance of such reactions. Methods and strategies of management to minimize undesirable aspects of human activities are considered. Detailed case histories are studied and discussed.]

606 Marine Resources Policies Spring. 2 credits. Prerequisite: at least one related course such as Biological Sciences 364, 666, or 668, Natural Resources 438, or permission of instructor. S-U grades optional. Offered alternate years.

R 1:30-3:30. B. T. Wilkins.

A seminar discussing the law and issues concerning current marine policy questions, such as coastal zone management, marine fish regulations, marine mammal protection, and wetland preservation.

[607 Perspectives on Conservation Spring. 3 credits. For graduate students; others by written permission of instructor. S-U grades for graduate students. Offered alternate years. Not offered 1980-81.

R 1:25-3:30. B. T. Wilkins.

A seminar based on extensive readings of articles highlighting varying philosophical approaches to the conservation of natural resources. Views espoused by developmentalists, preservationists, naturalists, economists, and welfare economists are considered.]

608 Policies and Management of Natural and Wild Lands Fall. 2 credits. Prerequisite: permission of instructor. S-U grades optional.

Lec, T 8-9:55. T. L. Hullar.

Lectures, discussions, special seminars, readings, and case studies on natural and wild lands, particularly those in public ownership. Major topics include the values of these lands, social and scientific basis for their establishment, analysis of the policies for preservation and use, and methods and strategies for management. National and state wilderness systems, social and biological carrying capacity, effects of special interests, and current issues are covered. An independent study of a selected area is required.

609 Effects of Ecological Perturbations on Fishes Fall. 3 credits. Prerequisites: Biological Sciences 476 or permission of instructor. Cost of field trips no more than \$15.

Lecs, T R 9:05; lab, W 1:25-4:25; several field trips. S. P. Gloss.

Impacts of habitat alteration and physical-chemical pollutants with emphasis on freshwater and diadromous fish species of North America. Direct and indirect effects of a variety of industrial and land-use practices on fish and other aquatic organisms with resultant changes in structure and function of fish communities due to lethal and sublethal responses are discussed. Laboratory includes several field trips.

610 Conservation Seminar Fall and spring. Noncredit. All graduate students in natural resources are expected to participate.

Time to be arranged. Staff.

611 Seminar in Environmental Values Fall. 3 credits. For graduate students, juniors, and seniors. S-U grades optional. Cost of weekend trip, no more than \$14.

W 1:25-3:50; two or three extra class sessions for presentations of papers and projects. Weekend trip in late September. R. A. Baer.

How the humanities, particularly religion, philosophy, and ethics, contribute to our understanding of the environment. In successive years topics will include (1) the role of nonutilitarian values in our relationship to our natural environment, (2) land ethics, (3) new models for higher education in the age of ecology, and (4) concepts of growth and progress in Western culture and their impact on our treatment of the environment.

Related Courses in Other Departments

Analysis and Interpretation of Aerial Photographs (Engineering CEE A687)

Biology of Fishes (Biological Sciences 476)

Bionomics of Freshwater Invertebrates (Entomology 471)

Evaluating Resource Investment and Environmental Quality (Agricultural Economics 450)

Ichthyology (Biological Sciences 479)

Limnology (Biological Sciences 402)

Marine Ecology (Biological Sciences 666)

Nature and Properties of Soils (Agronomy 200)

Oceanography (Biological Sciences 461)

Ornithology (Biological Sciences 473)

Phycology (Biological Sciences 348)

Physical Environment Evaluation (Engineering CEE A685)

Resource Economics (Agricultural Economics 350)

Wildlife Pathology (Veterinary Medicine 636)

Plant Breeding and Biometry

W. D. Pardee, chairman; R. E. Anderson, E. D. Earle, H. L. Everett, V. E. Gracen, Jr., P. Gregory, C. C. Lowe, H. M. Munger, M. A. Mutschler, O. H. Pearson, R. L. Plaisted, R. R. Seaney, M. E. Sorrells, D. R. Viands, D. H. Wallace

Biometry courses are listed under "Statistics and Biometry."

225 Plant Genetics Spring. 4 credits. Prerequisite: one year introductory biology.

Lecs, M W F 9:05; lab, W R or F 1:25; lab section assignments at first lecture. Labs start first week.

M. A. Mutschler.
An overview of genetic principles are related to plant sciences. Mendelian inheritance and cell mechanics, DNA as genetic material, genetic fine structure and gene regulation, gene recombination, linkage and mapping, gene interaction, extranuclear inheritance, environmental effect on phenotypic expression, gene mutation and chromosomal aberrations, variation in chromosome numbers, genes in populations, multiple gene inheritance, and genetic aspects of pest resistance. Relationship of genetic concepts and techniques to plant breeding. Students conduct an independent inheritance project with *Brassica campestris*.

603 Methods of Plant Breeding Fall. 4 credits. Primarily for graduate students, but open to qualified seniors who expect to engage in plant breeding. Prerequisites: Biological Sciences 101-102, Biological Sciences 281 or Plant Breeding 225, or equivalent; and field crops, vegetable crops, floriculture, or pomology. Students must enroll in this course by August 1.

Lecs, T R 8; labs, T R 1:25-4:15 (labs till 5 during first month). 2 S field trips. R. E. Anderson, H. L. Everett.

Breeding systems for producing commercial crop varieties are considered in detail. Labs include selection techniques, screening for heritable variation, and controlling pollination. Special emphasis is on selection for disease resistance and improved nutritional quality and on use of exotic germ plasm.

605 Physiological Genetics of Crop Plants Spring. 3 credits. Prerequisites: either genetics, biochemistry, and plant physiology, or permission of instructor.

T R 8-10. D. H. Wallace.

Both genetic and environmental influences on biochemical and molecular control of plant variation in physiological phenomena like photosynthesis, respiration, translocation, self-incompatibility, male sterility, maturity, yield, and heterosis are discussed. Emphasis is on variation that can be exploited in plant breeding, particularly in breeding for higher yield and adaptability.

608 Biochemical Analyses for Plant Breeders Fall. 3 credits. Limited enrollment. Prerequisite: permission of instructor. Students must enroll in this course by Aug. 27.

Lecs, M W 1:25-5 (first 4 weeks); lab, M W 1:25-5 (last 10 weeks). P. Gregory.
Acquaints the student with the specialized biochemical analyses commonly used in plant breeding programs. Nutrients and toxicants of several crops are studied. Importance of developing an ability to critically assess the biochemical analyses is emphasized.

612 Experimental Methods Spring. 2 credits. Prerequisite: Plant Breeding 601 or permission of instructor. Offered alternate years.

M W F 12:20. C. C. Lowe.
The use of statistical methods and the application of experimental designs and plot techniques to problems in plant breeding and related agricultural research.

622 Seminar Fall or spring. 1 credit. S-U grades only.

T 12:20. Staff and graduate students.

629 Special Topics in Plant Science Extension Spring. 2 credits.

F 1:25-4:25. W. D. Pardee.
Designed for graduate students and advanced undergraduates, to provide a broader knowledge of cooperative extension philosophy and methods and to prepare students for careers in extension and research or in related fields in public and commercial organizations. Topics relate to extension in other countries as well as in the United States.

650 Special Problems in Research and Teaching Fall, spring, or summer. 1 or more credits by arrangement with instructor. Undergraduates must attach to their course enrollment material written permission of the staff member who will supervise the work and assign the grade.
Staff.

716 Perspectives in Plant Breeding Strategies Spring. 2 credits. S-U grades optional. Prerequisite: Plant Breeding 603.

R 12:20-2:15. M. E. Sorrells.
Discussion of mating systems, selection techniques, and breeding strategies for self- and cross-pollinated

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crops. Extensive outside reading is required. Emphasis is on the discussion and evaluation of selected benchmark papers and current literature.

717 Quantitative Aspects of Plant Breeding

Spring. 2 credits. Prerequisites: Plant Breeding 603 and Statistics 601. S-U grades only.

T R 10:10. R. L. Plaisted.

Discussion of random mating populations, inbreeding, and components of genetic variance.

718 Genetics and Breeding for Disease and Insect Resistance

Fall, first 7 weeks of semester. 1 credit. Prerequisite: Plant Breeding 603. S-U grades only.

T R 10:10. V. E. Gracen.

Discussions of genetics and mechanisms of insect and disease resistance as they relate to the development and utilization of pest resistant varieties.

Plant Pathology

R. L. Millar, chairman; J. R. Aist, P. A. Arneson, S. V. Beer, C. W. Boothroyd, B. B. Brodie, R. S. Dickey, W. E. Fry, M. B. Harrison, R. K. Horst, G. W. Hudler, H. W. Israel, E. D. Jones, R. P. Korf, J. W. Lorbeer, W. F. Mai, W. F. Rochow, A. F. Sherf, W. A. Sinclair, R. W. Smiley, H. D. Thurston, H. D. VanEtten, R. E. Wilkinson, O. C. Yoder, M. Zaitlin, T. A. Zitter

Course Numbers

New	Old	New	Old
300	300	654	654
301	301	655	655
309	309	681	661
402	302	691	671
443	443	700	
497	431	701	501
498	431	703	503
499	431	705	505
504	404	706	506
641	656	707	507
642	657	708	508
645	645	709	579
646	646	715	
647	647	725	
648	648	726	556
649	649	728	
650	650	729	599
651	651	797	531
653	633	799	531

301 Introductory Plant Pathology Fall or spring. 4 credits. Limited to 100 students, 20 in each section; preference given to juniors, seniors and graduate students. Prerequisites: Biological Sciences 101-102, and 103-104 or 105-106. Plant Pathology 300 should be taken concurrently.

Lecs, T R 11:15; lab, M T W R or F 2-4:25, plus one unscheduled period weekly. W. A. Sinclair.

An opportunity to study fresh specimens of diseased field and forage crops, flowers, fruits and vegetables, trees and shrubs; to learn techniques of diagnosis such as isolation of pathogenic fungi and extraction of nematodes; to observe demonstrations and to perform exercises that display important phenomena or basic techniques in plant pathology.

309 Introductory Mycology Fall. 4 credits.

Prerequisites: a year of botany or equivalent and permission of instructor.

Lecs, T R 1:25-2:15; labs, T R 2:30-4:25; and additional 2-hour period to be arranged. Required field trips. J. W. Lorbeer.

An introduction to fungi, emphasizing biology and comparative morphology rather than taxonomy.

402 Plant Disease Control Spring. 3 credits.

Prerequisite: Plant Pathology 300-301 or equivalent.

Lecs, T R 11:15; lab and rec, T W or R 1:25-4:25. P. A. Arneson.

This course complements Plant Pathology 300-301 with an in-depth presentation of the principles and practices of plant disease control, building on the students' knowledge of diseases and their causal agents. General principles and concepts, illustrated by specific examples, are presented. Students write a term paper applying these principles to a specific disease control problem. The labs provide practical experience in diagnosis and disease control techniques.

443 Pathology and Entomology of Trees and Shrubs (also Entomology 443)

Fall. 5 credits. Prerequisites: either Plant Pathology 301 and Entomology 292 or equivalent.

Lecs, M W F 10:10; labs, T R 1:25-4:25 or W F 1:25-4:25. W. T. Johnson, W. A. Sinclair.

For students preparing for careers in horticulture, urban forestry, and pest management. Deals with the nature, diagnosis, assessment, and treatment of diseases and arthropod pests of trees and shrubs. Forest, shade, and ornamental plants are considered.

497 Special Topics Fall or spring. 1-5 credits. S-U grades optional.

Hours to be arranged. Staff.

An opportunity for independent study of a special topic in mycology or plant pathology under the direction of a faculty member.

498 Teaching Experience Fall or spring.

1-5 credits. S-U grades optional.

Hours to be arranged. Staff.

Undergraduate teaching assistance in a mycology or plant pathology course by mutual agreement with the instructor.

499 Undergraduate Research Fall or spring.

3-5 credits. S-U grades optional.

Hours to be arranged. Staff.

An opportunity for research experience under the direction of a faculty member.

504 Pest Management for Plant Protection (also Entomology 504)

Fall. 4 credits. Limited to seniors and graduate students. Prerequisites: Biological Sciences 360 or equivalent and two of the following: Agronomy 315, Entomology 440, or Plant Pathology 402.

Lecs, M W F 8; lab, M or W 1:25-4:25.

P. A. Arneson.

Intended for practitioners in plant protection. Lectures integrate the principles of pest control, ecology, and economics in the management of pest-crop systems. A term project prepared by a team of four to five students is required and consists of a proposal for an extension pest management program on a specific crop. Labs deal with pest monitoring techniques and the application of computer simulation models to management problems.

Unless otherwise indicated the following description applies to courses 641-655.

Fall or spring. 1 credit. Prerequisite: permission of instructor. S-U grades only.

Hours to be arranged.

Weekly discussions of current topics in special areas of plant pathology and mycology. Students are required to do extensive reading of current literature and to present oral and written reports.

641 Cytology of Plant Diseases

J. R. Aist, H. W. Israel.

642 Plant Disease Epidemiology

W. E. Fry.

645 Plant Virology

W. F. Rochow, M. Zaitlin.

646 Plant Nematology

M. B. Harrison, W. F. Mai.

647 Bacterial Plant Diseases

R. S. Dickey.

648 Pathogen and Disease Physiology

H. D. VanEtten.

649 Mycology

R. P. Korf.

Fall, Hemiascomycetes, Plectomycetes, Unitunicate Pyrenomycetes; spring, Bitunicate Pyrenomycetes.

650 Diseases of Vegetable Crops

Fall. J. W. Lorbeer, R. E. Wilkinson.

651 Diseases of Fruit Crops

Autotutorial slide and tape sets. P. A. Arneson. For graduate students and advanced undergraduates with a particular interest in fruit. Covers the economic importance, causal agents, symptoms, disease cycle, and control measures for the major diseases of fruit in the Northeast.

653 Dendropathology

G. W. Hudler, W. A. Sinclair.

654 Diseases of Florist Crops

R. K. Horst.

655 Plant Diseases in Tropical Agricultural Development

Spring. H. D. Thurston.

681 Plant Pathology Seminar

Fall or spring. 1 credit. Required of all plant pathology majors. S-U grades only.

T 4:30-5:30. Staff.

691 Plant Pathology Colloquium

Fall or spring. 1 credit.

First and third R of each month, 8-10 p.m. Staff and graduate students.

700 The Science of Plant Pathology

Fall. 1 credit. For graduate students with a major or minor in plant pathology; others by permission. Prerequisite: permission of instructor. S-U grades only.

Lec, R 9:05. R. L. Millar.

For students entering the graduate program. Consideration of plant pathology as a science, with emphasis on concepts, research, and philosophy.

701 Nature of Plant Disease

Spring. 4 credits. Prerequisites: introductory plant pathology and permission of instructor.

Lecs, M W F 8; lab, W 1:25-4:25. W. E. Fry, O. C. Yoder.

The control of plant disease initiation and development at the molecular, organismal, and population levels of organization. Manipulation of factors important to disease development in populations is considered as the basis for disease management.

703 Diagnosis of Plant Disease

Fall. 1 credit. Limited to graduate students with a major or minor in plant pathology. Prerequisite: Plant Pathology 701 or equivalent.

Lec, T 9:05 (Sept. 2-30 only); lab, T or R 1:25-4:25 (Sept. 2-30 only), 5 additional labs to be arranged. S. V. Beer and staff.

Provides instruction and practice in the diagnosis of plant diseases. All important classes of plant pathogenic agents are considered. Classical and modern techniques are discussed.

705 Plant Virology

Fall. 1 credit. Primarily for graduate students with major or minor in plant pathology; others by permission. Prerequisite: permission of instructor.

Lecs, T R 11:15 (Oct. 2-30 only); lab, T or R 1:25-4:25 (Oct. 2-30 only). M. Zaitlin.

Basic information on plant viruses and on the diseases they cause. Emphasis on viral replication mechanisms.

706 Plant Nematology Spring. 2 credits. For graduate students with a major or minor in plant pathology; others by permission. Prerequisite: permission of instructor.

Lec and 3-hour lab each week, hours to be arranged. W. F. Mai.

Anatomy, morphology, and taxonomy of plant parasitic forms and nonparasitic soil-inhabiting forms of nematodes are studied. Plant pathogenic forms are also considered from the standpoint of host-pathogen relationships, host ranges, life cycles, and the symptoms they cause. Principles and methods of control are discussed.

707 Bacterial Plant Pathogens Fall. 1 credit. For graduate students with a major or minor in plant pathology; others by permission. Prerequisite: permission of instructor.

Lec, T R 11:15 (Sept. 2–30 only); lab to be arranged. R. S. Dickey.

Basic information on bacterial plant diseases and phytopathogenic bacteria. The lab includes some of the more important techniques used in the study of bacterial plant pathogens.

708 Disease Physiology Spring. 1 credit. For graduate students with a major or minor in plant pathology; others by permission. Prerequisite: permission of instructor.

Hours to be arranged. Staff.

Basic information on the physiological basis for plant pathogenesis.

709 Advanced Mycology Spring. 4 credits.

Prerequisites: Plant Pathology 309 or equivalent, a course in genetics, and permission of instructor. Offered alternate years.

Lec, M 10:10; labs, M W 1:25–4:25; an additional 3-hour period to be arranged. Optional field trips. R. P. Korf.

A detailed study of the biology and taxonomy of the major groups of plant pathogenic fungi (rusts, smuts, Fungi imperfecti, Peronosporales), with emphasis on mechanisms of variation of fungi.

715 Applied Plant Virology Fall. 1 credit. For graduate students with a major or minor in plant pathology; others by permission. Prerequisite: permission of instructor.

Lecs, T R 11:15 (Nov. 4–Dec. 2 only); lab to be arranged. T. A. Zitter.

Applied aspects of plant virology including symptomatology, diagnosis, methods of virus transmission, and means of control.

[725 Advanced Plant Virology Spring. 2 credits.

For graduate students with a major in plant pathology and special interest in plant virology. Prerequisite: permission of instructor. Offered alternate years. Not offered 1980–81. Hours to be arranged. M. Zaitlin.]

[726 Advanced Plant Nematology Fall. 2 credits.

For graduate students with a major in plant pathology and special interest in nematology. Prerequisite: permission of instructor. Offered alternate years. Not offered 1980–81. Hours to be arranged. W. F. Mai.]

[728 Advanced Disease Physiology Fall.

2 credits. For graduate students with a major in plant pathology and special interest in disease physiology. Prerequisite: permission of instructor. Offered alternate years. Not offered 1980–81. Hours to be arranged. H. D. VanEtten.]

729 Taxonomy of Fungi Fall. 4 credits.

Prerequisites: Plant Pathology 309 or equivalent, genetics, plant or animal taxonomy, and permission of instructor. Offered alternate years.

Lecs, M W 10:10; labs, M W 1:25–4:25; required field trips. R. P. Korf.

Emphasis is on the principles of taxonomy and nomenclature, critical evaluation of keys and monographs, and practice in identification. The Discomycetes are treated in detail.

797 Special Topics Fall or spring. 1–5 credits. S-U grades optional.

Hours to be arranged. Staff.

An opportunity for independent study of a special topic.

799 Graduate Research Fall or spring. 1–5 credits. S-U grades optional.

Hours to be arranged. Staff.

Pomology

W. J. Kender, chairman; G. D. Blanpied, L. L. Creasy, J. N. Cummins, F. W. Liu, G. H. Oberly, R. M. Pool, L. E. Powell, J. P. Tomkins

101 Tree Fruits Fall. 3 credits. Prerequisite: introductory biology (may be taken concurrently). Cannot be taken for credit after Pomology 104.

Lecs, T R 8; lab, M or W 2–4:25. G. H. Oberly.

A study of the general principles and practices of tree-fruit culture and their relation to the underlying sciences. Topics include propagation, varieties, orchard management, and growth and fruiting habits. Practical work is presented in grafting, pruning, site and soil selection, and planting.

104 Essentials of Fruit Growing Spring. 3 credits. Cannot be taken for credit after Pomology 101.

Lecs, T R 8; lab, T or W 2–4:25. J. P. Tomkins.

Growing tree fruits, grapes, small fruits, and nuts in the Northeast. The student who wants a course in commercial aspects of fruit production should take Pomology 101.

[208 Economic Fruits of the World Spring. 3 credits. Prerequisite: introductory biology, or permission of instructor. Offered alternate years. Not offered 1980–81.

Lecs, M W 10:10; lab, F 2–4:25. F. W. Liu.

The more important subtropical and tropical fruits such as citrus, banana, pineapple, mango, coffee, and cacao are considered. Morphology, physiology, and adaptation to climate are stressed rather than details of culture. A broad view of world pomology is given.]

[302 Fruit Tree Nursery Operation Spring, first 4½ weeks. 1 credit. Prerequisite: Pomology 101 or 104 or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1980–81.

Lecs, M W 9:05; lab, M 2–4:25. J. N. Cummins.

This course is intended to familiarize the fruit producer with the operations and problems of the fruit tree nursery operator. Topics include production objectives, management decisions, and cultural aspects of nursery operation. Techniques of grafting, budding, pest identification, inspection, and grading of fruit tree planting stocks are included.]

304 Orchard Management I Spring. 3 credits.

Prerequisite: Pomology 101 or 104.

Lecs, M W 8; lab, R 1:25–4:25. L. E. Powell.

A treatment of problems of concern to fruit growers such as site selection, planting and pruning systems, water relations, cold hardiness, dormancy, flowering, and fruiting. Physiological and practical aspects are emphasized.

305 Orchard Management II Fall. 3 credits.

Prerequisite: Pomology 101 or 104. Recommended: Pomology 304.

Lecs, M W 8; lab, R 1:25–4:25. G. H. Oberly, L. L. Creasy.

A continuation of the principles of pomology presented in Pomology 304. Subjects include the later stages of fruit maturation, quality, harvesting, aspects of tree nutrition, protection from pests, and regulatory policies affecting fruit production and sale.

[306 Small Fruits Spring, last 9 weeks. 2 credits. Prerequisite: Pomology 101 or 104 or permission of instructor. Offered alternate years. Not offered 1980–81.

Lecs, M W 9:05; lab, M 2–4:25. J. P. Tomkins.

A study of the general principles and practices in the commercial culture of strawberries, brambles, blueberries, currants, gooseberries, elderberries, and cranberries.]

[307 Viticulture Fall. 3 credits. Prerequisite: Pomology 101 or 104 or permission of instructor.

Offered alternate years. Not offered 1980–81.

Lecs, T R 9:05; lab, T 2–4:25. R. M. Pool.

Viticulture, with emphasis on the viticulture of the Great Lakes region, as a series of interrelated decisions on varieties, sites, vine management, and vine protection, is presented. Those decisions are based on ampelography, meteorology, soils, vine and grape anatomy and physiology, as well as protection of the vine and grapes from injuries, primarily diseases and insects.]

310 Postharvest Physiology and Storage of Fruits and Vegetables Fall. 3 credits. Prerequisite: a course in pomology or vegetable crops, or permission of instructor.

Lecs, M W 9:05; lab, F 2–4:25. One field trip is required. F. W. Liu.

The chemistry and physiology of fruits and vegetables as they affect quality and marketability are studied. Maturity indices, handling methods, and storage practices are considered. Practical work includes observations of the effect of handling and storage methods on quality and condition of fruits and vegetables.

311 Fruit Crop Systematics Fall, first 4½ weeks.

1 credit. Prerequisite: Pomology 101 or 104 or permission of instructor. S-U grades optional. Offered alternate years.

Lecs, T R 9:05; lab, T 2–4:25. G. H. Oberly.

The classification of fruit species is considered from a botanical and production viewpoint. The course deals with the identification and naming of fruit species and varieties and their botanical classification.

313 Utilization of Fruit Crops Fall, middle 4½ weeks. 1 credit. Prerequisite: Pomology 101 or 104 or permission of instructor. S-U grades optional. Offered alternate years.

Lecs, T R 9:05; lab, T 1:25–4:25. F. W. Liu.

A consideration of the fate after processing of fruits produced for consumption. The coverage of fruit products is generally limited to those commercially grown and processed in New York State. Although the discussion includes methods of canning, freezing, dehydration, and other types of processing, emphasis is on the quality requirement and proper handling of raw materials and how they affect the quality of end products.

315 Fruit Variety Improvement Fall, last 4½ weeks. 1 credit. Prerequisite: Pomology 101 or 104 or permission of instructor. S-U grades optional. Offered alternate years.

Lecs, T R 9:05; lab, T 2–4:25. Staff.

The techniques and limitations of producing new varieties of perennial fruit crops are considered.

400 Undergraduate Seminar Spring. 1 credit (may be taken twice for credit). Prerequisite: a course in pomology. S-U grades only.

Hours to be arranged. Staff.

Seminar topics and speakers selected and arranged by the students on subject areas related to pomology.

402 Special Topics in Experimental Pomology

Spring. 3 credits. Open to undergraduates by permission. Offered alternate years.

Hours to be arranged. Staff.

Selected topics are considered with respect to the

current literature or experimental techniques. Topics reflect the research interests of the professors who participate.

[604 Growth and Development of Woody Plants] Spring. 2 credits. Prerequisite: introductory plant physiology. Offered alternate years. Not offered 1980-81.

T R 9:05. L. E. Powell.

An advanced course dealing with physiological, morphological, and biochemical changes during development, beginning with the seed and advancing through the mature reproductive plant. Hormonal control mechanisms emphasized.]

610 Research Fall or spring. 2 or more credits. Prerequisite: a course in advanced pomology. S-U grades optional. Undergraduates must attach to their course enrollment material written permission from the staff member who will supervise the work and assign the grade.
Staff.

700 Graduate Seminar Fall. 1 credit. S-U grades only.

Hours to be arranged. Staff.

Reports by students on current research or literature in experimental pomology or related areas.

710 Teaching Experience Fall or spring. 1 credit. S-U grades only. Prerequisite: permission of instructor.

Hours to be arranged. Staff.

Designed to acquaint pomology graduate students with the methods and materials involved in teaching. The student participates in the design, delivery and evaluation of segments of a departmental course.

Related Course in Another Department

General Horticulture (Vegetable Crops 103)

Rural Sociology

E. C. Erickson, chairman; M. L. Barnett, F. H. Buttel, H. R. Capener, E. W. Coward, Jr., G. J. Cummings, P. R. Eberts, E. C. Erickson, J. D. Francis, P. Garrett, C. C. Geisler, J. C. Preston, B. M. Scott, F. W. Young

100 Introduction to Sociology Fall. 3 credits.

Lecs, T R 10:10; disc, M or F 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30. C. C. Geisler and staff.

An examination of the theories, concepts, and methods of sociology as they apply to sociology in general. Major topics include the origins of the discipline, its major theoretical and methodological currents, and its application to contemporary questions of power and bureaucracy, social and cultural change, materialism and sociobiology, social class and community institutions. 100 is formally equivalent to 101 (offered in the spring), though less emphasis is placed on rural society and its problems.

101 Introduction to Rural Sociology Spring. 3 credits.

Lecs, T R 10:10; disc, M or F 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30. F. H. Buttel and staff.

An examination of the theories, concepts, and methods of sociology as they apply to rural society, particularly in relation to major issues concerning the United States agricultural and food systems. Major topics include change in the structure of agriculture and in rural communities, inequality in rural America, the structure and functioning of agribusiness organizations, agricultural policy, energy and environmental problems, and alternative futures for rural development in the United States. 101, though placing greater emphasis on rural society, is equivalent to 100 (offered in the fall).

105 Rural Sociology and World Development Problems Fall. 3 credits.

M W F 10:10. P. Garrett.

An introduction to the analysis of some pressing social problems of contemporary Third World countries. Lectures and reading materials will present different approaches, analyses, and recommendations which follow from competing theories, in order that the student may determine which approach best explains the situation in Third World countries. Topics to be considered include: visions of "development"; the social organization of peasant communities and large-scale agricultural enterprises; problems of land tenure and agrarian reform; the relationships among population growth, hunger, and employment; multinational corporations; social movements and social control.

213 Social Indicators and Data Management Spring. 3 credits.

M W F 11:15. F. W. Young.

Introductory sociological research methods, from the perspective of social indicators, their construction, sources of data, and their policy relevance. The course also surveys currently reported social indicators for the United States. Students work through computer exercises illustrating basic data management using SPSS programs.

240 Social History of American Agriculture Spring. 3 credits. No prerequisites.

T R 8:30-9:55. E. C. Erickson and staff.

A social and technical history of the changes in agriculture and the agricultural systems in the United States from about 1800 to the present day. Includes documentation of the technologies associated with agriculture as well as the rural social organization that supported the agricultural system (such as farm organizations, marketing systems, export patterns, transportation systems). Emphasizes the energy systems that included animal and human power in the eighteenth and nineteenth century, horsepower in the latter nineteenth century, steam and mechanical power from the early twentieth century onwards, and the managerial emphasis of the recent years.

300 Proseminar: Issues and Problems in Rural Society Fall. 1 credit. S-U grades only.

R 12:20-1:25. Staff.

Introduces the student to subject matter of concern to both applied and academic rural sociologists. Focuses on such subjects as migrant workers, agribusiness, rural poverty, rural to urban migration, rural development, agricultural research and people, community development, small farmers in the lesser developed nations. These topics are explored through the use of films and group discussion.

324 Social Organization and the Environment Spring. 3 credits.

M W F 9:05. Staff.

A discussion of principles involved in our interaction with our physical environment, viewed from a human ecological and ecosystem perspective. Emphasis is given to the function of social organization in human-environment exchanges. Principles are illustrated by referring to both developing and developed societies. The course provides a conceptual framework for understanding and addressing recurring environmental issues.

355 Rural Development and Cultural Change (also Anthropology 314) Fall. 3 credits.

M W F 11:15. M. L. Barnett.

An analysis of planned social change programs in predominantly agricultural societies. Focusing on problems of administration, socioeconomic development, and the introduction of new practices.

356 Rural Society in America Fall. 3 credits. S-U grades optional.

M W F 9:05. Staff.

The focus is on gaining a greater understanding and appreciation of the rural sector of American society. From sociological and historical perspectives, the

nature of changes in rural society are examined, including the impact of technology on agriculture, other extractive industries, natural resources, the environment, regional variation, the rural-urban dominance theme, comparative life styles, cultural orientations, value patterns, and a look to the future.

357 Subsistence Agriculture in Transition Spring. 3 credits.

Lecs, T R 10:10-11:25. M. L. Barnett.

An analysis of selected types of peasant communities, drawn from differing ecological conditions. Social structure, systems of farming and land tenure arrangements, and motivational characteristics of subsistence farmers in the context of socioeconomic change. Theoretical and policy aspects of modernization and traditional agriculture and programming for agricultural development.

380 Independent Honors Research in Social Science 1-6 credits. Limited to students who have met the requirements for the honors program. A maximum of 6 credits may be earned in the honors program.

Staff.

Students must submit written proposals, by the third week of the fall semester of their senior year, to P. Garrett, departmental honors committee representative.

404 Intermediate Sociological Theory (also Sociology 404) Fall. 4 credits. S-U grades optional.

T R 10:10-12:05. P. R. Eberts.

An advanced undergraduate seminar for senior majors in rural sociology and sociology. The course will focus on: (1) the central concepts of the sociological tradition; (2) major classical theorists (Marx, Weber, Durkheim, Tocqueville) and contemporary counterparts; (3) application of the classical ideas in contemporary research.

424 Science, Technology, and Social Change Fall. 3 credits.

T R 12:20-1:35. S. Del Sesto.

The effect of science and technology in the process of social change is examined. Different theories of social change are applied to specific issues in science and technology such as new energy systems, environmental pollution, the management of natural resources, genetic engineering and behavior control, and the relations between science and technology and alienation. The objective is to explain the movement of current events and to predict changes and outcomes in these issue areas.

[432 Community Development] Fall. 3 credits. Not offered 1980-81.

T R 10:10-11:25. J. C. Preston.

Examines the major concepts, trends, and issues in community development from the perspective of the community development change agent. Areas examined include: community, community change, community action, community conflict, community leadership, citizen involvement, and strategies and tactics for planned community change.]

436 Small Towns Seminar Spring. 2 or 3 credits. T 2:30-4:25. G. J. Cummings.

A review of selected approaches to understanding patterns of change in small population settlements. The concept of self-help along with other options for development are examined in terms of their potential contributions for enhancing the quality of community life.

[443 Politics and Development] Fall. 3 credits. Limited to upperclass and graduate students.

Prerequisite: Rural Sociology 100 or equivalent. S-U grades optional. Not offered 1980-81.

T R 10:10-11:25. P. R. Eberts.

Comparative analyses of politics as a significant process affecting societal development. The course examines politics and policies as major means of social control, resource redistribution, and stimuli for development in production, allocation, and

service-staffing processes; pluralism and inequalities among various socioeconomic classes, different-sized communities, and mutually interdependent institutions, as they affect social order and development.]

454 Rural Development Policy Analysis Spring. 3 credits.

R 2:30–4:25. J. C. Preston.

Focus on public policies and programs that relate to domestic rural development. Areas examined include a conceptual framework for rural development and policy analysis, public policy process, regional programs, grantsmanship in rural development, policy research, and projecting the future in regard to rural development policy.

462 Changing Health Perspectives Spring. 3 credits.

M W F 2:30. G. J. Cummings.

Major determinants of health status and their interrelationships are studied as a basis for evaluating various models that are proposed for improving the organization of health services for underserved populations. Readings are mainly drawn from the United States and Canadian experiences. Other cases can be considered according to student interests.

497 Informal Study Fall or spring. 1–3 credits

(may be repeated for credit). S-U grades optional. Undergraduates must attach to their course enrollment material written permission from the faculty member who will supervise the work and assign the grade.

Staff.

Informal study may include a reading course, research experience, or public service experience.

606 Contemporary Sociological Theories of Development Fall. 3 credits.

M W F 11:15. F. W. Young.

A review of theory, empirical studies, and policy prescriptions as applied to communities and regions, especially those in less-developed countries. Human ecology, the Weberian tradition, central place, dependency, and symbolic structural theory are compared.

618 Research Design I Fall. 4 credits.

M W F 10:10; lab to be arranged. J. D. Francis.

First of a two-semester sequence (may be taken individually) in graduate methods. This course discusses problems of measurement, the design of measuring instruments, and problems of reliability and validity. Some common forms of measuring instruments are discussed, including multidimensional techniques. Students are expected to use actual data for labs.

619 Research Design II Spring. 4 credits.

Prerequisite: an introductory methods course or a statistics course.

M W F 10:10; lab to be arranged. J. D. Francis.

The second part of the sequence in graduate methods deals with sampling frames, some pragmatic sampling techniques, and some discussion of statistical analysis procedures appropriate under each. An intermediate-level treatment of the following topics: nonexperimental designs, regression analysis, analysis of variance, analysis of covariance, and causal models. A classic piece of sociological research is one source of illustration and a component of the lab exercises. Students are expected to use actual data to familiarize themselves with data handling and processing.

[621 Environmental Sociology Fall. 3 credits. Not offered 1980–81.

W 1:25–4:25. F. H. Buttel.

An exploration of various sociological approaches to the study of society and its physical environment and an analysis of major issues relating to the survival base of human societies — particularly

overpopulation, the energy and food crises, the limits-to-growth debate, and the conduct of political struggles over energy and environmental policy.]

[641 Political Economy of Rural and Regional Development Spring. 3 credits. Limited to

upperclass or graduate students. S-U grades optional. Not offered 1980–81.

T R 10:10–11:25. P. R. Eberts.

An interdisciplinary course focusing on social, political, and economic factors in regional development. Theories from demography, ecology, social organization, and planning are used to examine the emergence of new forms of social organization and their implications for contemporary societies.]

642 Macrosystems Theory and Policy Analysis Spring. 3 credits. S-U grades optional.

F 12:20–2:50; disc to be arranged. P. R. Eberts.

An analysis of major theoretical and research problems related to the application of systems theory to society's changing organizational process. Major theories are examined, with attention to their compatibility with modern analytic techniques such as simulations and projections in analyzing current issues in macropolitical economy.

[650 Social Organization of Agriculture Fall.

3 credits. Not offered 1980–81.

R 1:25–4:25. E. C. Erickson.

Concentrates on a small number of significant commercial crops, examining the institutions and relationships involved in the production process: research, credit, distribution of inputs, the farm operation, processing, transportation, and marketing. Patterns at the farm and community level, including topics such as settlement, land tenure, ethnic groups, class structures, methods of cooperation, small farmers, labor problems, and information networks. Ecological and physical constraints on production. Emphasis on the influence of national and international structures — political, social, and economic — on the production process, including the role of government and quasi-government units. Examines the historical circumstances giving rise to the present crop systems. Consideration of what rearrangements of the political, social, and economic structures, both domestic and international, are required for change in crop systems, improvement in production, and increased social welfare.]

651 Structural Change in United States Agriculture Fall. 3 credits.

T 1:25–4:25. F. H. Buttel.

An analysis of the structural transformations of United States agriculture in the nineteenth and twentieth centuries, particularly in terms of the role of the state in agricultural development. This course emphasizes the historical roots of the socioeconomic problems of contemporary agriculture and examines the prospects for and limitations of various strategies for ameliorating these problems.

[706 State, Economy, and Society Spring.

3 credits. Not offered 1980–81.

Hours to be arranged. F. H. Buttel, C. C. Geisler, and P. Garrett.

Reviews major issues concerning the relations between political and economic institutions, including the political-economic methodologies of the classical sociological theorists, the instrumentalist-structuralist debate on the nature of the state, theories of crisis in advanced capitalism, and the controversies among theorists of unequal exchange, dependency, and imperialism in the world system.]

[712 Factor Analysis and Multidimensional

Scaling Fall. 4 credits. Prerequisite: previous course work in scaling and statistics. Not offered 1980–81.

M W F 10:10; lab to be arranged. J. D. Francis.

Topics include philosophy of factor analysis, factor analysis models, factoring design, factoring techniques, and comparison with factor analysis

models. Multidimensional scaling and discriminant analyses are also discussed. As matrix algebra is an integral part of these procedures, class time is devoted to this topic.]

715 Macrosocial Accounting and Evaluation Spring. 3 credits.

R 1:25–4. F. W. Young.

A new methodology for monitoring and evaluating rural development projects based on data from informants, field analysis with a microcomputer system, and a generalized evaluation design. The relationship of this method to conventional evaluation as well as to comparative subnational analysis of whole countries is reviewed.

[717 Regression and Path Analysis Spring.

4 credits. Prerequisite: 2 courses in statistics and 1 in methods. Not offered 1980–81.

M W F 10:10; lab to be arranged. J. D. Francis.

The first part of the course reviews multiple and nonlinear regression. Two-stage least squares models are discussed for sociological data along with a discussion of nonmetric regression. The latter half of the course deals with recursive and nonrecursive path models.]

723 Social Movements In Agrarian Society

Spring. 3 credits.

T 1:25–4. F. W. Young.

The recent research explosion in this area is approached in terms of the several fundamental explanatory formats, a comparison of class-based and region-based movements, and research on the United States and the Third World.

741 Community Development and Local Control

Spring. 3 credits.

Hours to be arranged. C. C. Geisler.

Theories of community growth and decline and the current debate over the place of local control in community development in general are considered. Salient themes include the role of neopopulism in community development, changing institutions of property as community development occurs, and changing definitions of "community."

751 Applications of Sociology to Development Programs Fall. 3 credits.

R 1:25–4:25. E. C. Erickson.

A consideration of problems of implementing change strategies at national, regional, and institutional levels, especially as they relate to rural development. Focus is also on institutional constraints on the sociologist as a researcher, as a strategist, and as a participant and on the different contexts within which developmental change occurs.

754 Sociotechnical Aspects of Irrigation Spring. 2–3 credits.

Hours to be arranged. M. L. Barnett, E. W. Coward, Jr., and G. Levine.

Examines irrigated agriculture and its relation to agricultural development. Emphasis on social processes within irrigation systems and interactions with the social setting. The seminar provides an opportunity to examine systematically the institutional and organizational policy issues associated with the design and operation of systems of irrigated agriculture.

771 Special Seminar Fall or spring. Credit to be

arranged. Limited to graduate students; others by permission of instructor.

791 Teaching Experience Fall or spring.

1–3 credits. Limited to graduate students. S-U grades only.

Staff.

Participation in the ongoing teaching program of the department.

792 Public Service Experience Fall or spring. Credit to be arranged. Limited to graduate students. S-U grades optional. Staff.

Participation in the ongoing public service activities of the department.

871-874 Informal Study Fall or spring. Credit to be arranged. Limited to master's and doctoral degree candidates with permission of the graduate field member concerned. S-U grades optional.

871 Rural Sociology

872 Development Sociology

873 Organization Behavior and Social Action

874 Methods of Sociological Research

881 Research Fall or spring. Credit to be arranged. Limited to master's and doctoral degree candidates with permission of the graduate field member concerned. S-U grades optional.

Lecs, M W F 8; disc, M 1:25-2:15 (second 7 weeks). S. R. Searle.

Rank, linear dependence, canonical forms, linear equations, generalized inverses, characteristic roots and vectors. Emphasis is on developing skills for applying matrix algebra.

600 Statistics Seminar Fall or spring. 1 credit. S-U grades only. W 3. Staff.

601 Statistical Methods I Fall. 4 credits. Limited to graduate students; others by permission of instructor. Lecrs, M W F 9:05 or 11:15; lab, M 12:20-1:50 (two sections), 2:30-4 (two sections), 7:30-9 or T 12:20-1:50 or 2:30-4 (two sections). When two sections meet simultaneously, one may be more mathematical than the other, depending on the availability and interest of students with a knowledge of calculus. Prelims, 7 p.m. Oct. 21 and Nov. 18. D. L. Solomon.

Statistical methods, both parametric and nonparametric, are developed and used to analyze data arising from a wide variety of applications. Topics include point and interval estimation, hypothesis testing, inference for a single population, comparisons between two populations, one- and two-way analysis of variance, comparisons among population means, analysis of categorical data, and correlation and regression analyses. Interactive computing is introduced through the MINITAB statistical computing system. Emphasis is on basic principles and criteria for selection of statistical techniques.

602 Statistical Methods II Spring. 4 credits. Prerequisite: Statistics 601 or equivalent. Lecrs, M W F 9:05 or 11:15; lab, M 12:20-2:15 or 2:30-4:25, or T 10:10-12:05, 12:20-2:15, or 2:30-4:25. F. B. Cady.

Continuation of Statistics 601. Emphasis on data analysis and inference for a wide variety of research situations using standard multiple regression programs. Topics include estimating and interpreting sequential and partial coefficients and sums of squares, prediction, residual plotting, model building, estimation of standard errors, analysis of sample means from one-way and multiway classifications, factorial experiments, estimation of contrasts, covariance analysis, comparison of regression lines, model (variable) selection with many predictor variables and principles of experimental design. Selected topics from pairwise comparisons among means, transformations of data, response surface methodology, weighted regression, random effects models, nonlinear regression, split plot experiments, combining experiments, and analysis of categorical data. MINITAB and SAS statistical computing packages are used.

[605 Applied Regression Analysis Fall. 1 credit. Prerequisite: Statistics 602. Not offered 1980-81. A continuation of Statistics 602, with emphasis on data analysis using a regression or linear model approach. Comparison of variable selection procedures. Biased estimation. Variable selection for prediction. Regression approach to nonorthogonal analysis of variance situations. Case study for complex data set.]

606 Sampling Biological Populations Fall. 1 credit. Prerequisite: Statistics 601 or equivalent. Offered alternate years. D. S. Robson.

Standard methods of sample survey design and estimation are presented, including stratified-random sampling, cluster sampling, double sampling, and variable probability sampling. Special emphasis given to methods of particular utility or specifically designed for biological sampling. Examples are taken from forestry, fisheries, and other biological areas.

[607 Nonparametric and Distribution-Free Statistical Methods Spring. 1 credit. Prerequisite: Statistics 601 or equivalent. Offered alternate years. Not offered 1980-81.

D. L. Solomon. Nonparametric and distribution-free alternatives to normal-theory testing procedures are presented: randomization tests; location and scale tests for two populations; analyses for completely randomized, randomized blocks, and balanced incomplete blocks designs; comparisons among several means; correlation and regression; goodness-of-fit.]

662 Mathematical Ecology (also Biological Sciences 662) Spring. 3 credits. Prerequisites: a year of calculus, a course in statistics. Offered alternate years.

M W F 12:20. D. L. Solomon, S. A. Levin. Mathematical and statistical analysis of populations and communities: theory and methods. Spatial and temporal pattern analysis, deterministic and stochastic models of population dynamics. Model formulation, parameter estimation, simulation, and analytical techniques.

699 Special Problems in Statistics and Biometry Fall, spring, or summer. 1 credit or more by arrangement with instructor. Staff.

701 Advanced Biometry Spring. 3 credits. Prerequisites: Statistics 409 and 602. T R 1:30-2:45. D. S. Robson.

Bioassay methods including parametric and nonparametric statistical analyses of quantal and graded response to controlled levels of single and multifactor stimuli; directional statistics as applied to animal orientation experiments; compartment models and analyses; enzyme kinetics and pharmacokinetic analysis; bioavailability.

[713 Experiment Design Fall. 4 credits. Prerequisites: Either Statistics 416 and 602 or equivalent. Offered alternate years. Not offered 1980-81.

T R 8-9:50; disc to be arranged. W. T. Federer. Principles and techniques of experimentation, theoretical concepts, extensions and variations of the completely randomized, generalized blocked, and generalized row by column experiment designs, repeated measures designs, interval estimation for ranked means, transformations, unequal variances, additivity, residual analyses, sample size, variance component analyses, unequal number analyses, the place of orthogonality, balance and confounding in design, and advanced statistical methodology.]

714 Treatment Design and Related Experiment Designs Fall. 4 credits. Prerequisites: Statistics 416-417 and 602. Offered alternate years.

T R 8-9:50; disc to be arranged. W. T. Federer. Treatment design, the selection of treatments for an experiment, is divided into factorial, response surfaces, mixtures, and combinations of these. Single degree of freedom contrast matrices, factorial design theory for prime powers and nonprime powers, confounding, split plot, split block, complex confounded designs, lattice designs derivable from pseudofactorial theory, fractional replication, response surface designs, and designs and analyses for mixtures, including diallel crossing designs, are covered. Statistical analyses involving residual analyses and real data are included. Emphasis is on concepts and applications rather than mathematical manipulations.

717 Linear Models Spring. 3 credits. Prerequisites: Statistics 409, 417, and 602 or Mathematics 472. S-U grades only. Offered alternate years.

S. R. Searle. Introduction to multinomial variables and distribution of quadratic forms; linear statistical models, estimable

Statistics and Biometry

F. B. Cady, W. T. Federer, D. S. Robson, S. J. Schwager, S. R. Searle, D. L. Solomon

Courses in statistics and biometry are offered by the Department of Plant Breeding and Biometry.

200 Statistics and the World We Live In Spring. 3 credits.

Lecs, T R 10:10-11:25; disc, M 10:10 or 1:25 or T 9:05, 1:25, or 2:30. W. T. Federer.

Focus is on a better consumer understanding of statistical design, data collection, and information. Concepts of statistics, measurements and measuring instruments, data collection, principles of scientific investigation, survey design, questionnaire construction, experiment design, treatment design, graphs, tables, probability, averages, measures of variation, common distributions, confidence intervals, sample size, international and national statistics, and some simple statistical methodology are presented.

406 Theory of Probability Fall. 4 credits.

Prerequisite: Mathematics 106, 108, or 112, or permission of instructor.

M W F 10:10; disc, M 3:35. Prelims, 7 p.m. Oct. 23 and Nov. 20. S. J. Schwager.

An introduction to probability theory: combinatorics, random variables and their probability distributions, generating functions, and limit theory. Biological and statistical applications are the focus. Can serve as either a terminal course in probability or as a foundation for a course in the theory of statistics.

409 Theory of Statistics Spring. 4 credits.

Prerequisite: Statistics 408 or equivalent.

M W F 10:10; disc, M 3:35. S. J. Schwager.

The concepts developed in Statistics 408 are applied to provide an introduction to the classical theory of parametric statistical inference. Topics include data reduction and the concept of sufficiency, parameter estimation, hypothesis testing, and linear regression. Students seeking training in statistical methodology should consider Statistics 601-607.

416 Matrix Algebra I Fall. 2 credits. Prerequisite: precalculus mathematics.

Lecs, M W F 8; disc, M 1:25-2:15 (first 7 weeks). S. R. Searle.

Definitions, basic operations and arithmetic, determinants, and the inverse matrix. Emphasis is on understanding basic ideas.

417 Matrix Algebra II Fall. 2 credits. Prerequisite: Statistics 416 or permission of the instructor. No auditors.

functions and testable hypotheses, regression models, experimental design models, and variance component models and combinations thereof.

[720 Statistical Design Theory Fall. 3 credits. Prerequisites: Mathematics 431-432 and a course in design theory. S-U grades only. Not offered 1980-81. W. T. Federer.

Primarily for those doing research on statistical design topics. Areas discussed are generalizations of balanced and partially balanced block design theory, F-square and latin square geometries, variance and other optimality criteria, fractional replication, and other topics of interest to participants. Many unsolved statistical design problems are posed.]

799 Statistical Consulting Fall and spring. 2 credits. Limited to graduate students.

Consulting, 1 hour a week; disc, 1 hour a week; hours to be arranged. Staff. Participation in the Biometrics Unit consulting service: faculty-supervised statistical consulting with researchers from other disciplines. Discussion sessions for joint consideration of selected consultations encountered by the service during the previous week.

890-990 Research Fall or spring. Credit to be arranged. Limited to candidates for graduate degrees. Prerequisite: permission of the graduate field member concerned. S-U grades only. Research at the M.S. (890) or Ph.D. (990) level.

Vegetable Crops

R. D. Sweet, chairman; L. Ellerbrock, E. E. Ewing, J. R. Hicks, W. C. Kelly, P. M. Ludford, P. L. Minotti, H. M. Munger, M. A. Mutschler, R. F. Sandsted, L. D. Topoleski, D. H. Wallace, H. C. Wien.

103 General Horticulture Spring. 4 credits. Each lab limited to 25 students.

Lecs, M W F 8; lab, M T W R or F 2-4:25. L. D. Topoleski. Acquaints the student with applied and basic horticulture. Primarily for students who want a general knowledge of the subject or who want to specialize in horticulture but have a limited background in practical experience or training in plant science. Includes flower, fruit, and vegetable growing and gardening techniques.

123 Organic Gardening Spring. 2 credits. Each section limited to 20 students. Primarily for students not enrolled in the College of Agriculture and Life Sciences. Prerequisite: permission of instructor.

M T W or R 1:25-4:25. W. C. Kelly. Students must be prepared to lead a discussion and write a paper on some aspect of home gardening or amateur horticulture. Organic methods of gardening are discussed and demonstrated, but other methods are not excluded from the discussions.

210 Vegetable Types and Identification Fall. 2 credits.

T 10:10-12:05 or 2-4. L. D. Topoleski. Acquaints the student with the vegetable species grown in the Northeast and the pests and disorders encountered in their production. Subjects covered include identification of economically destructive weeds, diseases and insects of vegetables, identification of vegetable and weed seeds, seedlings, nutrient deficiencies, vegetable judging, grading, and grade defects.

211 Commercial Vegetable Crops Fall. 4 credits. Limited to 50 students. Prerequisites: Vegetable Crops 103 and Agronomy 200.

Lecs, M W F 11:15; lab, W or F 2-4:25; field trips (Sept.), W 11:15-6. E. E. Ewing. Intended for those interested in the commercial vegetable industry from the viewpoint of production,

processing, marketing, or the related service industries. Topics included are techniques, problems and trends in the culture, harvesting, and storage of the major vegetable crops, including potatoes.

312 Postharvest Handling and Marketing of Vegetables Fall. 3 credits.

Lecs, T R 9:05; lab, R 2-4:25; field trips in early fall. J. R. Hicks.

Procedures used in marketing and shipping vegetables, including grade standards, methods of grading, packaging, harvesting methods, cooling principles, storage techniques, and market preparation.

401 Vegetable Crop Physiology Fall. 5 credits.

Prerequisites: Vegetable Crops 211 and Biological Sciences 242 or equivalents. Lec, M W F 11:15; lab, M 2-4:25; disc, R or F 1, 2, or 3. W. C. Kelly.

Subjects include mineral nutrition as influenced by fertilization programs and crop sequence; nutrient interactions and induced deficiencies; growth and development; flowering; fruit setting; growth correlation; senescence; sex expression; photoperiodism; vernalization; and environmental factors affecting growth.

413 Kinds and Varieties of Vegetables Fall.

3 credits. Prerequisite: Vegetable Crops 211 or permission of instructor. Offered alternate years. Lab, W F 2-4:25; day-long field trips September 13 and 20. H. C. Wien.

Designed to help students achieve proficiency in the evaluation of vegetable varieties through study of their origins, characteristics, adaptation, and usage. An important part of the course is the study of crops in the field. The vegetable seed industry is also discussed.

421 Plant-Plant Interactions Spring. 3 credits.

Prerequisites: Agronomy 200 and any crop production course. Recommended: Biological Sciences 242. Lec, M W 8; disc, F 8. P. L. Minotti. The manner in which plants affect the growth of other plants is examined with emphasis on crop situations rather than natural plant communities. Interactions in monoculture are considered as well as crop-associate crop interactions and weed-crop interactions. Fridays are devoted to a discussion and demonstration of weed control methods and production widely used in vegetable crops.

499 Undergraduate Research Fall or spring.

1 or more credits, by arrangement. Written permission from staff member directing the work must be obtained before course enrollment. Hours to be arranged. Staff. Special problems may be elected in any line of vegetable work.

601 Seminar Fall or spring. 1 credit. Required of graduate students majoring or minoring in vegetable crops. Limited to graduate students. S-U grades only. R 4:30. Staff.

610 Special Topics in Vegetable Crops Fall or spring. 1 or more credits. Hours to be arranged. Staff.

[612 Postharvest Physiology of Horticultural Crops Spring. 2 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1980-81.

T R 8. P. M. Ludford. Physiological and biochemical aspects of growth and maturation, ripening, and senescence of harvested horticultural plant parts. Topics include morphological and compositional changes in ripening and during storage life, some physiological disorders, aspects of hormone action and interaction, and a consideration of control.]

620 Teaching Experience Fall or spring. 1 or more credits by arrangement with instructor. Hours to be arranged. Staff. Participation in the teaching program of the department.

630 Research Methods in Applied Plant Science

Spring. 3 credits. Prerequisite: permission of instructor. Offered alternate years. T R 9:05-11. W. C. Kelly. The planning of applied research programs. The advantages and limitations of conventional experimental designs as they apply to specific research problems. Discussions include a critical interpretation of experimental results from the literature.

801 Master's Thesis Research Fall or spring. Credit to be arranged. Hours to be arranged. Staff.

901 Doctoral Thesis Research Fall or spring. Credit to be arranged. Hours to be arranged. Staff.

Related Course in Another Department

Special Topics in Plant Science Extension (Plant Breeding 629)

College of Architecture, Art, and Planning

Architecture

Architectural Design

A studio fee of \$10 is charged each semester for every design course.

Sequence Courses

101 Design I Fall. 3 credits. Limited to department students.

Studios and lects, M W F 2-6. Staff.
An introduction to design as a conceptual discipline directed at the analysis, interpretation, synthesis, and transformation of the physical environment. Exercises are aimed at developing an understanding of the issues, elements, and processes of environmental design.

102 Design II Spring. 3 credits. Limited to department students. A continuation of Architecture 101.

Studios and lects, M W F 2-6. Staff.
Human, social, technical, and aesthetic factors related to space and form. Design problems range from those of the immediate environment of the individual to that of small social groups.

201-202 Design III and IV Fall and spring. 4 credits each term. Coregistration in Architecture 231-232 required. Limited to department students. Studios and sems, M W F 2-6. Staff.

301-302 Design V and VI Fall and spring. 6 credits each term. Limited to department students. Studios and sems, M W F 2-6. Staff.

401-402 Design VII and VIII Fall and spring. 6 credits each term. Studios and sems, M W F 2-6. Staff.
Programs in architectural design, urban design, or architectural technology and environmental science are offered each term.

501 Design IX Fall or spring. 8 credits. Studios, M W F 2-6. Staff.

502 Design X—Thesis Fall or spring. 8 credits. Required of all students who are candidates for the B.Arch degree, who must satisfactorily complete a thesis during one term of their last year in residence. Students accepted for admission to the graduate studio are exempt from the thesis requirement. Studios, M W F 2-6. Staff.

503-504 Design IX—Thesis I and Design X—Thesis II Fall or spring. 8 credits each term. Prerequisite: permission of department. Studios, M W F 2-6. Staff.
Students who have obtained approval may elect to spend two terms working on the thesis.

510 Thesis Introduction Fall or spring. 2 credits. Required of all architecture students in the year preceding their thesis.

Lec and sem, R 1:25-3:20. Staff.
Lectures, seminars, and independent research leading to complete development of the student's thesis program. General instruction in the definition, programming, and development of a thesis is followed by tutorial work with the student's advisory committee.

601-602 Special Program Fall or spring. 9 credits each term. Intended primarily for students applying to a graduate program in the college. Hours to be arranged. Staff.

111-112 Elective Design Studio 111, fall; 112, spring. 3 credits each term. Limited to students from outside the department. Prerequisite: permission of department office. Coordinated by the Department of Architecture office. M W F 2-6. Staff.

200, 300, 400, 500 Elective Design Fall or spring. Credit as assigned. Open by permission to transfer students who have not been assigned to a sequence course. Prerequisite: permission of department office. Each student is assigned to a class of appropriate level. M W F 2-6. Staff.

Nonsequence Courses

310 Special Problems in Architectural Design Fall or spring. Registration and credit by arrangement. Hours to be arranged. Staff. Independent study.

[611-612 Urban Housing Developments 611, fall; 612, spring. 2 credits each term. Limited to fourth- and fifth-year students in architecture, and graduate students. Prerequisite: permission of instructor. Not offered 1980-81. Sem, hours to be arranged. O. M. Ungers. Large-scale housing developments, particularly in relation to size, density, and problems of infrastructure.]

[613 Transportation Fall. 2 credits. Prerequisite: permission of instructor. Not offered 1980-81. Sem, R 3:30-5:30. P. Cohen, A. Meyburg. The impact of various transportation forms on the environment are considered from the perspectives of architects, engineers, planners, and human ecologists. Readings and discussions of past, current, and future transportation modes focuses on aesthetic and physical aspects.]

614 Low-Cost Housing Spring. 3 credits. Prerequisite: permission of instructor. Sems, T R 1:25-2:15. F. O. Slate, P. Cohen, C. B. Daniels, H. W. Richardson. Aspects of low-cost housing involving engineering technology, architecture, physical planning, economics, and sociology.

618-619 Seminar in Urban and Regional Design 618, fall; 619, spring. 3 credits each term. Limited to fifth-year and graduate students. Hours to be arranged. O. M. Ungers, staff, and guest lecturers.

A broad range of issues and problems of urban and regional development and the context in which the designer functions are surveyed. Selected case studies are presented by the participants and visitors.

Graduate Courses

711-712 Problems in Architectural Design 711, fall; 712, spring. 9 credits each term. Studio and sem, hours to be arranged. O. M. Ungers. The basic first-year design course for graduate students whose major concentration is architectural design.

713-714 Problems in Urban Design 713, fall; 714, spring. 9 credits each term. Studio and sem, hours to be arranged. C. Rowe. The basic first-year design course for graduate students whose major concentration is urban design.

715-716 Problems in Regional Design 715, fall; 716, spring. 9 credits each term. Studio and sem, hours to be arranged. Staff. The basic first-year design course for graduate students whose major concentration is regional design.

811 Thesis or Research in Architectural Design Fall or spring. 9 credits.

Hours to be arranged. O. M. Ungers. Second-year design course for graduate students whose major concentration is architectural design.

812 Thesis of Research in Urban Design Fall or spring. 9 credits. Hours to be arranged. C. Rowe. Second-year design course for graduate students whose major concentration is regional design.

Structures

Sequence Courses

221 Mathematical Techniques Fall. 3 credits. Lects, T R 10:10-11; rec to be arranged. Mathematics department staff. Mathematical concepts and operations used in architecture are introduced.

222 Structural Concepts Fall or spring. 4 credits. Prerequisite: Architecture 221 or approved equivalent. Lects and sems, T R 9:05-11. F. W. Saul. Fundamental concepts of structural behavior. Statics and strength of materials.

321 Structural Systems I Fall. 3 credits. Prerequisites: Architecture 221 and 222. Lects and sems, T R 11:15-1:10. F. W. Saul. Structural design concepts and procedures for steel building construction.

322 Structural Systems II Spring. 3 credits. Prerequisite: Architecture 222. T R 11:15-1:10. F. W. Saul. Structural design concepts and procedures for reinforced concrete building construction.

Nonsequence Courses

323 Advanced Steel Building Design Fall. 3 credits. Prerequisites: Architecture 321 and permission of instructor. Sems, M W F 10:10-11. F. W. Saul. Design and investigation of advanced systems of steel building structure, plastic design of continuous beams, rigid frames, and high-rise buildings.

[324 Surface Structures Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1980-81. Sem, hours to be arranged. D. P. Greenberg. The qualitative and quantitative analysis and design of thin shell architectural structures, including shells of revolution, cylindrical shells, hypars, and folded plates. Suspension structures. The architectural implications and problems of curvilinear forms. Construction techniques.]

326 Building Substructure Spring. 3 credits. Prerequisites: Architecture 322 or concurrent registration and permission of instructor. Sem, hours to be arranged. F. W. Saul. The principles of soil mechanics and subsurface exploration. Design of building foundations—footings, piles, and subgrade walls.

328 Advanced Reinforced Concrete Buildings Systems Spring. 3 credits. Prerequisites: Architecture 322 and permission of instructor. Sem, hours to be arranged. Staff. Methods and specifications for the design and construction of reinforced concrete building systems are reviewed. Two-way framing systems. Precast concrete construction. Discussion of ultimate strength and yield line theories. Quality control of reinforced concrete. Exploration of new techniques in concrete construction. Other selected topics.

Architectural Principles, Theories, and Methods

Sequence Courses

131 Introduction to Architecture Fall. 2 credits. Open to students in other colleges.

Lec, T 2-4. Staff.

The built and natural environments are introduced as a context for culture. Architecture as an environmental design discipline and its relation to other fields is discussed.

231 Architectural Elements and Principles Fall. 3 credits. Architecture students must register concurrently in Architecture 201.

Studios and lects, T R 1:30-3:25. Staff.

Theory of the order, perception, and function of architectural space. Discourse on the nature of architectural systems and the multiplicity of ways they can be used to solve architectural problems.

232 Design Methods and Programming Spring. 3 credits. Architecture students must register for this course concurrently with Architecture 202.

Studios and lects, T R 1:30-3:25. Staff.

Basic methods for developing architectural programs. Programming as a conceptual as well as a descriptive task is emphasized. Basic methods of design. Analytic and synthetic skills are stressed.

630-631 Advanced Seminar in Architecture 630, fall; 631, spring. 1 credit each term. Required of all fifth-year architecture students. Open to graduate students.

Hours to be arranged. Staff and visiting critics.

Nonsequence Courses

331 Special Problems in Principles, Theories, and Methods Fall or spring. Registration and credit by arrangement.

Hours to be arranged. Staff. Independent study.

[333 Computer Applications Spring. 3 credits. Prerequisites: one term of calculus (Architecture 221 or equivalent), one term of FORTRAN programming, and Computer Science 100 and 106, or equivalent. Not offered 1980-81.

Hours to be arranged. D. P. Greenberg.

Current uses and potentials of digital computers in the architecture profession are introduced. Topics include architectural and planning models, structural analyses, energy simulation, critical path scheduling, and computer graphics.]

333-334 Computer Graphics (also Computer Science 417-418) Fall. 3 credits. Prerequisites: two terms of calculus and Computer Science 211, or equivalent.

T R 10:10-11. D. P. Greenberg.

Introduction to the principles of interactive computer graphics, including input techniques, display devices, display files, interactive graphic techniques, two- and three-dimensional computer graphics, perspective transformations, hidden line and hidden surface algorithms, and color picture generation.

335-336 Theory of Architecture 335, fall; 336, spring. 3 credits each term. Prerequisite: Architecture 231-232 or permission of instructor.

Lecs, T R 4:40-6:30 p.m. L. Hodgden.

437-438 Special Projects in Computer Graphics 437, fall; 438, spring. Variable credit. Limited to third-year students and above. Prerequisites: Architecture 334 plus concurrent registration in Computer Science 314 or equivalent, and permission of instructor.

Hours to be arranged. D. P. Greenberg.

Advanced work in computer graphics input and display techniques, including storage tube, dynamic vector and color raster displays.

[531-532 Computer-Aided Structural Design

531, fall; 532, spring. 4 credits each term. Limited to fourth-year students and above. Prerequisites: Architecture 334 and Engineering CEE G301-G302, Structural Engineering, concurrent registration in CEE G612 Advanced Structural Analysis, and permission of instructor. Not offered 1980-81.

D. P. Greenberg.

Advanced topics involving interactive computer graphics and advanced structural analysis techniques.]

533-534 Computer-Aided Environmental Design

533, fall; 534, spring. 4 credits each term. Limited to students in their fourth or later year. Prerequisites: Architecture 334, 362, and one year of college physics, and permission of instructor.

Staff.

Advanced topics involving interactive computer graphic and advanced environmental design techniques. Topics may include acoustics, lighting, and energy analyses.

[633-634 Introduction to Comparative Theories in Inquiry 633, fall; 634, spring. 3 credits each term. Not offered 1980-81. Limited to third-year students and above.

Sem, hours to be arranged. D. M. Simons.

The study of approaches to problem inquiry: the formal procedures of the fields of architecture, natural sciences, and applied sciences and the aesthetic and rational intelligences exemplified in these. Discussions of significant writings from various fields.]

635 Critical Theory in Architecture Fall or spring. 3 credits. Prerequisite: permission of instructor.

Hours to be arranged. E. K. Morris.

An inquiry into the fundamental principles of architectural criticism, in theory and practice, with emphasis on the philosophical problems involved.

639 Principles of Design Process Fall. 3 credits. Limited to third-year architecture students and above; students in other colleges must have permission of instructor.

Sems, M W 10:10-12:05. A. Mackenzie.

Analysis of the major theories and techniques of design developed during the past fifteen years, with special emphasis on application to the solution of whole problems in architectural design.

Note: **667-668 Architecture in Its Cultural Context I and II** is accepted as a theory course.

Architectural History

Sequence Courses

141-142 History of Architecture I and II 141, fall; 142, spring. 3 credits each term. Students in other colleges may take either or both terms for credit.

Lecs, T R 11:15-1:10. C. F. Otto and staff.

History of architecture as social and cultural expression of Western civilization. Selected examples from Mesopotamia to the eighteenth century are considered in 141; history of modern architecture is discussed in 142.

Nonsequence Courses

244 History of Preindustrial Building Spring. 4 credits.

Lecs, hours to be arranged. W. W. Cummer.

The development of traditional architectural elements and forms; materials, methods, and design expression.

[340 Architecture of the Ancient Near East Spring. 3 credits. Prerequisite: Architecture 141 or permission of instructor. Not offered 1980-81.

Lecs, hours to be arranged. W. W. Cummer. Architecture of the oldest historic civilizations associated with Western tradition. Emphasis on Egypt, Mesopotamia, and Anatolia.]

341 Architecture of the Classical World Fall. 3 credits. Prerequisite: Architecture 141 or permission of instructor.

T R 9:05-11. W. W. Cummer.

Architecture of the ancient Mediterranean civilizations, with emphasis on Greece and Rome.

[343 Introduction to the History of Urban Planning (also CRP 460) Fall. 3 credits. Not offered 1980-81.

J. W. Reys, W. W. Cummer.

Survey of urban planning in Western civilization from the Greeks and Romans through medieval Renaissance, and modern Europe and colonial and nineteenth-century America.]

[344 Islamic Architecture 3 credits. Prerequisite: permission of the instructor. Lec, hours to be arranged. Not offered 1980-81.]

346 The Renaissance Fall or spring. 3 credits. Prerequisites: Architecture 141-142 and permission of instructor.

Lecs, T R 9:05-11. C. F. Otto.

European architecture and city planning of the fifteenth and sixteenth centuries.

347 The Baroque Fall or spring. 3 credits. Prerequisites: Architecture 141-142 and permission of instructor.

Lecs, T R 9:05-11. C. F. Otto.

European architecture and city planning of the seventeenth and eighteenth centuries.

348 American Architecture I and II Fall and spring. 3 credits. Prerequisites: Architecture 141-142 or permission of instructor.

Lecs, M W 9:05-11. Staff.

Fall: Building in the United States from the colonial period through 1860. Spring: Building after 1860.

349 Modern European Architecture Fall. 3 credits. Prerequisite: permission of instructor.

M W 11:15-1:10. C. F. Otto.

A survey of nineteenth- and twentieth-century architecture and city planning in Europe.

442 Historical Seminars in Architecture Fall or spring. 2 credits. Prerequisite: permission of instructor.

Hours to be arranged. Staff.

Using historical evidence, students prepare papers discussing problems relating to design or architecture.

445 Special Investigations in the History of Architecture Fall or spring. Variable credit. Prerequisite: permission of instructor.

Hours to be arranged. Staff.

Independent study.

[447 History Workshop Fall or spring. Variable credit. Sem, hours to be arranged. Staff. Not offered 1980-81.]

448 Historical Lectures in Architecture Fall or spring. Variable credit. Prerequisite: permission of instructor.

Lec, hours to be arranged. Staff.

A series of one or two lectures a week on topics related to architectural history.

[540 Architectural Problems in Archaeological Fieldwork Spring. 3 credits. Not offered 1980-81.

Sem, hours to be arranged. W. W. Cummer.

A review and critique of students participation in the excavation of ancient cities or historic sites during the previous summer. For students in architecture and archaeology.]

541 Surveying for Archaeologists Fall. 3 credits. T 2:30-4:25. W. W. Cummer and staff.

The excavation architect on an archaeological team. Methods of site survey, recording ancient buildings,

and preparation of working, analytic, and restored drawings. For students in architecture or archaeology who anticipate joining a summer excavation.

[542 Methods of Archival Research (also CRP 461)] Spring. 3 credits. Not offered 1980–81.
Lec, R 10:10–12:05. K. C. Parsons.

Examination of methods for research in the history of architecture and urban development, using archival materials such as manuscripts, drawings, correspondence, and documents in the Cornell University archives and regional history collections.]

543 Measured Drawing Fall. 3 credits. For undergraduate architecture students and graduate students in history and preservation. Prerequisite: permission of instructor.

W 11:15–3:30. M. A. Tomlan, J. P. Shaw.
Combines study of architectural drawings as historical documents with exercises in preparing measured drawings of small buildings. Presents the basic techniques of studying, sketching, and measuring a building and the preparation of a finished drawing for publication.

544 Problems in Contemporary Preservation Practice (also CRP 563) Fall or spring. Variable credit.

Sem, T 2:30–4:25. M. A. Tomlan, T. Werbizky.
A review and critique of preservation planning projects selected to indicate the range of current approaches.

545 Perspectives on Preservation (also CRP 562) Fall or spring. 3 credits.

T 12:20–3:20. M. A. Tomlan.
Introductory course for preservation planning. The rationale for and methods of using existing cultural and aesthetic resources in the planning and design of regions and cities.

546 Documentation for Preservation Planning (also CRP 560) Spring. 3 credits.

M 2:30–5:30. M. A. Tomlan.
Methods of collecting, recording, processing, and analyzing historical architectural and planning materials.

547 Preservation Planning Workshop Fall or spring. 2 credits.

Sem, hours to be arranged. Staff and lecturers.
Seminar with visiting professionals, readings, and reports.

548 Problems in Modern Architecture Spring. 2 credits. Prerequisite: permission of instructor.
Lec, hours to be arranged. Staff.

[640 Seminar in Architecture of the Ancient Near East] Fall. 4 credits. Prerequisite: Architecture 340 or permission of instructor. Not offered 1980–81.

W. W. Cummer.
Problems in Near Eastern architectural history.]

641 Seminar in Architecture of the Classical World Spring. 4 credits. Prerequisite: Architecture 341 or permission of instructor.

Hours to be arranged. W. W. Cummer.
Problems in Greek and Roman architectural history.

645 Building Materials Conservation (also CRP 564) Fall or spring. 3 credits. Limited to upperclass and graduate students.

Lec, hours to be arranged. M. A. Tomlan.
A survey of the development of building materials in the United States, chiefly during the nineteenth and early twentieth centuries, and a review of the measures that might be taken to conserve them.

646 Seminar in the Renaissance Spring. 4 credits. Prerequisite: Architecture 346 or permission of instructor.

Sem, hours to be arranged. C. F. Otto.
Historical problems of European architecture and city planning of the fifteenth and sixteenth centuries.

647 Seminar in the Baroque Spring. 4 credits.

Prerequisite: Architecture 349 or permission of instructor.

Sem, hours to be arranged. C. F. Otto.
Historical problems in European architecture and city planning of the seventeenth and eighteenth centuries.

648 Seminar in the History of American Architecture Fall or spring. 4 credits. Prerequisite: permission of instructor.

M 12:20–2:15. Staff.
Investigation, by means of readings, lectures, and reports, of historical problems in architecture of the nineteenth and twentieth centuries in the United States.

649 Seminar in the History of Modern Architecture Fall or spring. 4 credits. Prerequisite: permission of instructor.

Sem, hours to be arranged. Staff.
Problems in modern art and architecture.

Graduate Courses

740 Informal Study in the History of Architecture Fall or spring. Variable credit.

Prerequisite: permission of instructor.
Hours to be arranged. Staff.
Independent study.

741 Approaches to the History of Architecture and Urban Development Fall or spring. 2 credits. Required of graduate students entering the field, and undergraduates in B.F.A. history of architecture program.

Sem, hours to be arranged. C. F. Otto and staff.
Motives, methods, and resources for scholarly work in history of architecture and history of urban development. Discussions, readings, and reports.

840 Thesis in Architectural History Fall or spring. Variable credit.

Hours to be arranged. Staff.
Independent study for the master's degree.

940 Dissertation in Architectural History Fall or spring. Variable credit.

Hours to be arranged. Staff.
Independent research by candidates for the Ph.D. degree.

Design Communications

Sequence Courses

151 Design Fundamentals I Fall. 2 credits.

Studio and lec, T R 4–6. Staff.
Fundamentals of visual and conceptual organization. Dynamics of perception; spatial organization and its representation. Demonstrative problems of an analytic and conceptual nature.

152 Design Fundamentals II Spring. 2 credits.

Studio and lec, T R 4–6. Staff.
Theory of visual and conceptual organization, spatial perception, spatial organization and its representation; demonstrative problems of an analytic and conceptual nature.

[251 Advanced Visual Communications] Fall or spring. 3 credits. Not offered 1980–81.

Lec, hours to be arranged. Staff.
Introduction to photographic tools and methods and their application to architectural presentation and design simulation.]

Nonsequence Courses

251–252 Introductory Photography (also Art 161–162) 251, fall; 252, spring. 3 credits each term.
Darkroom fee, \$30.

T R 3:25–6:30. S. Bowman and staff.
For course description, see Art 161–162.

351 Second-Year Photography (also Art 261)

Fall. 3 credits. Prerequisite: Architecture 251 or 252, or Art 161 or 162, or permission of instructor.
Darkroom fee, \$30.

T R 9:05–12:05. S. Bowman.
For course description, see Art 261.

352 Second-Year Photography (also Art 262)

Spring. 3 credits. Prerequisite: Architecture 251 or 252, or Art 161 or 162, or permission of instructor.
Darkroom fee, \$30.

Hours to be arranged. Staff.
For course description, see Art 262.

353 Large-Format Architectural Photography Spring. 3 credits. Prerequisites: Architecture 251 or 252, or Art 161–162, or permission of instructor.
Darkroom fee, \$30.

Lec and studio, hours to be arranged. Staff.
The special uses of large-format view camera photography. Emphasis on the creative use of the view camera in architectural photography.

[354 Fundamentals of Motion Film] Fall. 3 credits. Prerequisites: Architecture 251–252, or Art 161–162, or permission of instructor. Darkroom fee, \$20. Not offered 1980–81.

Lec and studio, hours to be arranged. Staff.
Basic principles of 16mm motion picture film, in black and white and color, including use of camera and basic editing techniques.]

[355 Graphic Design Studio] Fall or spring. 3 credits. Prerequisite: Architecture 152 or permission of instructor. Not offered 1980–81.

Lec and studio, hours to be arranged. Staff.
Design and preparation of materials for reproduction in print media. Studio in typography, available printing processes, and photomechanical methods of reproduction.]

[356 Architectural Simulation Techniques]

Spring. 3 credits. Prerequisite: Architecture 152 or permission of instructor. Not offered 1980–81.
Lec and studio, hours to be arranged. G. Hascup.
Two- and three-dimensional simulation techniques in architecture. Emphasis on simulation of environment, space, materials, and lighting as visual tools for architectural design.]

[451 Advanced Graphic Design] Fall or spring. 3 credits. Prerequisite: Architecture 355 or permission of instructor. Not offered 1980–81.

Lec and studio, hours to be arranged. Staff.
Design and preparation of materials for reproduction in print media. Emphasis on specialized projects dealing with graphic processes.]

[452 Media Environments] Fall or spring. 3 credits. Prerequisite: Architecture 251 or permission of instructor. Darkroom fee, \$30. Not offered 1980–81.

Studio, hours to be arranged. Staff.
Programmed multiple projection presentations as communication systems. Includes the use of multi-screen slides, motion picture film, and sound in the creation of media environment.]

457 Special Project in Photography Fall or spring. Variable credit. Prerequisites: written proposal outlining the special project and permission of instructor. Darkroom fee, \$30.

Hours to be arranged. Staff.
Independent study.]

[458 Special Project in Design Communication]

Variable credit. Prerequisite: written proposal outlining the special project and permission of instructor. Darkroom fee, \$30. Not offered 1980–81.
Hours to be arranged. Staff.
Independent study.]

[459 Thesis Project in Design Communication]

Fall or spring. 6 credits. Limited to design

communications majors. Prerequisite: written proposal outlining the special project. Not offered 1980-81.

Hours to be arranged. Staff.
Independent study in design communication leading to a thesis project.]

Architectural Science and Technology

Sequence Courses

162 Introduction to Social Sciences in Design

Spring. 2 credits.

Lecs, M W F 9:05. B. MacDougall.
An introduction to concepts and methods in the social sciences for architects; how approaches from anthropology, environmental psychology, and sociology can be used in the study and design of the built environment.

261 Introduction to Environmental Science

Fall. 2 credits.

Lecs, M W F 11:15-1:10. R. Crump.
The basic principles involved in inventory and analysis techniques as they relate to design implementation in the outdoor environment. Case studies depicting application of these principles at all scales of land planning and design are presented.

262 Building Technology, Materials, and Methods

Spring. 3 credits. Prerequisites:

Architecture 162 and 261.

Lecs, M W F 10:10. R. Crump.
Properties of materials — their use and application to the design of buildings and building systems. Discussion of various methods of building construction and assembly.

361 Environmental Controls I

Fall or spring. 3 credits each term. Prerequisite: Architecture 262.

Lecs, W F 11:15. R. Crump.
Basic properties and principles of sound and light. Sound phenomena, noise control, absorption, acoustical design. Light, color, and form. Natural lighting possibilities and constraints. Good and bad examples of artificial lighting.

362 Environmental Controls II

Fall or spring. 3 credits each term. Prerequisite: Architecture 361.

Lecs, W F 10:10-11. R. Crump.
Energy conservation. Passive solar design. HVAC distribution systems.

Nonsequence Courses

371 Environmental Technology Workshop I

Fall. 2 credits. Prerequisite or corequisite: Architecture 361.

Studio, hours to be arranged. R. Crump.
The mechanical engineer's task and its relation to the architectural design process. Full-scale and model studies of the role of air movement and temperature in building design. Passive and active solar energy design.

372 Environmental Technology Workshop II

Spring. 2 credits. Prerequisite or corequisite:

Architecture 362.

Studio, hours to be arranged. R. Crump.
The tasks of the acoustical consultant, the electrical engineer, and the illumination consultant in relation to the architect's work. Acoustical and lighting design studies using full-scale mock-ups and specific building type studies. Cost factors.

561-562 Special Problems in Architectural Science

561, fall; 562, spring. Variable credit.

Prerequisite: permission of science staff instructor.

Hours to be arranged. Staff.

Independent study.

662 Environmental Control Systems

Spring. 3 credits. Lecture and seminar. Prerequisite:

Architecture 362.

Hours to be arranged. R. Crump.

The influences of the environment on the design of buildings and urban developments. Lecture and workshop exercises use the wind tunnel and artificial sun.

667-668 Architecture in Its Cultural Context I and II

667, fall; 668, spring. 4 credits each term.

Prerequisite: permission of instructor.

Sem, F 9:05-11. B. MacDougall.
Fall term, theory; spring term, method and problem solving. An examination of the relationship between architecture and other aspects of culture. Emphasis on the motivations for particular architectural forms, and especially on theories of architecture. Examples from the United States and Asia.

Graduate Courses

761-762 Architectural Science Laboratory

761, fall; 762, spring. Variable credit. Open to graduate students only.

Hours to be arranged. Staff.

Projects, exercises, and research in the architectural sciences.

763-764 Thesis or Research in Architectural Science

763, fall; 764, spring. Variable credit.

Limited to graduate students.

Hours to be arranged.

Independent study.

The Profession of Architecture

Sequence Courses

481-482 Professional Practice

481, fall; 482, spring. 2 credits each term.

Lec, T 1:25-3:20. Staff.
An examination of organizational and management theories and practices for delivering professional design services. Included are an assessment of the building industry and its influence on practice; an analysis of the basic management functions within professional firms; and the legal concerns facing practitioners today. Sessions with selected guest participants focus on case studies.

Architectural Drawing

191 Analytical Drawing I

Fall. 2 credits.

Studios, T R 9:05-11.

Freehand drawing with emphasis on line and perspective representation of form and space.

192 Analytical Drawing II

Spring. 2 credits.

Prerequisite: Architecture 191.

Studios, T R 9:05-11. Staff.

Freehand drawing as a means of conceiving and expressing spatial form; line weight, shades and shadows, and figure drawing.

Washington Field Program

Fourth- and fifth-year students in good standing who have completed the requirements of the first three years of the curriculum are eligible for this program. Students must obtain permission of the program director. Courses offered include Design, Thesis Introduction, Special Problems in Architectural Design, plus the courses listed below. Other course offerings may be available.

480 Professional Studies

Fall or spring. Variable credit.

Lec, hours to be arranged. M. Schack and visiting lecturers.

An examination of organizational and management theories and practices for delivering professional design services. Included are an assessment of the building industry and its influence on practice; and analysis of the basic management functions within professional firms; and the legal concerns facing practitioners today. Sessions with selected guest participants focus on case studies.

530 Professional Seminar

Fall or spring. 1 credit each term.

Hours to be arranged. Staff and visiting critics.

Art

Most courses in the Department of Art are open to students in any college of the University who have fulfilled the prerequisites and who have permission of the instructor.

Fees are charged for all Department of Art courses. For freshman and sophomore fine arts majors, the fee is \$20 each semester. Students from outside the department are charged \$10 per course.

Courses in Theory and Criticism

110 Color, Form, and Space

Fall or spring. 3 credits. Fall: limited to B.F.A. candidates.

M 9:30-11. N. Daly
A study of traditional and contemporary ways of drawing and painting. An analysis of color theory and pictorial space.

111 Introductory Art Seminar

Fall. 1 credit.

Limited to B.F.A. candidates.

R 4:30-6:30.

Students meet for one hour each week with a different member of the faculty. The varying artistic interests of the staff are presented and discussed.

610 Seminar in Art Criticism

Fall or spring. 2 credits. May be repeated for credit. Four terms

required of M.F.A. candidates. Open to other

graduate students.

Hours to be arranged. J. Seley.
Historical and modern critical opinions and their relation to problems in the theory of art are studied.

Studio Courses in Painting

121-122 Introductory Painting

121, fall; 122, spring. 3 credits each term.

121: sec 1, M W 1:25-4:25; sec 2, T R 1:25-4:25.

An introduction to the problems of artistic expression through the study of pictorial composition; proportion, space, shapes, and color as applied to abstract and representational design.

221-222 Second-Year Painting

221, fall; 222, spring. 3 credits each term. Prerequisite: Art 121 or

122 or permission of instructor.

221: T R 9:05-12:05. J. Valerio.

Study of traditional and contemporary media.

321 Third-Year Painting

Fall. 4 credits.

Prerequisite: 9-12 studio credits, depending on

major.

T R 10:10-1. E. Mikus.
Continued study of the principles of painting and the selection and expressive use of materials and media. Group discussions and individual criticism.

322 Third-Year Painting

Spring. 4 credits.

Prerequisite: Art 321.

Staff.
Continued study of the principles of painting and the selection and expressive use of materials and media. Group discussions and individual criticism.

421 Fourth-Year Painting

Fall. 4 credits.

Prerequisite: Art 322.

T R 10:10-1. E. Mikus.
Further study of the art of painting through both assigned and independent projects, executed in various media. Instruction through group discussions and individual criticism.

42 Architecture, Art, and Planning

422 Senior Thesis in Painting Spring. 4 credits.
Prerequisite: Art 421.

Staff.
Advanced painting project to demonstrate creative ability and technical proficiency.

721-722, 821-822 Graduate Painting 721 and 821, fall; 722 and 822, spring. Credit as assigned. May be repeated for credit. Limited to M.F.A. students in painting.

Staff.
Students are responsible, under staff direction, for planning their own projects and selecting the media in which they are to work. All members of the staff are available for individual consultation.

Studio Courses in Graphic Arts

131 Introduction to the Graphic Arts Fall or spring. 3 credits.

Fall: T R 1:25-4:25. Staff.
Students explore the techniques of making impressions, including those that produce the raised surface of the relief print, the lowered surface of the intaglio print, and the flat (planographic) surface of the lithograph.

132 Introductory Silk-Screen Printing Fall or spring. 3 credits.

Fall: M W 9:05-12:05. S. Poleskie.
A basic introduction to the fine art silk-screen printing. Students explore the use of lacquer film, paper stencil, tusche, and glue, and other commonly used procedures of serigraphy.

230 Advanced Intaglio Printing Fall or spring. 3 credits. Prerequisite: Art 131 or 132, or permission of instructor.

Fall: T R 9:05-12:05.
Continuation of the study and practice of methods of printing from below the surface with emphasis on engraving, lift ground, experimental techniques, and color.

231 Introductory Lithography Fall or spring. 3 credits.

Fall: M W 1:25-4:25. G. Page.
The theory and practice of planographic printing, utilizing the limestone block and aluminum plate. Basic lithographic techniques of crayon, wash, and transfer are studied.

233-234 Advanced Lithography 233, fall; 234, spring. 3 credits each term. Prerequisite: Art 231.

233: M W 9:05-12:05. G. Page
Continuation of the study and practice of planographic printing with emphasis on color.

330 Advanced Silk-Screen Printing Spring. 3 credits. Prerequisite: Art 132.

Hours to be arranged. S. Poleskie.
Continuation of Art 132 including photographic stencils, three-dimensional printing, and printing on metal, plastic, and textiles.

331 Advanced Printmaking Fall. 4 credits. Prerequisite: 6 credits of graphic art course work.

T R 9:05-12:05. Staff.
Study of the art of graphics through both assigned and independent projects. Work may concentrate in any one of the graphic media or in a combination of media.

332 Advanced Printmaking Spring. 4 credits. Prerequisite: 6 credits of graphic art course work.

Staff.
Continuation and expansion of Art 331.

431 Senior Printmaking Fall. 4 credits. Prerequisite: courses in printmaking.

Hours to be arranged. Staff.
Further study of the art of graphics through both assigned and independent projects executed in various media. Instruction through group discussions and individual criticism.

432 Senior Thesis in Printmaking Spring. 4 credits. Prerequisite: four courses in printmaking.

Hours to be arranged. Staff.
Advanced printmaking project to demonstrate creative ability and technical proficiency.

731-732, 831-832 Graduate Printmaking 731 and 831, fall; 732 and 832, spring. Credit as assigned. May be repeated for credit. Limited to M.F.A. candidates in graphic arts. Prerequisite: permission of instructor.

Staff.
Students are responsible, under staff direction, for planning their own projects and selecting the media in which they will work. Members of the staff are available for consultation; discussion sessions of work in progress are held.

Studio Courses in Sculpture

141-142 Introductory Sculpture 141, fall; 142, spring. 3 credits each term.

Sec 1, M W F 8-11; sec 2, T R 8-11; sec 3, T R 3:35-6:35. Staff.
A series of studio problems introduce the student to the basic considerations of artistic expression through three-dimensional design. Modeling in Plasteline, building directly in plaster, and casting in plaster.

241-242 Second-Year Sculpture 241, fall; 242, spring. 3 credits each term. Prerequisites: nonmajors, none; majors, Art 141-142.

Sec 1, M W F 1:25-4:25; sec 2, T R 12:20-3:20. Staff.
Various materials including clay, plaster, wood and stone are used for exercises involving figurative modeling, abstract carving, and other aspects of three-dimensional form and design.

341 Third-Year Sculpture Fall. 4 credits. Prerequisite: Art 242.

Sec 1, M W F 1:25-4:25; sec 2, T R 1:25-3:20. Staff.
Continued study of the principles of sculpture and the selection and expressive use of materials and media. Group discussions and individual criticism.

342 Third-Year Sculpture Spring. 4 credits. Prerequisite: Art 341.

Staff.
Continuation and expansion of Art 341.

441 Fourth-Year Sculpture Fall. 4 credits. Prerequisite: Art 342.

Sec 1, M W F 1:25-4:25; sec 2, T R 12:20-3:20. Staff.
Further study of the art of sculpture through both assigned and independent projects executed in various media. Instruction through group discussions and individual criticism.

442 Senior Thesis in Sculpture Spring. 4 credits. Prerequisite: Art 441.

Staff.
Advanced sculpture project to demonstrate creative ability and technical proficiency.

741-742, 841-842 Graduate Sculpture 741 and 841, fall; 742 and 842, spring. Credit as assigned.

May be repeated for credit. Limited to M.F.A. students in sculpture.
Staff.
Students are responsible, under staff direction, for planning their own projects and selecting the media in which they are to work. All members of the staff are available for individual consultation. Weekly discussion sessions of works in progress are held.

Studio Courses in Photography

161-162 Introductory Photography 161, fall; 162, spring. 3 credits each term. Darkroom fee, \$30.

Fall: T R 3:25-6:30. Staff.

A basic lecture-studio course in black and white photography for beginners. Emphasis is on basic camera skills, darkroom techniques, and understanding of photographic imagery.

261 Second-Year Photography Fall. 3 credits. Prerequisite: Art 161 or 162 or permission of instructor. Darkroom fee, \$30.

T R 9:05-12:05.
A studio course in color photographic processes, including color toning and hand coloring of black and white prints, and color printing. Emphasis is on camera skill, color techniques, image content, and creative use of color photography.

262 Second-Year Photography Spring. 3 credits. Prerequisite: Art 161 or permission of instructor.

Darkroom fee, \$30.
Hours to be arranged. Staff.
A studio course in black and white or color photography. Emphasis is on advanced camera and darkroom skills, image content, and creative use of black and white photography.

263 Photo Processes Fall or spring. 3 credits each term. Prerequisite: Art 161 or 162 or permission of instructor. Darkroom fee, \$30.

Hours to be arranged. Staff.
A studio course in early photo and nonsilver processes. Emphasis upon camera skill, basic techniques and processes, image content, and creative use of photo processes.

361-362 Third-Year Photography 361, fall; 362, spring. 4 credits each term. A studio course intended for photography majors and other qualified students.

Prerequisite: Art 261 and 262 or permission of instructor. Darkroom fee, \$30.
361: T R 3:30-6:25. S. Bowman.
Continued study of creative use of photography with emphasis upon specialized individual projects.

461-462 Fourth-Year Photography 461, fall; 462, spring. 4 credits each term. A studio course intended for photography majors and other qualified students.

Prerequisite: Art 361 and 362 or permission of instructor. Offered only for students who enter in the fall of 1977. Darkroom fee, \$30.
461: T R 3:30-6:25. S. Bowman.
Continued study of creative use of photography leading to thesis exhibition.

Studio Courses in Drawing

151-152 First-Year Drawing 151, fall; 152, spring. 3 credits each term.

151: sec 1, M W 1:25-4:25; sec 2, M W 9:05-11, plus 2 hours to be arranged; sec 3, T R 1:25-4:25.
A basic drawing course in the study of form and techniques. Contemporary and historical examples of figure drawing are analyzed in discussion.

251-252 Second-Year Drawing 251, fall; 252, spring. 3 credits each term. Prerequisites: Art 151 or 152, or permission of instructor.

251: sec 1, T R 1:25-4:25; sec 2, M W 1:25-4:25. Staff.
A continuation of Art 151, but with a closer analysis of the structure of the figure and a wider exploitation of its purely pictorial qualities.

[351 Third-Year Drawing Fall. 3 credits. Prerequisites: Art 151, 152, 251, and 252. Staff. Not offered 1980-81.]

Graduate Thesis

712 Graduate Thesis Spring. Credit as assigned. Staff.

For graduate students in their last term in the programs in painting, sculpture, and graphics.

Special Studio Courses

270 Special Studio Fall or spring. Credit as assigned. May be repeated for credit. Prerequisite: permission of instructor.
Staff.

For transfer students and others whose standing in the professional sequence is to be determined. May be in painting, sculpture, graphics or photography.

370 Studio Concentration Fall or spring. Credit as assigned. May be repeated for credit. Prerequisite: permission of instructor.
Staff.

For B.F.A. degree candidates who want a greater concentration in drawing, painting, sculpture, graphics, or photography in the upperclass years.

470 Studio Concentration Fall or spring. Credit as assigned. May be repeated for credit. Prerequisite: permission of instructor.
Staff.

For B.F.A. degree candidates who want a greater concentration in drawing, painting, sculpture, graphics, or photography in the upperclass years.

City and Regional Planning

Most courses in the Department of City and Regional Planning are open to students in any college of the University who have fulfilled the prerequisites and have the permission of the instructor.

Course Numbers

There are two components to city and regional planning course numbers: (a) Courses numbered from 500-599 and 600-699 are generally considered to be introductory and/or first-year courses; those numbered from 700-799 and 800-899 are generally considered to be more advanced courses. Upperclass undergraduate courses are numbered from 300-499. (Undergraduates with the necessary prerequisites and permission of the instructor may enroll in courses numbered 500 and above.) (b) Courses are grouped (by the tens digit of the course number) to represent the underlying structure of the planning curriculum as follows: theory and quantitative methods (0, 1, 2), program areas (3, 4, 5), and interprogram topics (6, 7, 8, 9).

The department attempts to offer courses according to the following schedule; however, students should check with the department at the beginning of each semester for the latest changes.

Urban and Regional Theory

200 Contemporary Issues in Urban and Regional Studies Spring. 4 credits. Prerequisite: one course in either government, economics, or sociology.
N. Gilgosh.

Interdisciplinary course exploring an introductory level theories of the development and spatial patterning of cities and regions and the political and economic interactions with them. Emphasis will be on the relationships between these theories and current social and urban issues.

400/500 Introduction to Urban and Regional Theory Spring. 4 credits. A first-year graduate course, open to juniors and seniors.
T 2:30-5:30. W. W. Goldsmith.

A review of attempts by the various social sciences to understand the contemporary city and its problems, particularly as seen by planners. Material is drawn from urban and regional economics, human ecology, urban sociology, psychology, anthropology, and geography in order to explain the location, size, form, and functioning of cities. Traditional and contemporary critical theory is examined as it applies to physical, social, and economic problems of the modern city.

[402 Spatial Analysis of Urban and Regional Systems I] Fall. 4 credits. Not offered 1980-81.

Staff.
Introductory review of theories dealing with the spatial distribution of population and economic activity drawn from various social science disciplines, such as geography, economics, and sociology.]

[403 Spatial Analysis of Urban and Regional Systems II] Spring. 4 credits. Prerequisite: CRP 402. Not offered 1980-81.

A detailed, in-depth review of recent research dealing with such topics as population distribution, migration, location of industry and economic activity, and the spatial organization of urban and regional social systems.]

[600 Urban Economic Analysis] Fall. 3 credits. Prerequisite: CRP 500 or equivalent. Not offered 1980-81.

S. Czamanski.
Examination of the city as an economic entity with spatial characteristics. Urban phenomena are analyzed from an economic point of view, using tools from economic analysis. Areas examined include patterns and determinants of urbanization, urban structure and location of activities, urban land and housing markets, the role of urban transportation, and urban public policy.]

708 Fieldwork/Workshop in Urban and Regional Theory Fall or spring. Credit as assigned.
Staff.

Work on problems in urban and regional theory in a field and/or laboratory setting.

709 Special Topics in Urban and Regional Theory Fall or spring. Credit as assigned.
Staff.

800 Advanced Seminar in Urban and Regional Theory I Fall. 3 credits. Prerequisite: CRP 500.
M 3:35-5:30. B. G. Jones.

The theory or urban spatial organization. Economic, technological, and social factors leading to urbanization and various kinds of spatial organizations are explored. Major theoretical contributions to the understanding of intraregional and intraurban distribution of population and economic activity are reviewed.

801 Advanced Seminar in Urban and Regional Theory II Spring. 3 credits. Prerequisite: CRP 800.
M 3:35-5:30. B. G. Jones.

A continuation of CRP 800, concentrating on recent developments.

809 Informal Study in Urban and Regional Theory Fall or spring. Credit as assigned.
Staff.

Planning Theory and Politics

413 Planning and Political Economy I Fall. 4 credits.
Staff.

This course deals with Marx's methodological approach and his elaborations in volume I of *Capital*. Topics will cover Marx's method, labor theory of value, the formula of *Capital*, labor-process and surplus-value, absolute and relative surplus-value, general law of capital accumulation, and transition from feudalism to capitalism. Students are expected to have some familiarity with Marx's approach. Readings from Marx and modern writers such as Sweezy and Mandel will average about 100 pages a week.

414 Planning and Political Economy II Spring. 4 credits.
W. W. Goldsmith.

This course covers the economic formulations Marx expounded in volumes II and III of *Capital* and in *Theories of Surplus-Value*, as well as current

contributions on the different ensuing debates. Topics cover the circulation of capital, productive and unproductive labor, reproduction schemes, accumulation, the transformation of surplus-value into profits, the transformation of values into prices of production, the tendency of the rate of profit to fall, and crises. The end of the course treats the division of profits into profits of enterprise, interest, and, in particular, ground rent. Students must have read volume I of *Capital* and be generally familiar with Marx's approach. Readings from Marx and contemporary writers will average about 100 pages a week.

510 Introduction to Planning Theory Spring. 3 credits.

T 1:25-3:20. P. Clavel.
Normative and behavioral models of decision making for the provision of public goods and services. Theories of individual decision and choice are reviewed, followed by applications in institutional contexts stressing the impact of alternative organizational and political models of social decision processes.

511 Introduction to Planning Fall. 4 credits.
M W F 10:10-11. P. Clavel.

The origins, history, programs, and contemporary issues of city and regional planning in the United States. Conceptions of the state, the role of planners in public action, and the dominant methods and values of planners are discussed and criticized.

612 Urban Politics and Planning Spring. 3 credits.
I. R. Stewart.

A consideration of the political dimension of planning and renewal activities. Emphasis on government mandate and structure, as well as interest group and power relationships as they are related to development decision-making processes. Theory and case-study analyses.

614 Neighborhood and Community Theory Spring. 4 credits.

M 12:20-3:20. N. Gilgosh.
An examination of contemporary social and economic conditions of neighborhoods; community differentiation reinvestment and revitalization policies and practice; community control; and the role of the community in the provision of goods, services, and social support.

710 Politics of the Planning Process Spring. 4 credits.

W 2:30-4:25. P. Clavel.
Analysis of planning and political institutions in selected subjects and policy areas, relating national and subnational levels. Subjects are drawn from such areas as environmental control and use policy, industrial development, transportation, and community development. Theories of planning and politics are compared for their analytical usefulness in these areas.

711 Planning and Organization Theory Fall. 4 credits.

R 3:35-5:30. P. Clavel.
An examination of organizational and administrative models relevant to plan formation and implementation. Applications are made to such programs as community development, regional administration, urban renewal, and land-use control.

718 Fieldwork/Workshop in Planning Theory and Politics Fall or spring. Credit as assigned.
Staff.

Work on problems in planning theory and politics in a field and/or laboratory setting.

719 Special Topics in Planning Theory and Politics Fall or spring. Credit as assigned.
Staff.

44 Architecture, Art, and Planning

810 Advanced Planning Theory Fall. 3 credits.
Prerequisite: CRP 500 or 710.

F 3:35–5:30. B. G. Jones.

A survey of the works of scholars who have contributed to current thinking about planning theory. Alternative assumptions concerning models of man and theoretical concepts concerning the nature of planning today are considered.

819 Informal Study in Planning Theory and Politics Fall or spring. Credit as assigned.
Staff.

Quantitative Methods and Systems Analysis

320 Introduction to Quantitative Methods I Fall. 3 credits. Prerequisite: Mathematics 108 or equivalent, or permission of instructor.

T R 10:10–12:05. Staff.

An introduction to the application of quantitative methods to issues in urban and regional studies. Special attention is given to the characterizations, evaluations, and control of evolving processes of urban and regional issues. Emphasis is on methods for the description of physical and social phenomena by mathematical means. Topics include linear and non-linear deterministic processes, elementary stochastic process, process identification, and simulation.

321 Introduction to Quantitative Methods II

Spring. 3 credits. Prerequisite: CRP 320, or permission of instructor.

Staff.

Methods for the evaluation and control of process performance. Topics include linear and dynamic programming, single stage and multistage decisions, and elementary statistical decision theory.

520 Mathematical Concepts for Planning Fall. 1, 2, 3, 4 credits. Prerequisite: permission of instructor.

T R 9:05–11. P. Brandford.

Intended for students having little or no background in college mathematics. Basic concepts in matrix algebra, calculus, and probability are covered in self-contained units of one credit each. Students may register for any or all of these topics.

Mathematics 201, Mathematics for the Social Sciences, and Sociology 420. Mathematics for Sociologists, are acceptable substitutes.

521 Introduction to Computers in Planning Fall. 3 credits.

T R 12:20–2:15; lab to be arranged. P. Brandford.

An introduction to the use of computers in the problem-solving and planning processes. Students run programs using PL/1 or another appropriate programming language. Brief introduction to computer systems and the use of library routines. Advantages and limitations of using computers are considered.

620 Planning Analysis Spring. 4 credits.

Prerequisite: CRP 621.

M W F 10:10–11:00; lab, T 2:30–4:25. B. G. Jones.

A survey of commonly used techniques for analyzing various aspects of subnational socioeconomic systems emphasizing planning applications.

621 Statistical Analysis for Planning Spring.

3 credits. Prerequisites: CRP 520 or equivalent and permission of instructor.

T R 9:05–9:55; lab, T 4:30–5:30. Staff.

An introduction to basic methods of statistical analysis with an emphasis on their use in the decision-making process in planning. Material in decision theory, sampling, estimation, hypothesis testing, and prediction will be introduced.

622 Planning Information Systems Fall. 3 credits.

Prerequisite: CRP 521 or equivalent.

T R 3:35–4:25; lab to be arranged. G. Ziegler.

The design and use of computer-based information systems for planning and policy analysis, including conventional data processing and advanced data base systems. Technical aspects in the design and structure of such information systems are introduced along with a variety of applications.

623 Methods of Social Policy Planning Spring. 3 credits. Prerequisite: CRP 521 or equivalent.

R 12:20–2:15. N. Gilgosh.

An examination of methodologies of needs assessment, programming, and evaluation suitable for social planning problems. Many of the methodologies, survey research, social area analysis, and social indicators have been drawn from other social science disciplines but are applied to policy and planning issues. Others, such as needs assessment, social impact assessment, goal attainment, PPBS, and PERT were developed directly or were adapted for use in social planning.

720 Quantitative Techniques for Policy Analysis and Program Management Fall. 4 credits.

M W 9:05–11; lab, W 2:30–3:20. D. Lewis.

Selected analytical techniques used in the planning and evaluation of public policy and public investments are examined. Topics include simulation modeling, benefit-cost and cost effectiveness analysis (including capital budgeting), and optimization strategies.

[721 Simulation in Planning and Policy Analysis] Fall or spring. 3 credits. Prerequisites: CRP 621 and 521 or equivalent. Not offered 1980–81.

T R 4:40–5:30. S. Saltzman.

The design and use of simulation models in planning and policy analysis. Various approaches drawn from discrete stochastic simulation, econometric simulation, microanalytic simulation, and urban dynamics are evaluated. Applications in design, land use, regional development, and social policy will be considered. Students run their own programs on the Cornell computer.]

722 Decision Analysis for Policy Planning and Program Management Spring. 4 credits.

M W F 9:05–9:55; lab, W 12:20–2:15. D. Lewis.

An examination of selected techniques for analyzing complex dynamic decision problems in the planning context. Topics include dynamic programming (deterministic and probabilistic), integer programming, and process simulation (queueing models).

728 Fieldwork/Workshop in Systems Planning and Analysis Fall or spring. Credit as assigned.

Staff.

Work on applied systems planning problems in a field and/or laboratory setting.

729 Special Topics in Quantitative Methods and Analysis Fall or spring. Credit as assigned.

Staff.

829 Informal Studies in Quantitative Methods and Analysis Fall or spring. Credit as assigned.

Staff.

Regional Development Planning

[430 Regional Economic Development] Fall. 4 credits. Prerequisite: CRP 500. Not offered 1980–81.

Staff.

Problems of and theories about development of lagging, underdeveloped, or poor regions in industrial nations, with emphasis on planning implementation.]

[530 Introduction to Regional Development Planning] Fall. 3 credits. Prerequisite: CRP 500. Not offered 1980–81.

Staff.

An introduction to the history, theories, methods, and

processes of regional development planning. Will also focus on planning for specialized functions in various public agencies.]

[630 Regional Development Administration] Fall or spring. 4 credits. Not offered 1980–81.

M 1:25–3:20. P. Clavel.

Administrative institutions relevant to regional development policies, with attention to the United States, Western Europe, and Third World countries. Approaches to theory, measurement, and spatial distribution of institutions are covered with reference to the design of effective programs.]

730 Regional Planning Methods Fall. 4 credits.

Prerequisites: CRP 620, basic economics, some calculus, and statistics.

T 11:15–1:10. S. Czamanski.

Problems in the formulation and testing of scientific hypotheses. Focus is on depressed or underdeveloped regions; also includes some discussion of past and current work of participants and their dissertations. Topics include construction of models, main estimating techniques, and some applied regional models.

731 Optimization Techniques in Planning Spring. 4 credits.

S. Czamanski.

A continuation of CRP 730.

732 Regional Industrial Development Spring. 4 credits.

S. Czamanski.

The course will cover issues of interregional disparities, agricultural vs industrial development, planning of industrialization in market, mixed and planned economies. The determinants of industrial location and ability of a region to attract industries will be discussed, as well as the role of trade and of appropriate technology and technical progress. Regional industrialization policies based on neoclassical, radical, and structuralist approaches to development will be reviewed.

738 Fieldwork/Workshop in Regional Development Planning Fall or spring. Credit as assigned.

Staff.

Work on applied problems in regional development planning in a field and/or laboratory setting.

739 Special Topics in Regional Development Planning Fall or spring. Credit as assigned.

Staff.

830 Seminar in Regional Interindustry Analysis and Programming Spring. 4 credits. Prerequisites: basic economics and elementary matrix algebra.

M 11:15–1:10. S. Czamanski.

Advanced treatment of regional industrial structure, methods of construction and applications of input-output, linear programming, saturation, and dynamic optimization. Examples of recent applications of the techniques discussed to the solution of actual regional problems will be analyzed.

831 Techniques of Regional Accounting Fall or spring. 3 credits. Prerequisites: CRP 620 and Economics 312 or equivalent.

Staff.

Methods of construction of the regional social accounts and their application to regional planning. Measuring levels of activity within regions, such as income and product accounts, is emphasized.

Methods of estimating flows between regions, such as balance of payment accounts, are also considered.

832 Location Theory Fall or spring. 3 credits.

Prerequisites: CRP 500 and 620 and Economics 311–312, or equivalent.

R 7–10 p.m. W. Isard.

Traditional Weberian location doctrine; transport orientation, labor orientation, agglomeration, and urban rent theory are examined. Interregional trade and market and supply area analysis is treated. Particular attention is paid to Loschian and Christaller systems of urban places.

833 Methods of Regional Analysis Spring. 3 credits.

R 1:25-4:25. W. Isard.
Advanced applications of interregional and regional input-output and linear programming techniques to development problems. Applications of spatial interaction and growth (intertemporal) models to the analysis of urban and multiregional systems, with particular reference to environmental quality management.

839 Informal Study in Regional Development Planning Fall or spring. Credit as assigned.
Staff.

Social Policy Planning

[340 Institutional Decision Processes Fall. 3 credits. Not offered 1980-81.
Staff.

An introduction to the administrative and political environment in which urban and regional issues occur. Starting from an analysis of social decision procedures, the course then goes on to describe the characteristic administrative and political institutions in which issues on urban and regional problems take place; some attention is also given to the underlying dynamics of economic and political development in cities and regions, and the roles that various participants play in these decision processes.]

[442 Social and Political Studies of Science (also Sociology 355) Spring. 3 credits. Not offered 1980-81.

W 2:30-4:30. D. Nelkin, S. Del Sesto.
A view of science less as an autonomous activity than as a social and political institution. Focus is on its relationship to government, the media, religion, and education. Drawing from recent controversies, questions of ethics and social responsibility in science, struggles to maintain internal control over research and the teaching of science, and concepts of limits to inquiry are discussed.]

440 The Impact and Control of Technological Change (also Economics 302 and Government 302) Cosponsored by the Program on Science, Technology, and Society. Spring. 4 credits.

T R 2:30-4:25. R. Brickman and guest lecturers.
Social, environmental, and economic implications of technological change in the context of present policies and strategies of control. Several specific cases are considered in detail, followed by investigation of the problems of a modern technological society. Alternative political and economic solutions are explored.

540 Introduction to Social Policy Planning Fall. 4 credits.

R 12:20-3:20. N. Gilgosh.
The process and politics of providing public services, primarily social services, within the context of changing fiscal and social conditions. Topics include (1) a review of the nature and source of selected social problems and of the present service systems that attempt to meet these needs; (2) an analysis of the inadequacies and problems of this system in the light of changing conditions that affect service delivery, such as fiscal and service disparities, budget retrenchment, and political movements to limit spending such as Proposition 13; and (3) an exploration of new forms or alternatives to the existing service delivery systems.

541 The Politics of Technical Decisions I (also Government 628 and B&PA NPA 515)

Cosponsored by the Program on Science, Technology, and Society. Fall. 4 credits.
W 2:30-4:25. S. Del Sesto.
Political aspects of decision making in areas traditionally regarded as technical. Subjects include the origins and characteristics of "technical politics," the role of experts in government, and the problem of expertise in a democratic system. Alternatives to current decision-making procedures are explored.

542 The Politics of Technical Decisions II (also Government 629 and B&PA NPA 516)

Cosponsored by the Program on Science, Technology, and Society. Spring. 4 credits.
Prerequisite: CRP 541 or permission of instructors.
Hours to be arranged. D. Nelkin.
A continuation of CRP 541, focusing on decision making in several technical policy areas. Students develop individual or group research projects focusing on policy decisions with a significant technical component and considerable public impact.

543 Planning, Organizing, and Public Service Delivery Fall or spring. Credit as assigned.

R 10:10-12:05. J. Forester.
An exploration of planners' roles and practices with special attention to organizational and political contexts of planning and policy analysis efforts. Focus is on communicative dimensions of organizational behavior and planning practice; planning is assessed as an organizing activity extending far beyond technical problem-solving.

544 Recurring Themes in Social Policy Planning Spring. Credit as assigned.
J. Forester.

A seminar devoted to the understanding of problems of social policy planners. Recurring social policy themes are studied: professional power and dependency-creation, political and technical aspects of expertise, organizational and institutional settings of social policy programs and services, problems of professional altruism. Work of Titmuss, Lubove, Goffman, and Illich is discussed.

[640 Critical Social Theory in Planning Fall. 4 credits. Limited to seniors and graduate students. Intended for students already familiar with "radical" social theory. Prerequisite: permission of instructor. Not offered 1980-81.

F 2:30-4:25. W. Goldsmith.
A review of Marxist methods and analysis of controversies in critical theory: problems of capital accumulation, the role of the state, the role of the intellectual, and alternative paths to socialism, focusing on the industrialized West.]

[642 Critical Theory and the Foundation of Planning Analysis Fall. Credit as assigned. Not offered 1980-81.

J. Forester.
Beginning with Weber, Marx, and Durkheim, the fundamental assumptions, theories, and frameworks structuring planning and policy analyses are explored. Positivist, phenomenological, ordinary language, and critical perspectives are considered as they clarify or obscure questions of value, rationality, objectivity, interpretation, and action in public policy contexts.]

740 Seminar in Social Policy Research and Analysis Spring. 4 credits.

Staff.
The focus is on examining contemporary methods of social policy analysis, including their political implications, and developing multidisciplinary approaches to selected social policy issues. The dilemmas of action research and of implementing research findings are explored.

743 Critical Theory and Public Policy Spring. 4 credits. Prerequisite: background in political or social theory.

M 1:25-3:20. J. Forester.
This seminar explores the critical theory of Jurgen Habermas, particularly its application to problems of planning and public policy analysis. We consider problems of legitimation, power, rationalization, instrumental and communicative action, ideology, and systematically distorted communications as they appear more broadly in the practice of planners, policy analysts, or professionals.

[744 Urban Financial Planning and Management Spring. 3 credits. Not offered 1980-81.
Staff.

Introduction to the theory and practice of financial management and planning in urban government, including budgeting, capital expenditures, management of short-term assets, borrowing, taxation, and intergovernmental finance. Case studies and problem sets that place the student in a decision-making context are emphasized.]

[745 Urban Fiscal Analysis Fall. 3 credits. Prerequisite: CRP 744 or a course in public finance. Not offered 1980-81.

Staff.
Government financial information (fund accounting, financial statements, and budgets) is introduced and this information and other data are used to identify major fiscal problems and their causes faced by cities. Alternative solutions to urban fiscal problems are evaluated using this analysis.]

746 Informal Seminar in Planning Theory: Philosophy, Ethics, and Values in Planning Fall or spring. Credit as assigned.
J. Forester.

An informal seminar to discuss problems of values, ethics, and alternative philosophical positions that are inherent in various planning proposals or perspectives. The claims of incrementalists to the contrary, can planning be ethical? Must value judgments be arbitrary?

747 Seminar on Jurgen Habermas and the Analysis of Public Policy Spring. Credit as assigned.

J. Forester.
Discussions to ground Habermas's theory of systematically distorted communication in the context of planning and public policy analysis. Themes include communicative action, limits of instrumental rationality, critique of ideology and analysis of distortions of communication, relationship of critical theory to practices, and praxis, necessary interestedness of inquiry.

748 Fieldwork/Workshop in Social Policy Planning Fall or spring. Credit as assigned.
Staff.

Work on applied problems in social policy planning in a field and/or laboratory setting.

749 Special Topics in Social Policy Planning Fall or spring. Credit as assigned.
Staff.

849 Informal Study in Social Policy Planning Fall or spring. Credit as assigned.
Staff.

Urban Development Planning

[551 Suburbanization and Metropolitan America Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1980-81.

I. R. Stewart.
The major issues in suburban development, metropolitan growth analysis, and the role of new communities in accommodating expected future population.

552 Urban Land-use Planning I Spring. 3 credits.
T 12:20–2:15. S. Stein.

Surveys, analyses, and plan-making techniques for guiding physical expansion and renewal of urban areas; location requirements, space needs, interrelationships of land uses. Emphasis on residential, commercial, and industrial activities and community facilities; housing and neighborhood conditions. Lectures, seminars, and field exercises.

553 Urban Land-use Planning II Spring. 2 credits.

Prerequisite: CRP 552 or permission of instructor.
F 11:15–1:10. S. Stein.

Consideration in-depth of neighborhoods, central business districts, shorelines and waterfronts, new towns, planned-unit developments, high-density housing, highway-oriented uses, and others.

554 Introduction to Environmental Planning Design Fall. 3 credits. Intended for graduate planning students without design backgrounds.

Prerequisite for other students: permission of instructors.
M W 11:15–1:10. S. Stein.

Planning and design of built environments as an aesthetic reflection of comparative values and needs. Lectures, seminars, readings, and design exercises explore basic concepts and issues related to architecture, landscape, urban design, and urban planning.

555 Environmental Planning and Design Workshop Spring. 4 credits. Prerequisite: CRP 554 or permission of instructor. No previous graphics experience required.

M W 11:15–1:10, plus studio work. Staff.
Planning and design problems related to the built environment. An understanding of the design process is developed and graphic communication techniques are explored.

556 Built-Environment Education Workshop Fall and spring. 4 credits.

Lecs and sems, W 7:30–9:30 p.m. S. Stein.
Interdisciplinary teams of students from the environmental design disciplines and historic preservation program work in elementary and junior high school classrooms with school children and teachers to deepen their understanding of the impact of the built environment on their lives, and encourage their participation in the shaping of their own environment. Classroom work is emphasized.

557 Small-Town Community Design Workshop Fall and spring. 4 credits.

S. Stein.
An in-depth approach to the problems and challenges facing the small-town commercial district. Various aspects of design including building and storefront rehabilitation, graphics and signage, construction details, and presentation are explored in workshop and studio settings. Emphasis is placed on preservation of historic architecture. Students participate in downtown revitalization activities, including contact with merchants and property owners, promotional events, and community events.

651 Urban Land Policy and Programs Fall.

3 credits. Prerequisite: 653 or permission of instructor.
M 1:25–3:15. J. W. Reps.
Major problems of urban land control and management and possible solutions are considered. Subjects for discussion include taxation, compensation and betterment, large-scale public land acquisition, subsidies and incentives, and acquisition of developmental rights.

652 The Urban Development Process Spring. 2 credits. Enrollment limited. Prerequisite: CRP 511 or permission of instructor.

M 3:35–5:30. Staff.
Examination of the goals, strategies, methods, and achievements of major participants in the urban land

and building market: land owners, speculators, real estate brokers, developers, bankers, lawyers, nonprofit builders, and government agencies.

653 Legal Aspects of Land-use Planning Spring. 3 credits. Prerequisite: CRP 511 or permission of instructor.

R 12:20–2:15. Staff.
Survey of leading cases and legal concepts in land-use planning, with particular attention to zoning, subdivision control, condemnation, and growth control issues.

656 Critical Areas Protection Fall. 3 credits.

M W F 9:05–9:55. R. Booth.
State government attempts to protect critical areas such as tidal wetlands, key agricultural lands, and flood plains with planning and regulatory techniques. Analysis of significant management, implementation, and legal issues.

657 Planning and Development Workshop Fall or spring. 4 credits.

Staff.

658 Regulation of Projects of State Concern Spring. 3 credits.

R. Booth.
State government attempts to regulate the planning and development of projects deemed to be of statewide concern, such as key power generation and transmission facilities and large industrial development. Analysis of significant management, implementation, and legal issues.

750 Urban Land Policy and Programs—Special Problems Fall or spring. Credit as assigned.

Staff.

758 Fieldwork/Workshop in Urban Development Planning Fall or spring. Credit as assigned.

Staff.
Work on applied problems in urban development planning in a field and/or laboratory setting.

759 Special Topics in Urban Development Planning Fall or spring. Credit as assigned.

Staff.

859 Informal Study in Urban Development Planning Fall or spring. Credit as assigned.

Staff.

Special Interprogram Topics: History and Preservation**[460 Introduction to the History of Urban Planning (also Architecture 343)]** Fall. 3 credits.

Not offered 1980–81.
T R 9:05–9:55; lab, W 2:30–3:20. Staff.
Survey of urban planning in Western civilization, from the Greeks and Romans through medieval, Renaissance, and modern Europe, to colonial and nineteenth-century America.]

[461 Methods of Archival Research (also Architecture 542)] Spring. 3 credits. Not offered 1980–81.

T 10:10–12:05. K. C. Parsons.
Examination of methods of using archival materials, including documents in the Cornell Archives and Regional History collection, for research in the history of architecture, historic preservation, and urban development.]

462 The American Planning Tradition Fall. 4 credits. No prerequisites.

M W F 9:05. J. W. Reps.
A systematic review of American city planning history, beginning with the earliest colonial settlements and ending with the era of the New Deal. An introductory lecture course requiring no previous exposure to planning or architecture and a prerequisite for students intending to take advanced seminars or independent studies in planning history.

560 Documentation for Preservation (also Architecture 546) Fall or spring. 3 credits.

M 2:30–5:30. M. A. Tomlan and visiting lecturers.
Methods of identifying, recording, collecting, processing, and analyzing information dealing with historic and architecturally significant structures, sites, and objects.

561 Historic Preservation Planning Workshop: Surveys and Analyses Fall and spring. 4 credits.

R 3:30–5:30. S. Stein, T. Werbizky.
Techniques for the preparation of surveys of historic structures and districts; identification of American architectural styles focusing on upstate New York; explorations of local historical resources, funding sources, and organizational structures. Lectures and training sessions. Emphasis on fieldwork with individuals and community organizations.

562 Perspectives on Preservation (also Architecture 545) Fall. 3 credits.

T 12:20–3:20. M. A. Tomlan and visiting lecturers.
Introductory course for preservationists. A survey of the historical development of preservation activity in Europe and America leading to a contemporary comparative overview. Field trips to notable sites and districts.

563 Problems in Contemporary Preservation Practice (also Architecture 544) Fall or spring. Variable credit.

S. W. Stein, M. A. Tomlan, T. Werbizky.
A review and critique of ongoing preservation projects, and an investigation of areas of expertise currently being developed. Presented by staff and guest lecturers.

564 Building Materials Conservation (also Architecture 645) Fall or spring. 3 credits. Open to juniors, seniors, and graduate students.

M. A. Tomlan and visiting lecturers.
A survey of the development of building materials in the United States, chiefly during the nineteenth and early twentieth centuries, and a review of the measures that might be taken to conserve them.

660 Seminar in the History of American City Planning Spring. 3 credits. Prerequisites: 462 or permission of the instructor.

J. W. Reps.
A research seminar in which each student will select a topic for oral presentation followed by the completion of a research paper. Early sessions will examine the scope of planning history, its relations to other disciplines, sources of written and graphic materials, and the uses of historical evidence in interpreting urban planning and development.

661 Historic Preservation Planning Workshop: Plans and Programs Fall and spring. Variable credit. Prerequisite: CRP 561.

Hours to be arranged. S. Stein, T. Werbizky.
Preparation of elements of historic preservation plans, designs, legislation, and special studies. Individual or group projects are selected by students. Fieldwork is emphasized.

662 Seminar in American Urban History Spring. 3 credits. Prerequisite: permission of instructor.

M 10:10–12:05. I. R. Stewart.
Seminar in the historical evolution of the American city. Emphasis on factors in urban growth, the process of urbanization, urban reform movement, and intellectual and social responses to the city.

[663 Historic Preservation Law Spring. 3 credits. Offered alternate years. Not offered 1980–81.

M W 11:15–12:05. R. Booth.
Law of historic district and landmark designation; tools for preservation (such as police power, taxation, eminent domain); recent developments in state and federal historic preservation mandates.]

664 Economics and Financing of Neighborhood Conservation and Preservation Fall. 2 credits.

B. G. Jones.

The economic and financial aspects of historic preservation and neighborhood conservation. Topics include public finance, selected issues in urban economics, real estate economics, and private financing of real estate projects.

665 Public Policy and Preservation Planning Spring. 3 credits.

I. R. Stewart.

An examination of fundamental planning concepts and issues as they relate to historic preservation. Neighborhood revitalization, federal housing programs, the role of public and private institutions, displacement, and other social issues are among the primary topics.

768 Fieldwork/Workshop in History and Preservation Fall or spring. Credit as assigned.

Staff.

Work on applied problems in history and preservation planning in a field and/or laboratory setting.

769 Special Topics in History and Preservation

Fall or spring. Credit as assigned.

Staff.

869 Informal Study in History and Preservation

Fall or spring. Credit as assigned.

Staff.

**Special Interprogram Topics:
International Studies****570 Seminar in Latin American Urban Planning and Development** Fall and spring. 2 credits.

S. W. Stein and guest lecturers.

Seminar covering the broad urban planning and development problems facing Latin American cities. Historical development; current and future physical, social, economic, and administrative issues focusing on urban areas, with consideration of their regional context. Coordinated with CRP 571.

571 Workshop in Latin American Urban Planning and Development Fall and spring. 4 credits.

S. W. Stein.

Application of planning theories and methodologies to problems of Latin American cities. Selection of specific urban planning projects for survey, analysis, policy formulation, plan preparation, and program development. Students work in teams or individually in workshop/studio setting.

670 Regional Planning and Development in Developing Nations Fall. 4 credits. Prerequisite: second-year graduate standing.

T 2:30-5. W. W. Goldsmith.

Extensive case studies of development planning are analyzed. Focus is on a Marxist critique of the process of regional development through urbanization and in particular the concepts of equity and efficiency, external economies, export linkages, and internal self-sufficiency and integration. Resource development, national integration, human development, and migration problems are discussed.

671 Seminar in International Planning Spring. 1 credit. S-U grades only.

F 12:20-1:30. W. W. Goldsmith.

The International Planning Lecture Series sponsors lectures by visiting scholars or professionals in the field of international development and planning. The only formal requirement for the course is a brief evaluation of the series at the end of the semester.

771 Seminar in Science and Technology Policy in Developing Nations Spring. 3 credits

D. Lewis.

An examination of the issues facing developing countries as they endeavor to use technology in pursuit of their national goals. Topics covered include

alternative choices of technology and the associated impacts, the role of multinational corporations, government policymaking institutions, manpower development and utilization strategies, and policy instruments.

[772 Seminar in Policy Planning in Developing Nations: Technology Transfer and Adaption] Fall. 3 credits. Not offered 1980-81.

F 10:10-12:05. D. Lewis.

An exploration of the international transfer of technology to developing nations and the policies used to guide this process. Topics covered include the role of foreign aid and multinational corporations, economic rationale for choice of appropriate technology, and social benefit-cost analysis. Case studies are emphasized.]

773 Seminar in Project Planning in Developing Countries Spring. 3 credits.

M 1:25-3:20. D. Lewis.

An examination of the problems and issues involved in the process of planning and implementing development projects in developing countries. The role of the planner is explored from several different disciplinary points of view through a series of case studies selected from agriculture, industry, rural development, and urban planning. Countries typically represented include: Egypt, Ethiopia, India, Jordan, Korea, Mexico, Nepal, and the Commonwealth of Puerto Rico.

[777 Theories of Development and Underdevelopment] Fall. 4 credits. Prerequisite: familiarity with Marxist theory. Not offered 1980-81.

R 2:30-4:25. W. W. Goldsmith.

An exploration of current debates regarding the problem of articulation of the world economy and peripheral regions.]

778 Fieldwork/Workshop in Planning for Developing Regions Fall or spring. Credit as assigned.

Staff.

Work on applied problems in planning for developing regions in a field and/or laboratory setting.

779 Special Topics in Planning for Developing Regions Fall or spring. Credit as assigned.

Staff.

879 Informal Studies in Planning for Developing Regions Fall or spring. Credit as assigned.

Staff.

**Special Interprogram Topics:
Environmental Health, Housing, and Institutional Planning****480 Environmental Issues and Public Decisions** Fall. 3 credits.

M W F 11:15. R. Booth.

An examination of public decisions affecting environmental quality, including the pressures that require decisions on environmental issues; the methods of influencing those decisions; the decision makers; the criteria and rationale for the decisions; and the environmental, social, political, and economic impacts.

481 Environmental Aesthetics Spring. 4 credits.

Staff.

Introduction to issues affecting the design of the large-scale built environment. Development of awareness to aspects of the urban environment; theories and concepts drawn from historical and current writings; critical analysis of extant urban spaces; understanding of the creative contributions of the design disciplines (i.e., urban designers, architects, landscape architects) to the evolving urban form. Primarily for students without background in design. Lectures, seminars, field projects.

[580 Introduction to Planning Institutions] Fall. 3 credits. Not offered 1980-81.

P. Clavel.

A survey of contemporary organizational forms and political forces facilitating and inhibiting the development of the planning profession at the city, state, and regional levels. The focus is on subnational planning in the United States, but the national context and other nations are dealt with where appropriate.]

[582 Administrative Planning] Spring. 3 credits.

Prerequisite: permission of instructor. Not offered 1980-81.

K. C. Parsons.

An analysis of interactive elements in the planning process for colleges and universities. Topics include organizational and administrative theory, management objectives, evaluation, accountability-quantity and quality budgeting, and program planning. Governmental constraints are stressed.]

585 Introduction to Environmental Health Issues Spring. 3 credits.

F 2:30-4:25. B. G. Jones.

An examination of concepts and issues in environmental health, particularly as they relate to planning for health and medical care delivery systems, economic development, and other policy issues.

685 Environmental Epidemiology Spring. 3 credits. Prerequisite: CRP 520.

W F 11:15-12:05. P. Brandford.

Introduction to epidemiological methods. Emphasis is on the detection of changes in health status associated with changes in environmental conditions and the significance of these findings for environmental health planning.

[686 Environmental Law, Policy, and Management] Fall. 3 credits. Not offered 1980-81.

M W F 11:15-12:05. R. Booth.

Examination of selected environmental law topics from a policy management standpoint. Topics include environmental impact statement preparation and analysis, pollution control laws, and government regulatory procedures.]

687 Environmental Management Workshop Spring. 3 credits.

M W F 9:05. R. Booth.

Research and analysis of environmental management topics of current interest at the state or local government level. Fieldwork emphasized in order to produce reports, recommendations, and/or draft legislation that contributes to solving current issues.

[784 The Political Economy of Health Planning] Spring. 3 credits. Not offered 1980-81.

R 11:15-1:45. S. Keiman.

Lectures, reading, and fieldwork and theoretical and practical materials are combined to develop operating skills in health planning. The critical focus is on (1) the social determinants of illness, (2) the engineering model of medicine, (3) the commodity form of medical care, and (4) the prevailing economic definition of health. These topics together comprise the social context in which health planning takes place. After an intensive institutional introduction to health planning legislation, organizations, and practices, participants in the course work in one of four health planning research projects conducted in the surrounding area. Contact with local and regional organizations in and out of health planning is included.]

785 Planning and Evaluation of Environmental Health Programs and Projects Spring. 3 credits.

Prerequisite: second-year graduate standing.

P. Brandford.

An examination of the use of quantitative methods and economic analysis as aids to social decision

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making for action in the area of environmental health. Applications of these methods to the study of particular problems of environmental health.

786 Environmental Health Planning Fall. 2 credits. Prerequisite: second-year graduate standing.

M W 10:10. P. Brandford.

Introduction to concepts and issues in environmental health planning. Topics covered include the planning problems involved in the control of water quality, liquid and solid waste disposal, air quality, and housing quality.

[787 Health Systems Planning Fall. 3 credits. Not offered 1980-81.

T R 9:05-9:55. Staff and guest lecturers.

Issues, institutions, politics, economics, and social elements involved in the planning and administration of health problems. Special emphasis is on planning techniques and methodologies.]

788 Fieldwork/Workshop in City and Regional Planning Fall or spring. Credit as assigned. Staff.

Work on applied planning problems in a field and/or laboratory setting.

789 Special Topics in City and Regional Planning Fall or spring. Credit as assigned. Staff.

790 Professional Planning Colloquium I Fall. 1 credit. Staff.

791 Professional Planning Colloquium II Spring. 1 credit. Staff.

792 Master's Thesis, Project, or Research Paper I Fall. Credit as assigned. Staff.

793 Master's Thesis, Project, or Research Paper II Spring. Credit as assigned. Staff.

794 Planning Internships Fall, spring, summer. 1-4 credits. Staff.

Combines a professional planning internship in a metropolitan area with academic study in order to gain experience and understanding of the planner's role in formulating and implementing plans and policies. Salaried internships in federal or state agencies, legislative offices, and comparable settings includes development of research, analysis, and other technical skills. Weekly seminar draws on student field experiences, assigned readings, and guest speakers to examine current issues of federal, urban, and regional policy from the perspective of planning practice.

888 Informal Studies in Environmental Health Planning Fall or spring. Credit as assigned. Staff.

889 Informal Studies in City and Regional Planning Fall or spring. Credit as assigned. Staff.

890 Planning Research Seminar I Fall. 1 credit. Intended for doctoral candidates in city and regional planning; other students welcome. Staff.

Presentation and discussion of current problem areas and research by advanced doctoral students, faculty, and visitors.

891 Planning Research Seminar II Spring. 1 credit. Staff.

892 Doctoral Dissertation I Fall. Credit as assigned. Staff.

893 Doctoral Dissertation II Spring. Credit as assigned. Staff.

Landscape Architecture

The Landscape Architecture Program at Cornell is sponsored by the College of Agriculture and Life Sciences (in association with the Department of Floriculture and Ornamental Horticulture) and the College of Architecture, Art, and Planning.

Landscape Architectural Design

Sequence Courses

***201 Design I: Basic Landscape Architectural Design** Fall. 5 credits. T. H. Johnson.

***202 Design II: Basic Landscape Architectural Design** Spring. 5 credits. M. I. Adleman.

***301 Design III: Intermediate Landscape Architectural Design** Fall. 5 credits. P. J. Trowbridge.

***302 Design IV: Intermediate Landscape Architectural Design** Spring. 5 credits. T. H. Johnson.

***401 Design V: Advanced Landscape Architectural Design** Fall. 4 credits. M. I. Adleman.

402 Design VI: Advanced Landscape Architectural Design Spring. 5 credits. P. J. Trowbridge.

501 Graduate Landscape Architecture Design Studio Fall. 5 credits. Open to graduate students in landscape architecture, architecture, city and regional planning, and fifth-year architecture students.

Lecs and studios, M W 1:25-4:25. L. J. Mirin. Analysis, planning, and design response to problems of environmental impact. Traditional and advanced techniques of landscape architecture are applied to study natural and cultural systems and processes.

***502 Graduate Landscape Architecture Design Studio** Spring. 5 credits. T. J. Johnson.

601 Graduate Landscape Architecture Design Studio Fall. 5 credits. Lecs and studios, M W 1:25-4:25. L. J. Mirin.

800 Thesis Research and Preparation in Landscape Architecture Fall or spring. Credit to be arranged. Limited to candidates for Master of Landscape Architecture degree. Prerequisite: permission of the graduate field members concerned. Hours to be arranged. Staff.

Landscape Materials and Construction

***310 Site Construction I** Spring. 4 credits. P. J. Trowbridge.

***311 Site Construction II** Fall. 4 credits. T. H. Johnson.

Related Courses in Other Departments

Woody Plant Materials of Landscape Use (Floriculture 213)

Drawing for Landscape Architects (Floriculture 109)

Perspective for Landscape Architects (Floriculture 110)

Landscape Architecture Principles, Theory, and History

***220 Principles of Landscape Architecture** Fall. 2 credits. P. J. Trowbridge.

***221 Principles of Landscape Architecture** Fall. 1 credit. Discussion to be arranged. P. J. Trowbridge.

***425 Plants and Design** Fall. 2 credits. M. L. Adleman.

520 Contemporary Issues in Landscape Architecture Fall. 2 credits.

Lec, F 11:15. L. J. Mirin.

Recent technological, methodological, and legislative developments are assessed in terms of their probable impact on the practice of landscape architecture.

521 History of Landscape Architecture I Fall. 3 credits.

Lecs, T R 11:15; discussion to be arranged.

L. J. Mirin.

The landscape architectural tradition, from classical times to the present, is examined as a reflection of the diverse influences that have generated physical modifications of outdoor space. Recognition of the principles and techniques inherent in noted examples of the altered environment is emphasized.

522 History of Landscape Architecture II Spring. 3 credits.

Lecs, T R 11:15; disc to be arranged. L. J. Mirin.

Development of landscape architectural design in the United States from the time of Jefferson to the present is examined as a unique expression of the American experience. Influences exerted by factors such as the physical landscape, the frontier and utopian spirit, and the cultural attitudes and assumptions of democracy and capitalism are traced as they affect the forms of urban parks, private and corporate estates, suburban and public housing, transportation planning, national parks, and other aspects of open-space design in which landscape architects have made significant contributions.

***622 Graduate Seminar in Landscape Architecture** Spring. 2 credits. T. J. Johnson.

Landscape Planning

***431 Introduction to Parks and Recreation** Fall. 2 credits. E. J. Carter.

***432 Issues in Parks and Recreation** Spring. 2 credits. E. J. Carter.

530 Urban Landscape Planning and Design Spring. 3 credits.

Lec, disc, and field trips to be arranged. L. J. Mirin.

The principles and techniques of landscape architectural development and conservation of urban open space. Areas studied include the urban landscape tradition, urban arboriculture, streets and strollways, design controls and public space, recreation, and housing.

*Offered through the College of Agriculture and Life Sciences.

***[531 Regional Landscape Inventories and Information Systems: An International Perspective** Fall. 3 credits. A. S. Lieberman. Not offered 1980-81.]

***532 Analysis and Use of Vegetation in Comprehensive Land Planning** Spring. 3 credits. A. S. Lieberman.

Landscape Industry

***140 Introduction to Landscape Design** Fall or spring. 3 credits. R. W. Dwelle.

***340 Landscape Design for Nurserymen or Landscape Contractors** Fall or spring. 3 credits. D. W. Dwelle.

Independent Study

***555 Independent Study in Landscape Architecture** Fall or spring. 1-3 credits as assigned. Staff.

621 Summer Internship Seminar Fall. 2 credits. Hours to be arranged. L. J. Mirin. Presentation and discussion of projects developed during summer internships.

650 Fieldwork/Workshop in Landscape Architecture Fall or spring. Variable credit. Hours to be arranged. Staff. Work on applied problems, under faculty supervision, in landscape architecture in a field and/or studio setting.

*Offered through the College of Agriculture and Life Sciences.

College of Arts and Sciences

General Education

The faculty of the College of Arts and Sciences has established a Board on General Education responsible for creating and maintaining a program of courses designed for nonspecialists. Such courses are free from the need to present the elements of an entire subject as a basis for more specialized study. They can therefore be deeper and more challenging than conventional introductions, as concerned with the general ability to write and think as they are with substantive content. Besides such courses for nonspecialists, the board has also sought courses that require a relatively advanced acquaintance with a particular field, but not in the interest of further specialization. The aim of such specialized general education courses is to raise, for an informed audience, questions about the history of a field, about its methodological or philosophical presuppositions, or about its relation to other fields of knowledge.

Twice a year at advance course enrollment the board distributes to students and faculty in the college a set of descriptions of courses and departmental programs. These have been recommended by departments or faculty members and are considered by the board to be particularly suitable as introductory or upperclass general education courses. Almost any course in the University can serve eminently well as a general education course for some student. The purpose of the board's booklet is to call attention to some of the new and existing courses or programs in the College of Arts and Sciences whose primary focus is on general education. The booklet is not intended to be used in planning electives as a substitute for the *Description of Courses*, but rather as a guide to some of the more striking possibilities to be found in the pages that follow.

Akkadian

See Department of Near Eastern Studies, p. 108.

American Studies

American studies is basically a program of coordinated study in the history and literature of the United States. Courses are drawn from a number of different departments, and students who are interested in American studies should consult the program description in the *Announcement of Academic Information*.

Anthropology

To cover the breadth and diversity of anthropology the Department offers five different introductory courses. Each surveys a major subarea of the discipline. The most general is 111, *Nature and Culture*, which introduces a set of themes central to all the other courses. The remaining four (112, 113, 114, 116) cover aspects of social and cultural anthropology, biological anthropology, and archaeology respectively. Given the logic of their organization, it is recommended that students start with 111 and select from among the others in terms of their own interests. Majors are required to take 111. Anthropology courses with numbers below 500 do not have prerequisites unless specifically given in the course descriptions.

I. Introductory Courses (including Freshman Seminars)

111 Nature and Culture Fall. 3 credits (4 by arrangement with instructor).

M W F 11:15. D. J. Greenwood.

Anthropology arose as a novel attempt to address fundamental questions about humanity: Who are we? Where do we come from? Where are we going? Though it does not provide privileged answers to these questions, it approaches them through a unique combination of methods and a spirit of comparative inquiry. Informed by the long view gotten from the study of human evolution and culture history and the comparative view arising from the study of contemporary human biological and cultural diversity and uniformity, anthropology aspires to examine the relationships between the physical/biological and symbolic/moral worlds in which we live. This course examines a variety of past and current attempts to explain the relationships between nature and culture in human life.

112 Social Anthropology Spring. 3 credits (4 by arrangement with instructor).

M W F 10:10. C. J. Greenhouse.

Anthropologists study social institutions by examining how they relate to their cultural contexts and how they vary across cultures. Using what are, in most cases, first-hand accounts by ethnographers, we consider law, politics, religion, kinship, economics, family life, and other aspects of the institutional arrangements human beings design for themselves in adaptation to their own sociocultural environments. The course meets twice weekly for lectures, and once weekly for films and seminars.

113 The Comparison of Cultures Fall. 3 credits (4 by arrangement with instructor).

M W F 10:10. J. V. Murra.

The diversity of cultural responses to similar human needs is what strikes one first when looking at what anthropologists do. The variability looms endless, yet we have also insisted on the rule within the multiplicity, the regularities behind the apparently bizarre. Through reading and the lectures, students will familiarize themselves with four cultures from several parts of the world. Two of these four will be precapitalist, non-European kingdoms; the other two will be smaller societies in which cultural homogeneity was striking. Fiction and films will supplement the formal anthropological material.

114 Human Origins: What They Tell Us About Ourselves Spring. 3 credits (4 by arrangement with instructor).

T R 10:10–11:25. L. C. Jackson.

Anthropological inquiries about human diversity and about human biology and behavior require an understanding of the causes and effects of evolution. This survey of biological anthropology examines recent issues about human origins and antiquity, adaptations to past environments, sociobiology, the communications with apes, physical diversity in ancient and modern populations, and our biological capacity for developing a diversity of cultural behaviors—our most critical adaptation. Current controversies about the extent to which cultural behaviors reflect the effects of biological adaptation through natural selection will be examined in detail. Lectures are supplemented with films, class discussion sections, guest lecturers, and assigned readings.

116 Ancient Societies Spring. 3 credits (4 by arrangement with instructor).

M W F 9:05. J. S. Henderson.

An introduction to anthropological archaeology. Case studies provide detailed examples of methods used and problems encountered in reconstructing ancient societies. Cases feature diverse societies representing a variety of time periods, world areas, and levels of cultural complexity, including hunting

bands, farming villages, non-urban kingdoms, and urban empires. The course illustrates the nature and diversity of archaeological evidence and the process of archaeological reasoning and provides a perspective for evaluating popular generalizations about cultural evolution.

121 Encounters With Other Cultures Fall. 3 credits. Freshman Seminar.

M W F 1:25. B. Lambert.

A survey of writings by anthropologists and other travelers who have told of their experiences as participants in other societies and as interpreters of foreign cultures. Ways of playing the outsider's role and changes in the traveler's own outlook are also discussed. Some of the lectures deal with the cultural contexts of the readings, and thereby provide an introduction to the materials of cultural anthropology.

125 The Anthropologist's America Fall. 3 credits. Enrollment limited to 15 students. Freshman Seminar.

R 2:30–4:25. R. Ascher.

The anthropologist, having experienced the cultures of others, views America with new eyes. Readings include interpretations of contemporary American ceremonies, games, myth, gadgets, arts, foot habits, buildings, and language. Writing is limited to careful descriptions of things, scenes, and processes outside of one's ordinary experience. For example, a student might observe and record a ritual of a religion other than his or her own. Discussions focus on alternate anthropological interpretations of what students describe in their writings.

130 Apes and Languages Spring. 3 credits. Freshman Seminar.

W 7:30–9:30 p.m. B. J. Isbell.

Extraordinary claims have been made about the language capacities of chimpanzees and gorillas. Are the apes talking? How does the sign language that has been taught to apes compare with natural spoken language of human beings? A selection of popular and scholarly books and articles will be examined in order to better understand the key issues in the debate over the language capacities of apes.

150 The Discovery of America Spring. 3 credits. Freshman Seminar.

T 12:20–2:15. T. F. Lynch.

The discovery of the New World, beginning with American Indian origins in Asia and ending with the intellectual discoveries of European adventurers, chroniclers, and travelers. Special attention is given to Norse exploration and settlement in the North Atlantic, the first Spanish encounters with the American land and people, and the exchange of flora and fauna.

205 Ethnographic Films Fall. 2 credits.

W 7:30–9 p.m. A. T. Kirsch.

Human cultural and social variability is explored through a series of ethnographic films, and readings and lectures relating to these films. The films are chosen to show peoples living in a variety of ecological situations and at different levels of social complexity in various parts of the world (i.e., Africa, Asia, Australia, the Americas). Readings and lectures will use the concepts and theories of cultural anthropology to interpret the significance of the different modes of life shown in the films.

II. Courses Intended Primarily for Majors

300 The Discipline of Anthropology Fall.

4 credits. Limited to and required of anthropology majors, who must take this course during the junior year.

T R 2:30–3:45. B. J. Isbell with the Anthropology faculty.

An overview of the field of anthropology: a systematic treatment of the discipline, the concepts that are used, the persistent questions that are asked, the

specializations within the field, and the shared goals and differing viewpoints. This course will help the student plan course work in anthropology.

491 Honors Thesis Fall. 4 credits. Prerequisite: consent of the honors committee. Intended for majors graduating in midyear.

Hours to be arranged. Staff.
Independent work under the close guidance of a faculty member selected by the student.

492 Honors Thesis Spring. 4 credits. Prerequisite: consent of the honors committee.

Hours to be arranged. Staff.
Independent work under the close guidance of a faculty member selected by the student.

495 Social Relations Seminar (also Sociology 497) Spring. 4 credits. Limited to seniors majoring in social relations.

Hours to be arranged. Staff.

497-498 Topics in Anthropology 497, fall; 498, spring. Credit to be arranged.

Hours to be arranged. Staff.
Independent reading course in topics not covered in regularly scheduled courses. Students select a topic in consultation with the faculty member who has agreed to supervise the course work.

III. Archaeological Courses

See also courses listed under *Archaeology*.

[250 The Earliest Civilizations Fall. 4 credits. Not offered 1980-81.]

[352 Interpretation of the Archaeological Record Spring. 4 credits. Not offered 1980-81.]

354 Archaeology of the Americas I Fall. 4 credits. M W F 9:05. T. F. Lynch.

A study of the prehistoric cultures of the New World. Major topics will include the entry of man, early adaptations to diverse environments, hunting and gathering people to the ethnographic present, and the beginnings of agriculture.

355 Archaeology of the Americas II Spring. 4 credits.

M W F 11:15. J. S. Henderson.

A consideration of the origins, development, and spread of the native civilizations of Middle and South America. Prehistoric cultural developments in Mexico, Coastal America, and the Andes from the emergence of settled village life to the European discovery of the New World will be emphasized.

[358 Archaeological Research Methods (also Archaeology 358) Fall. 4 credits. Not offered 1980-81.]

[361 Field Archaeology in South America (also Archaeology 361) Fall. 10 credits. Not offered 1980-81.]

[435 Investigation of Andean Institutions: Archaeological Strategies Spring. 4 credits. Not offered 1980-81.]

494 Seminar in Archaeology: Settlement Archaeology Fall. 4 credits.

R 10:10-12:05. J. S. Henderson.

Archaeological approaches to ancient settlements. Analyses of households, neighborhoods, communities, and regions. Emphasis is on strategies for investigation and problems in interpretation.

IV. Biological and Ecological Anthropology

221 Human Biology: Variation and Adaptations of Contemporary Populations Fall. 4 credits.

T R 10:10-11:25. L. C. Jackson.

A survey of important biological characteristics of the human species, with emphasis upon the historical development of the concept of race, biological and cultural adaptations to changing and different ecological settings of the modern world, and microevolutionary features of certain existing populations. Differences in adaptive strategies of human groups in the past and today will be discussed. Applied aspects of biological anthropology and current issues of sociobiology and genetic engineering are additional topics for consideration in the course.

[374 Human Palaeontology Fall. 4 credits. Not offered 1980-81.]

375 Ecology and Human Biology Fall. 4 credits. T R 2:30-3:45. L. C. Jackson.

An analysis of human interactions with the physical, biological, and social environment, based on the principles of general ecology. Changes over time in human interactions with the environment will be discussed, as well as differences in adaptive strategies of contemporary human groups living in similar and different environments.

[471 Laboratory and Field Methods in Biological Anthropology I Spring. 5 credits. Not offered 1980-81.]

[476 Human Behavior: A Sociobiological Perspective Fall. 4 credits. Not offered 1980-81.]

V. Linguistic Anthropology

See also courses offered in *linguistics*, listed in the *Department of Modern Languages and Linguistics*.

202 Language and Culture Fall. 4 credits.

M W F 10:10. C. F. Hockett.

A survey of the field of linguistics as a branch of anthropology.

VI. Sociocultural Anthropology

301 Biology and Society I: The Biocultural Perspective (also Biological Sciences 301 and Biology and Society 301) Fall. 3 credits (4 by arrangement with instructor). Prerequisites: one year of introductory biology. This is part of the two-semester core course for the biology and society major and is also open to other students who have fulfilled the necessary prerequisites.

M W F 9:05. D. J. Greenwood.
Viewing human biology, behavior, and institutions as the ongoing products of the interactions between human biological evolution and cultural change, this course documents these interactions with reference to the following topics: the evolution of the capacity for culture; human groups and institutions; language, meaning, and cultural "realities"; and major models of human nature and human institutions.

302 Biology and Society II: Biology, Society, and Human Values (also Biological Sciences and Biology and Society 302) Spring. 3 credits (4 by arrangement with instructor). Prerequisites: Anthropology, Biological Sciences, or Biology and Society 301. This is the second semester of a two-semester core course for the biology and society major and is also open to other students who have taken Anthropology 301 (Biological Sciences and Biology and Society 301).

M W F 9:05. S. M. Brown, Jr., and S. Risch.
This course takes up the complex intellectual, practical, and ethical issues centering on the relationships between biological and social phenomena. Specific current issues such as pollution, genetic counseling, recombinant DNA research, and others will be taken up and an effort will be made to develop a viable biocultural ethics for dealing with such problems.

305 Psychological Anthropology Fall. 4 credits.

M W F 11:15. B. J. Isbell.

A consideration of problems selected to illustrate the mutual relevance of psychology and anthropology, concentrating on cross-cultural studies of cognitive and social development, with an emphasis on comparisons of socialization for sex roles.

313 Urban Anthropology Spring. 4 credits.

M W F 9:05. R. J. Smith.

An examination of the sociocultural structure and process in urban settings, with emphasis on the role of rural migrants, the relationship of urbanism to political and economic development, the role of voluntary associations, and the adjustment of family and kinship groups to urban life. Asian, African, and Latin American urban centers are emphasized.

314 Applied Anthropology (also Rural Sociology 355) Fall. 4 credits.

M W F 11:15. M. L. Barnett.

What anthropology knows or suspects about some general processes of cultural change, and the application of these insights to practical and ethical problems faced in the planning, conduct, and evaluation of programs of intervention and change.

320 Meaning Across Cultures Fall. 4 credits.

T R 10:10-11:25. J. A. Boon.

Are societies machines, therapies, religions, dramas, stories, texts, games, aesthetic forms, structural codes? We assess such possibilities in anthropological views of different cultures: from cosmologies and ceremonies of tribal systems, to expressive genres of archaic hierarchies, to differentiated arts and sports of nation-states. Principles of language and culture, symbolic interpretation, and structuralism are introduced.

321 The Anthropology of Women (also Women's Studies 321) Fall. 4 credits.

M W F 2:30. K. S. March, D. H. Holmberg.

An introduction not only to the study of women from an anthropological perspective but, also, to anthropological theories of sex and gender from the perspective of women's studies. The course examines various aspects of the position of women—political, economic, social, ideological, and biological—to emphasize the diversity in gender and sex-role definition cross-culturally.

[322 Comparative Religious Systems Spring. 4 credits. Not offered 1980-81.]

323 Kinship and Social Organization Spring. 4 credits.

M W F 11:15. B. Lambert.

Much of this course is a survey of forms of the family, descent groups, and marriage systems. The role of age and sex in the social structure is also considered. The last part of the course is devoted to a history of the British and American family and to its fate in utopian communities.

325 Images of Exotics Spring. 4 credits.

T R 10:10-11:25. J. A. Boon.

A survey of texts and contexts in European explanations of tribal, Indic, and other non-Western populations. We explore topics across ancient, medieval, Renaissance, Enlightenment, and Romantic-comparativist anthropologies, including monstrosities, paradise, degradation, kingship, utopias, hermetics, nature, sexuality, marriage, language, economy, descent, authority, etc.

326 Economic Anthropology Fall. 4 credits.

M W F 10:10. P. S. Sangren.

Comparison of capitalist and noncapitalist economies and analysis of the cultural foundations of Western economic concepts.

[328 Law and Culture Fall. 4 credits. Not offered 1980-81.]

[329 Politics and Culture Spring. 4 credits. Not offered 1980-81.]

[347 Peasant Cultures Fall. 4 credits. Not offered 1980–81.]

[414 Anthropology and History (also History 404) Spring. 4 credits. Not offered 1980–81.]

[418 Ethnohistory Fall. 4 credits. Not offered 1980–81.]

422 Special Problems in the Anthropology of Women (also Women's Studies 422) Spring. 4 credits.

Hours to be arranged. K. S. March.

Each year this seminar focuses upon a particular area of concern within the anthropology of women, building upon the work done in Anthropology and Women's Studies 321. The topic for 1980–81 is women's life histories. This seminar explores the insights provided by biographical and autobiographical materials into both the peculiarities of individual lives and wider cultural forms.

[424 Myth, Ritual, and Sign Fall. 4 credits. Not offered 1980–81.]

[426 Ethnography of Communication Fall. 4 credits. Not offered 1980–81.]

451 Anthropological Boundaries Fall. 4 credits. S-U grades only. Enrollment limited.

T 2:30–4:25. R. Ascher.

An exploration of the ways in which the creative arts serve as a model for doing anthropology. The works of anthropologists, native artists who use traditional sources, and Western artists who sense a kinship with anthropological questions are studied. The novel, cinema, and poetry are emphasized, but attention is also given to still photography, music, theatre, architecture, and sculpture. About half the course is devoted to native North America, the rest is divided between Africa, Europe, and the contemporary United States. *Henderson the Rain King*, *Three Penny Opera*, and *The Navajo Silversmith* are examples of readings, listenings, and viewings, respectively.

452 Portraits, Profiles, and Life Histories Spring. 4 credits. S-U grades strongly recommended. Enrollment limited.

T 2:30–4:25. R. Ascher.

The goal is the creation, by each student, of a portrait or life history of one other person. Freedom is granted—and experimentation is encouraged—in the form of observation, recording, and presentation. As a point of departure, a study is made of books such as *The Children of Sanchez* and *Group Portrait With Lady*. Portraits on film include *Sam and Betty Tells Her Story*. The photography of Arbus and Avedon and the sculpture of Segal and Giacometti are examined critically. Discussion includes life histories in the works of Freud, Gertrude Stein, and Radin.

453 Constructions and Visualizations Spring. 4 credits. S-U grades only. Enrollment limited.

R 2:30–4:25. R. Ascher.

The expression of anthropological ideas through original three-dimensional constructions, tapes, drawings, graphics, video, painting, film, and related media. Writing can be combined with visual expressions as, for example, in concrete poetry or photographic essays. Projects must conform to three general guidelines: (1) concern with some aspect of the human condition; (2) prior knowledge of the medium chosen for the project; and (3) the project must be one that can be developed through the course and benefit from its particular setting. The first half of the term consists of readings and discussion; the projects occupy the second half.

VII. Theory and History of Anthropology

[306 Ethnographic Description Spring. 4 credits. Not offered 1980–81.]

412 Contemporary Anthropological Theory Fall. 4 credits.

M W F 11:15. B. Lambert.

A survey of the assumptions social anthropologists make concerning the nature of society and culture, and the explanations they have proposed for regularities in social behavior, values, and belief systems. Among the approaches considered are processual analysis, the use of the concept of transaction, the historical method, ethnohistory, and structuralism.

[413 History of Anthropology in the United States Fall. 4 credits. Not offered 1980–81.]

417 Structuralism Spring. 4 credits.

T R 2:30–3:45. J. A. Boon.

A study of the corpus of Claude Lévi-Strauss and a reading of diverse structuralist texts which raise general issues in philosophy, criticism, and the comparative method. An effort is made to assess the place of structuralism in the history of ideas.

420 Development of Anthropological Thought Spring. 4 credits.

T R 11:15, plus additional 50-minute section to be arranged. A. T. Kirsch.

Developing a paradigmatic perspective, this course attempts to locate the emergence and development of anthropological thought, theories, methods, and generalizations within the context of the Western social and cultural milieu.

425 Ritual Structures and Cultural Pluralism Fall. 4 credits.

R 2:30–4:25. J. A. Boon.

The course focuses on Indonesia plus other areas with Hindu-Buddhist and Islamic religious traditions. We examine ethnographies and novels that portray complexities of ritual, marriage, rank, and ethnic, religious, or cross-clan stereotypes. Colonial and post-colonial works by Bateson, Hocart, Rassers, Geertz, Dumont, Multatuli, Forster, and others are considered.

[475 Physical Anthropology: History and Theory Spring. 4 credits. Not offered 1980–81.]

VIII. Area Courses

[230 Ethnology of Native North America Fall. 4 credits. Not offered 1980–81.]

[331 The United States Spring. 4 credits. Not offered 1980–81.]

333 Ethnology of the Andean Region Fall. 4 credits.

M W F 2:30. J. V. Murra.

Cultural continuities in the development of Andean societies. The ecological, archaeological, ethnohistorical, and contemporary ethnological record. The Andean heritage as a resource for "modernization."

[334 Ethnology of Island Southeast Asia Fall. 4 credits. Not offered 1980–81.]

[335 Ethnology of Mainland Southeast Asia Fall. 4 credits. Not offered 1980–81.]

[336 Ethnology of Oceania Fall. 4 credits. Not offered 1980–81.]

[338 Ethnology of Africa Spring. 4 credits. Not offered 1980–81.]

Culture and Society in South Asia Spring.

4 credits.

M W F 10:10. D. Holmberg.

An introduction to the main features of South Asian culture, society, and history with emphasis on Hindu India, Nepal, and Sri Lanka.

343 Traditional Chinese Society and Culture Fall. 4 credits.

M W F 1:25. P. S. Sangren.

Chinese society in the nineteenth and early twentieth centuries is considered as a complex, premodern society. Major topics include family and kinship; villages and their integration into local systems; social stratification and mobility; and religion, ideology, and values.

344 Modern Chinese Society Spring. 4 credits.

M W F 10:10. P. S. Sangren.

The emphasis is on change in Chinese society and culture, among the Overseas Chinese, in Hong Kong and Taiwan and in China proper.

345 Japanese Culture and Society Fall. 4 credits.

M W F 9:05. R. J. Smith.

The social structure of Japan is surveyed and trends in urban and rural life during the past century are discussed. The family, ancestor worship, community and social organization, and urbanism and modernization are the topics emphasized.

[432 Indians of Mexico and Central America Spring. 4 credits. Not offered 1980–81.]

433 Andean Thought and Culture Spring. 4 credits.

M W F 1:25. B. J. Isbell.

Andean conceptual structures are explored in order to delineate key symbolic concepts underlying the organization of social and cosmological space, time, history, kinship, and political structure. Ethnohistory and ethnographic research will be used to focus upon the dynamics of change in Andean conceptual structures.

456 Mesoamerican Thought and Culture Fall. 4 credits. Prerequisite: Anthropology 355 or 432.

T 10:10–12:05. J. S. Henderson.

Investigating pre-Columbian Mesoamerican peoples by means of their painted books, supplemented by historical documents. Emphasis is on reconstructing Aztec and Maya religion and concepts of time, space, and the universe.

IX. Related Courses in Other Departments

Introduction to Archaeology (Archaeology 100)

Popular Archaeology (Archaeology 107)

History of Archaeology (Archaeology 281)

Individual Study in Archaeology and Related Fields (Archaeology 300)

Historical Archaeology (Archaeology 311)

Archaeology of Ancient Europe (Archaeology 313)

Human Growth and Development: Biological and Social Psychology Consideration (Nutritional Sciences/HDFS 347)

Subsistence Agriculture in Transition (Rural Sociology 357)

Cross-Cultural Psychology (Sociology 384 and Psychology 384)

Interpersonal and Social Stress and Coping (Sociology and Psychology 486)

X. Graduate Seminars

600-level courses are open to undergraduates who have fulfilled the prerequisites or by consent of the instructor.

Southeast Asia Seminar: Malaysia (Asian Studies 601)

Southeast Asia Seminar: Indonesia (Asian Studies 602)

607-608 Special Problems in Anthropology 607, fall; 608, spring. Credit to be arranged. Hours to be arranged. Staff.

[611 Principles of Social Anthropological Theory Fall. 4 credits. Not offered 1980-81.]

612 History of Anthropological Thought Spring. 4 credits. Restricted to graduate students. T 2:30-4:25. A. T. Kirsch. Readings in original sources of importance to the development of anthropological thought.

Methods of Assessing Physical Growth in Children (Nutritional Sciences 612)**619 Anthropological Approaches to the Study of Buddhism in Asia** Fall. 4 credits.

T 2:30-4:25. A. T. Kirsch. This seminar will examine the various conceptual and analytical strategies employed by social scientists in the study of Theravada Buddhism in South and Southeast Asia. Problems of religious complexity, the social and psychological correlation of Buddhism, and the role of Buddhism in social change will be explored.

627 Law in the Context of Culture Spring. 4 credits.

W 2:30-4:25. C. J. Greenhouse. What do legal processes reveal of culture? Discussions and readings for this seminar develop around the comparison of four contemporary legal systems: The United States, the People's Republic of China, the customary law of Africa, and Islamic law. In each case, our fundamental concerns will be to examine what each system implies is the nature of the individual, and the relationship of the individual to society, through such concepts as justiciability, liability, evidence, reasonableness, and causality. In addition, the seminar requires a term paper from each student.

[628 Political Anthropology Spring. 4 credits. Not offered 1980-81.]**Anthropometric Assessment (Nutritional Sciences 630)**

[632 Andean Symbolism Spring. 4 credits. Not offered 1980-81.]

633 Andean Research Fall. 4 credits. Hours to be arranged. J. V. Murra.

634-635 Southeast Asia: Readings in Special Problems 634, fall; 635, spring. Credit to be arranged.

Hours to be arranged. M. L. Barnett, J. A. Boon, A. T. Kirsch.

[651 Anthropological Boundaries: Graduate Spring. 4 credits. Not offered 1980-81.]**[653 Constructions and Visualizations: Eskimos and Theatre** Fall. 4 credits. Not offered 1980-81.]**663 Problems in Archaeology: Agricultural Origins** Fall. 4 credits.

M 2:30-4:25. T. F. Lynch. The topic will be considered in historical perspective, as it has been dealt with by botanists, geographers, and anthropologists. The emphasis will be on agricultural systems rather than plant or animal morphology and taxonomy. The geographical focus will be America, with special attention to the Andes.

664 Problems in Archaeology: Early Man in America Spring. 4 credits.

W 2:30-4:25. T. F. Lynch. The topic will be considered in historical perspective, as it has been dealt with by archaeologists,

anthropologists, and geologists. The emphasis will be on environmental adaptations, rather than chronology, and topics will be drawn from both North and South American archaeology.

[666 The Discovery of America Spring. 4 credits. Not offered 1980-81.]

[667 Origins of Mesoamerican Civilization Spring. 4 credits. Not offered in 1980-81.]

677 Topics of Ecological Anthropology Spring. 4 credits.

Hours to be arranged. L. C. Jackson. Survey of current literature on the subjects of human ecology and biological anthropology.

[678 Palaeoanthropology: South Asia Spring. 4 credits. Not offered 1980-81.]

Social Movements in Agrarian Society (Rural Sociology 723)**Sociotechnical Aspects of Irrigation (Rural Sociology 754)**

901-902 Field Research 901, fall; 902, spring. Credit to be arranged. Hours to be arranged. Staff.

Arabic and Aramaic

See Department of Near Eastern Studies, p. 108.

Archaeology

100 Introduction to Archaeology Spring. 3 credits.

M 4:15, W F 1:25. D. M. Jones. The history, methods, and theory of archaeology are introduced. Lectures briefly outline the nature of archaeologically known cultures around the world to help illustrate the variety of archaeological sites and materials.

101 Introduction Archaeology, Section Spring. 1 credit. Optional section to be taken concurrently with Archaeology 100. Prospective archaeology majors are expected to participate in this section, although it is open to all interested students.

M 1:25. D. M. Jones and staff. The main outlines of world archaeology are discussed briefly in terms of research problems. Seminars on particular archaeological cultures or topics are given by various archaeology staff members.

107 Popular Archaeology Fall and spring. 3 credits. Freshman Seminar.

M W F 1:25. Staff. Popular conceptions of prehistory that have antagonized the archaeological establishment are focused on. Readings include both scholarly and popular books, careful and critical analysis of archaeological evidence is emphasized.

108 The Origins and Diversity of the Family in Antiquity Fall and spring. 3 credits. Freshman Seminar.

M W F 9:05. L. A. McKee. The course concerns the study of ancient family units as cultural subsystems. We explore the range of forms and functions of the basic social unit, the family, as these are reflected in the archaeological record. Some of the theoretical questions we pursue are (1) evolutionary theories of the origin of the family, (2) the relationships between ecology and family structure, (3) the merits of approach to archaeological data and the reconstruction of ancient cultures through the methods of cultural history or through processual analysis.

300 Individual Study in Archaeology and Related Fields Fall or spring. Credit to be arranged. Prerequisite: Archaeology 100 or permission of instructor.

Hours to be arranged. Staff. Students pursue topics of particular interest with the guidance of a faculty member.

Theory and Interdisciplinary Approaches**Earth Science (Geological Sciences 103)****Earth Science Laboratory (Geological Sciences 105)****Ancient Societies (Anthropology 116)**

[The Earliest Civilizations (Anthropology 250) Not offered 1980-81.]

281 History of Archaeology Fall. 3 credits. T R 2:30-3:45. D. M. Jones.

The development of archaeological studies from sixteenth-century antiquarianism to the present day are surveyed. Concepts of man's past and scientific frameworks derived from these concepts are emphasized.

311 Historical Archaeology: Method and Theory Fall. 4 credits.

T R 10:10-11:25. D. M. Jones. A general introduction that draws examples from both Europe and North America. Theory and practical questions are addressed, including the use and interpretation of archival material. The approaches of the anthropologist and the historian are assessed using actual site reports as examples.

Geomorphology (Geological Sciences 345)

[Interpretation of the Archaeological Record (Anthropology 352) Not offered 1980-81.]

[358 Archaeological Research Methods (also Anthropology 358) Fall. 4 credits. Not offered 1980-81.]

Ceramics (History of Art 423)**Use of Soil Information and Maps as Resource Inventories (Agronomy 506)**

[Architectural Problems in Archaeological Fieldwork (Architecture 540) Not offered 1980-81.]

Surveying for Archaeologists (Architecture 541)**Glacial and Quaternary Geology (Geological Sciences 642)****Old World Archaeology**

Freshman Seminar in Popular and Practical Archaeology: The Vikings (English 110)

Freshman Seminar in Archaeology (Classics 121)

[Mediterranean Archaeology (Classics 200 and Near Eastern Studies 280) Not offered 1980-81.]

[Rise of Classical Greece (Classics 206) Not offered 1980-81.]

Introduction to Classical Archaeology (Classics 220 and History of Art 220)

[Minoan-Mycenaean Art and Archaeology (Classics 221 and History of Art 221) Not offered 1980-81.]

Archaeology in Action I (Classics 232)

Archaeology in Action II (Classics 233)

The History of Ancient Israel (Near Eastern Studies 243)

History of Preindustrial Building (Architecture 244)

[Introduction to Art History: Art of Egypt and Mesopotamia (Near Eastern Studies 248 and History of Art 211) Not offered 1980-81.]

[275 Ancient Seafaring (also Near Eastern Studies 249) Fall. 3 credits. T R 10:10-11:25. D. I. Owen. Not offered 1980-81.]

[Introduction to Biblical Archaeology (Near Eastern Studies 285) Not offered 1980-81.]

Dendrochronology of the Aegean (Classics 309)

[310 Archaeology of the Ancient Near East (also Near Eastern Studies 387) Spring. 4 credits. Prerequisite: Archaeology 100 or permission of instructor. Not offered 1980-81.]

[313 Archaeology of Ancient Europe Spring. 4 credits. Prerequisite: Archaeology 100 or consent of instructor. Not offered 1980-81.]

Arts and Monuments of Athens (Classics 320 and History of Art 320)

[Archaeology of Cyprus (Classics 321 and History of Art 321) Not offered 1980-81.]

Arts of the Roman Empire (History of Art 322)

Painting in the Greek and Roman World (History of Art 323)

[Greek Vase Painting (History of Art 325) Not offered 1980-81.]

[Art and Archaeology of Archaic Greece (Classics 326 and History of Art 326) Not offered 1980-81.]

[Greek and Roman Coins (History of Art 327) Not offered 1980-81.]

[Greek Sculpture (Classics 329) Not offered 1980-81.]

[Art in Pompeii: Origins and Echoes (History of Art 330) Not offered 1980-81.]

The Architecture of the Classical World (Architecture 341)

[Independent Study: Ancient Israel (Near Eastern Studies 348) Not offered 1980-81.]

[Independent Study: Ancient Near East (Near Eastern Studies 349) Not offered 1980-81.]

[Interconnections in the Eastern Mediterranean World in Antiquity (Near Eastern Studies 385) Not offered 1980-81.]

[Archaeology of Ancient Egypt (Near Eastern Studies 388) Not offered 1980-81.]

[Seminar in Syro-Palestinian Archaeology (Near Eastern Studies 481) Not offered 1980-81.]

Scandinavia and Europe 400-1100 (English 601)

Seminar in Aegean Archaeology (Classics 629)

Seminar in Classical Greek Archaeology (Classics 630)

[Seminar in the Architecture of the Classical World (Architecture 641) Not offered 1980-81.]

New World Archaeology

The Discovery of America (Anthropology 150) Spring.

312 Archaeology of the European Colonial Movement Spring. 4 credits. Prerequisite: Archaeology 100 or consent of instructor. T R 2:30-3:45. D. M. Jones.

Archaeology of the Americas I (Anthropology 354) Fall.

Archaeology of the Americas II (Anthropology 355)

[Investigation of Andean Institutions: Archaeological Strategies (Anthropology 435) Not offered 1980-81.]

Mesoamerican Thought and Culture (Anthropology 456)

Seminar in Archaeology: Settlement Archaeology (Anthropology 494)

Seminar in Andean Research (Anthropology 633)

Problems in Archaeology: Agricultural Origins (Anthropology 663) Fall.

Problems in Archaeology: Early Man in America (Anthropology 664) Spring.

Related Courses for Archaeology Majors

Ethnology of the Andean Region (Anthropology 333)

[Ethnology of Oceania (Anthropology 336) Not offered 1980-81.]

[Human Paleontology (Anthropology 374) Not offered 1980-81.]

[Ethnohistory (Anthropology 418) Not offered 1980-81.]

[Indians of Mexico and Central America (Anthropology 432) Not offered 1980-81.]

Andean Thought and Culture (Anthropology 433) Fall.

[Laboratory and Field Methods in Biological Anthropology (Anthropology 471) Not offered 1980-81.]

[Paleoanthropology: South Asia (Anthropology 678) Not offered 1980-81.]

Introduction to Asian Civilizations (History 190)

[Latin American History to 1825 (History 210) Not offered 1980-81.]

The Emergence of Greek Democracy (History 265)

The Crisis of Greek Civilization (History 266)

History of China up to Modern Times (History 393)

Southeast Asian History to the Fourteenth Century (History 395)

[Archaic Greece 776-500 B.C. (History 450) Not offered 1980-81.]

The Roman Revolution (History 461)

[Seminar in Ancient Classical History (History 661) Not offered 1980-81.]

Introduction to Art History: Asian Traditions (History of Art 280)

The Arts of Early China (History of Art 383)

[Studies in Indian and Southeast Asian Art (History of Art 386) Not offered 1980-81.]

The Greek Experience (Classics 211)

The Roman Experience (Classics 212)

[The Individual and Society in Classical Athens (Classics 222) Not offered 1980-81.]

The Ancient Epic (Classics 238 and Comparative Literature 238)

Greek and Roman Drama (Comparative Literature 300)

Christian Origins (Comparative Literature 326)

Literature of the Old Testament (Comparative Literature 328)

Old Testament Seminar (Comparative Literature 421)

New Testament Seminar (Comparative Literature 426)

Readings in the New Testament (Comparative Literature 429)

Jews of the Ancient and Muslim Near East: 450 B.C.E.-1204 C.E. (Near Eastern Studies 244)

[Elementary Akkadian (Near Eastern Studies 323-324) Not offered 1980-81.]

Theory and Practice of Linguistics (Linguistics 101-102)

Comparative Methodology (Linguistics 404)

[Hittite (Linguistics 621-622) Not offered 1980-81.]

Comparative Indo-European Linguistics (Linguistics 631-632)

Introductory Geological Science (Geological Sciences 101)

Introduction to Historical Geology (Geological Sciences 102)

Structural Geology and Sedimentation (Geological Sciences 325)

Historical Geology and Stratigraphy (Geological Sciences 376)

Nature and Properties of Soils (Agronomy 200)

Identification, Appraisal, and Geography of Soils (Agronomy 301)

Geography and Appraisal of Soils of the Tropics (Agronomy 401)

Morphology, Genesis, and Classification of Soils (Agronomy 603)

Plants and Human Affairs (Biological Sciences 246)

Engineering Surveying and Evaluation (Engineering CEE A380)

Photogrammetry (Engineering CEE A661)

Advanced Physical Environment Evaluation (Engineering CEE A686)

Analyses and Interpretation of Aerial Photographs (Engineering CEE A687)

Plane Surveying (Agricultural Engineering 221)

Scientific Illustration (Floriculture 417)

Introductory Photography (Architecture 251)

Second-Year Photography (Architecture 351)

[Color Photography (Architecture 350 and Art 262) Not offered 1980–81.]

[Case Studies in Preservation Planning (Architecture 544) Not offered 1980–81.]

Design and Conservation (Architecture 545)

Documentation for Preservation Planning (Architecture 546)

Elementary Statistics (Mathematics 370)

Statistics (Mathematics 472–473)

Introductory Statistics for the Social Sciences (Industrial and Labor Relations 510)

Computer Science courses numbered 100, 101, 102, 104, and 211 may be of interest to some students (see the departmental listing for information about sequences and combinations).

Asian Studies

Freshman Seminars

101 Japanese Conceptions of Beauty Spring. 3 credits.

T R 2:30–4. B. deBary.

The central aesthetic values of the Japanese tradition as they have been expressed in diverse arts are examined. The literary arts (poetry, narrative, and dramatic writing) are emphasized, but architecture, brush painting, flower arranging, and other arts are considered.

[103 Revolutions and Social Values in Modern Chinese Literature Spring. 3 credits. E. M. Gunn. Not offered 1980–81.]

104 Three Ways of Thought Fall. 3 credits.

T R 10:10–11:25. T. L. Mei.

An introduction to Confucianism, Taoism, and Zen through reading and discussion of basic texts.

[105 Feminine and Masculine Ideals in Japanese Culture (also Women's Studies 105) Fall. 3 credits. K. Brazell. Not offered 1980–81.]

Related Freshman Seminars in Other Departments

[Government 100 Contemporary Japan Fall. 3 credits. T. J. Pempel. Not offered 1980–81.]

Government 100.6 Literature and Politics Spring. 3 credits.
B. Anderson.

History 192 Asia in the Western Mind Spring. 3 credits.
V. Koschmann.

[History 193 China and the West before Imperialism Fall. 4 credits. C. A. Peterson. Not offered 1980–81.]

[History 194 Chinese Views of Themselves Spring. 4 credits. S. G. Cochran. Not offered 1980–81.]

History of Art 106 Art in a Landscape: The Traditional Arts in Southeast Asia Spring. 3 credits.

S. J. O'Connor.

General Education Courses

211 Introduction to Japan Fall. 3 or 4 credits.

M W F 11:15. K. Brazell and staff.

An interdisciplinary introduction to Japanese culture especially designed for students not majoring in Asian studies.

212 Introduction to China Spring. 3 or 4 credits.

M W F 11:15. E. M. Gunn and staff.

An interdisciplinary introduction to Japanese culture especially designed for students not majoring in Asian studies.

Asia—Literature and Religion Courses

The following courses are taught entirely in English and are open to any Cornell student.

250 Dimensions of Religious Experience in Asia Spring. 3 credits.

T R 10:10–11:25. A. G. Grapard.

A systematic approach to various religious traditions of East Asia within the context of experience: sacred time, sacred space, ritual behavior, pilgrimage, ideal types, death, relationships to the divine, religious language, sociocosmic systems, etc.

[307 Asian Dance and Dance Drama (also Theatre Arts 307) Fall or spring. 3 credits. Not offered 1980–81.]

313 The Japanese Film Fall. 3 credits.

M 2:30–4:30 plus film viewing. B. deBary.

After an introduction to methods of film analysis, the course presents a sequence of ten films by noted Japanese directors. The aim of the course is two-fold: to enhance appreciation of film as an art form, and to use the formal analysis of the films to yield insights into Japanese society and culture. Particular attention is given to areas in which Japanese film, influenced by traditional arts and aesthetic principles, has resisted Western or Hollywood codes.

351 Early Buddhism Fall. 4 credits.

T R 2:30–3:45. A. G. Grapard.

A study of the philosophies and religious context out of which Buddhism emerged and how it became a religion: formation of the doctrine, cult, and practices. The emphasis is on scriptures and philosophical outlook and on how practice is related to them. Classical Hinduism and Jainism are presented to provide a comparative background.

352 Mahayana Buddhism Spring. 4 credits.

Prerequisites: Asian Studies 351, 355, or permission of instructor.

T R 2:30–3:45. A. G. Grapard.

A survey of the major schools of Buddhism as they developed in China and Japan: cultural contexts and interactions, philosophical problems, and practices.

355 Japanese Religions Fall. 4 credits.

T R 10:10–11:25. A. G. Grapard.

A historical and phenomenological approach to the Japanese religious traditions with an emphasis on systems of interaction, in order to attempt to establish the forms of the major forces that have shaped Japanese culture.

371 Chinese Philosophical Literature Spring. 4 credits.

M W F 10:10. T. L. Mei.

Readings in English translation of Confucian, Taoist, and Buddhist works.

[372 Chinese Poetry Spring. 4 credits. T. L. Mei. Not offered 1980–81.]

373 Twentieth-Century Chinese Literature Fall. 4 credits.

M W F 10:10. E. M. Gunn.

A survey of principle works in English translation, the course introduces the fiction, drama, essays, and poetry of China beginning with the Republican era and continuing up to the present in the People's Republic and Taiwan, with attention to social and political issues and literary theory. One session each week will be devoted to discussion.

[374 Chinese Narrative Literature Spring. 4 credits. E. M. Gunn. Not offered 1980–81.]

375 Japanese Poetry and Drama Fall. 4 credits.

T R 1–2:15. K. Brazell.

A study of selected poets and dramatists in English translation. The course covers works from the eighth through the eighteenth centuries.

376 Modern Japanese Fiction Spring. 4 credits.

Lec, T 11:15–12:30; sem, R 11:15–12:30.

B. deBary.

The major Japanese novelists and short story writers of the twentieth century are studied in translation.

[377 Japanese Narrative Literature Fall. 4 credits. K. Brazell. Not offered 1980–81.]

379 Southeast Asian Literature in Translation Fall. 3 credits.

T 2:30–4:30. J. M. Echols. Uris 153.

A survey of the literatures of Southeast Asia with special attention to several masterpieces.

[400 Japanese Nō Theatre Spring. 4 credits. K. Brazell. Not offered 1980–81.]

For complete descriptions of courses numbered 600 and above consult the graduate faculty representative.

611 Chinese and Japanese Bibliography and Methodology Fall. 1 credit. Prerequisite: permission of the instructor. Required of honors students and master of arts candidates.

Sec 1 (Chinese): W 3:35–4:35; sec 2 (Japanese): F 1:25–2:25. D. Perushek.

650 Seminar on Asian Religions Spring.

2–4 credits. Prerequisite: permission of the instructor.

Hours to be arranged. A. G. Grapard.

Topic is announced annually.

701–702 Seminar in East Asian Literature 701, fall; 702, spring. 1 to 4 credits.

Hours to be arranged. Staff.

Asia—General Courses

401 Asian Studies Honors Course Fall. 4 credits.

Intended for seniors who have been admitted to the honors program.

Staff.

Supervised reading and research on the problem selected for honors work.

402 Asian Studies Honors: Senior Essay Fall or spring. 4 credits. Prerequisite: admission to the honors program.

The student, under faculty direction, prepares an honors essay.

403–404 Asian Studies Supervised Reading

Either or both terms. Credit to be arranged.

Prerequisite: permission of instructor. Open to majors and other qualified students.

Intensive reading under the direction of a member of the staff.

For complete descriptions of courses numbered 600 or above, consult the graduate faculty representative.

605–606 Master of Arts Seminar in East Asian Studies 605, fall; 606, spring. 2–4 credits.

Hours to be arranged. E. Gunn and staff.

703-704 Directed Research 703, fall; 704, spring.
Credit to be arranged.
Hours to be arranged. Staff.

Related Courses in Other Departments

Economics of Agricultural Development
(Agricultural Economics 464)

Food, Population, and Employment (Agricultural
Economics 660)

Communication in the Developing Nations
(Communication Arts 624)

**Seminar on Agricultural Development in
Southeast Asia** (International Agriculture 601)

**Applications of Sociology to Development
Programs** (Rural Sociology 751)

Architecture in Its Cultural Context (Architecture
667-668)

*The six courses listed above will count as College of
Arts and Sciences credit only for Asian studies
majors.*

Urban Anthropology (Anthropology 313)

Meaning Across Cultures (Anthropology 320)

Images of Exotics (Anthropology 325)

**Anthropological Approaches to the Study of
Buddhism in Asia** (Anthropology 619)

Politics of Industrial Societies (Government 348)

Political Role of the Military (Government 349)

Comparative Revolutions (Government 350)

[The United States and Asia (Government 387)
Not offered 1980-81.]

[The United States and Asia (Government 387)
Not offered 1980-81.]

Seminar in Comparative Communism
(Government 446)

[Policymaking Industrial Societies (Government
456-457) Not offered 1980-81.]

Field Seminar in International Relations
(Government 606)

Graduate Seminar in Comparative Communism
(Government 648)

Seminar in International Relations of Asia
(Government 687)

**Introduction to Asian Civilizations: Origins to
1600** (History 190)

**Introduction to Asian Civilizations in the Modern
Period** (History 191)

Introduction to Art History: Asian Traditions
(History of Art 280)

[Buddhist Art in Asia (History of Art 381) Not
offered 1980-81.]

[Studies in Indian and Southeast Asian Art
(History of Art 386) Not offered 1980-81.]

[Ceramic Art of Asia (History of Art 482) Not
offered 1980-81.]

[Problems in Asian Art (History of Art 580) Not
offered 1980-81.]

China — Area Courses

Traditional Chinese Society and Culture
(Anthropology 343)

Modern Chinese Society (Anthropology 344)

Chinese Government and Politics (Government
347)

[The Foreign Policy of China (Government 390)
Not offered 1980-81.]

[Readings on the Great Cultural Revolution
(Government 447) Not offered 1980-81.]

Chinese Political Readings (Government 448)

**[Capitalism and Communism: Chinese and
Japanese Patterns of Development** (Government
462) Not offered 1980-81.]

Politics of China (Government 645)

**The Thoughts of Mao Ze Dong, Marxism-Leninism
on Anarchism** (Government 651)

[China and the West before Imperialism (History
293) Not offered 1980-81.]

[Chinese Views of Themselves (History 294) Not
offered 1980-81.]

Early Warfare, East and West (History 360)

History of China up to Modern Times (History 393)

History of China in Modern Times (History 394)

**Undergraduate Seminar in Medieval Chinese
History** (History 492)

**[Self and Society in Late Imperial and
Twentieth-Century China** (History 493) Not offered
1980-81.]

**[Undergraduate Seminar: The First Chinese
Revolution, 1880-1930** (History 494) Not offered
1980-81.]

Chinese Historiography and Source Materials
(History 691)

[Problems in Modern Chinese History (History
694) Not offered 1980-81.]

Seminar in Medieval Chinese History (History
791-792)

Seminar in Modern Chinese History (History
793-794)

Art of China (History of Art 383)

Chinese Painting and Ceramics (History of Art
385)

Chinese Art of the T'ang Dynasty (History of Art
483)

[Studies in Chinese Painting (History of Art 486)
Not offered 1980-81.]

Problems in Chinese Art (History of Art 584)

Other courses dealing extensively with China are
Anthropology 322; Government 347, 348, 350, 387,
446, 456-457, and 687; History 190 and 191; History
of Art 280 and 580; and Architecture 667-668.

China — Language Courses

Basic Course (Chinese 101-102)

Cantonese Basic Course (Chinese 111-112)

Intermediate Chinese I (Chinese 201-202)

Chinese Conversation (Chinese 203-204)

Intermediate Cantonese (Chinese 211-212)

Intermediate Chinese II (Chinese 301)

Intermediate Chinese III (Chinese 302)

Chinese Conversation — Intermediate (Chinese
303-304)

Intermediate Cantonese II (Chinese 311-312)

FALCON (full-time intensive course, Chinese
161-162)

History of the Chinese Language (Chinese
401-402)

**[Linguistic Structure of Chinese: Phonology and
Morphology** (Chinese 403) Not offered 1980-81.]

[Linguistic Structure of Chinese: Syntax (Chinese
404) Not offered 1980-81.]

[Chinese Dialects (Chinese 405) Not offered
1980-81.]

[Chinese Dialect Seminar (Chinese 607) Not
offered 1980-81.]

China—Literature Courses

Introduction to Classical Chinese (Chinese
213-214)

Chinese Philosophical Texts (Chinese 313)

Classical Narrative Texts (Chinese 314)

T'ang and Sung Poetry (Chinese 402)

Readings in Modern Chinese Literature (Chinese
411-412)

Directed Study (Chinese 421-422)

Readings in Literary Criticism (Chinese 424)

Readings in Folk Literature (Chinese 430)

Seminar in Chinese Poetry and Poetics (Chinese
603)

Seminar in Folk Literature (Chinese 609)

Advanced Directed Reading (Chinese 621-622)

Japan — Area Courses

Japanese Culture and Society (Anthropology 345)

[Introduction to Japanese Economy (Economics
366) Not offered 1980-81.]

[Contemporary Japan (Government 100) Not
offered 1980-81.]

Politics in Contemporary Japan (Government 346)

Politics of Productivity: Germany and Japan
(Government 430)

**[Capitalism and Communism: Chinese and
Japanese Patterns of Development** (Government
462) Not offered 1980-81.]

History of Modern Japan (History 389)

Other courses dealing extensively with Japan are:
Anthropology 313; Government 348, 387, 446,
456-457, and 605; History 190, 191 and 192; History
of Art 280 and 580; and Architecture 667-668.

Japan — Language Courses**Basic Course (Japanese 101–102)****Japanese for Business Purposes (Japanese 141–142)****Accelerated Introductory Japanese (Japanese 121–122)****Intermediate Japanese I (Japanese 201–202)****Japanese Conversation (Japanese 203–204)****Intermediate Japanese I and Conversation (Japanese 205–206)****Intermediate Japanese II (Japanese 301–302)****Japanese Communicative Competence (Japanese 303–304)****Advanced Japanese (Japanese 401–402)****Linguistic Structure of Japanese (Japanese 404)****Oral Narration and Public Speaking (Japanese 407–408)****FALCON (full-time intensive course, Japanese 161–162)****Japan — Literature Courses****Introduction to Literary Japanese (Japanese 305–306)****Intermediate Literary Japanese (Japanese 405–406)****Directed Readings (Japanese 421–422)****Seminar in Modern Literature (Japanese 611)****Seminar in Classical Literature (Japanese 612)****Advanced Directed Readings (Japanese 621–622)****South Asia — Area Courses****Paleoanthropology of South Asia (Anthropology 678)****Architecture in Its Cultural Context (Architecture 667–668)****Seminar on Agricultural Development in Southeast Asia (International Agriculture 601)****Government and Politics of India (Government 300)****[India: A Political Experiment (Government 451) Not offered 1980–81.]****[Studies in Indian and Southeast Asian Art (History of Art 386) Not offered 1980–81.]****[India as a Linguistic Area (Linguistics 341) Not offered 1980–81.]****[Dravidian Structures (Linguistics 440) Not offered 1980–81.]****Indo-Aryan Structures (Linguistics 442)****Comparative Indo-European Linguistics (Linguistics 631–632)****Elementary Pali (Linguistics 640)****[Elementary Sanskrit (Linguistics 641–642) Not offered 1980–81.]****Seminar (Linguistics 700)****Directed Research (Linguistics 701–702)**

Other courses dealing extensively with South Asia are: Anthropology 425 and 628; Architecture 433; Asian Studies 250 and 351; Government 387, 605, and 687; History 190 and 191; History of Art 280, 386, and 580; Agricultural Economics 464; Communication Arts 624 and 626; and Rural Sociology 751.

South Asia — Language Courses**Basic Course (Hindi-Urdu 101–102)****Hindi Reading (201–202)****Composition and Conversation (Hindi 203–204)****Readings in Hindi Literature (Hindi 301–302)****Advanced Composition and Conversation (Hindi 303–304)****Advanced Hindi Readings (Hindi 305–306)****[History of Hindi (Hindi 401) Not offered 1980–81.]****Seminar in Hindi Linguistics (Hindi 700)****Basic Course in Sinhala (Sinhalese 101–102)****Sinhala Reading (Sinhalese 201–202)****Composition and Conversation (Sinhalese 203–204)****Basic Course (Tamil 101–102)****Basic Course (Telugu 101–102)****Telugu Reading (Telugu 201–202)****Southeast Asia — Area Courses****Geography and Appraisal of Soils and the Tropics (Agronomy 401)****History of Asian Architecture (Architecture 433)****Ethnographic Films (Anthropology 205)****Applied Anthropology (Anthropology 314 and Rural Sociology 355)****Meaning Across Cultures (Anthropology 320)****[Ethnology of Island Southeast Asia (Anthropology 334) Not offered 1980–81.]****Ethnology of Mainland Southeast Asia (Anthropology 335)****[Myth, Ritual, and Symbol (Anthropology 424) Not offered 1980–81.]****Ritual Structures and Cultural Pluralism (Anthropology 425)****Anthropological Approaches to the Study of Buddhism in Asia (Anthropology 619)****Southeast Asia: Readings in Special Problems (Anthropology 634–635)****[Political Anthropology: Culture and Revolution in Indonesia (Anthropology 628 and Government 647) Not offered 1980–81.]****Southeast Asian Literature in Translation (Asian Studies 379)****Southeast Asia Seminar: Malaysia (Asian Studies 601) Fall. 4 credits.**

C. E. R. Abraham, M. L. Barnett.

Southeast Asia Seminar: Indonesia (Asian Studies 602) Spring. 4 credits.
B. Anderson.**[Southeast Asia Seminar (Asian Studies 604; also International Agriculture 601, Philippine Agricultural Development) Not offered 1980–81.]****Southeast Asia Research Training Seminar (Asian Studies 676)****Directed Research (Asian Studies 703–704) 703: fall and spring; 704: fall and spring. Credit to be arranged.****Microeconomic Issues in Agricultural Development (Agricultural Economics 664)****[Economic Policy and Development in Southeast Asia (Economics 365) Not offered 1980–81.]****Public Policy and Economic Development (Economics 371/571)****[Economic Growth in Southeast Asia (Economics 678) Not offered 1980–81.]****[Government and Politics of Southeast Asia (Government 344) Not offered 1980–81.]****[Political Role of the Military (Government 349)****The United States and Asia (Government 387)****[Political Problems of Southeast Asia (Government 652) Not offered 1980–81.]****International Relations of Asia (Government 687)****Indochina and the Archipelago to the Fourteenth Century (History 395)****Southeast Asian History from the Fifteenth Century (History 396)****Historiography of Southeast Asia (History 695–696)****Seminar in Southeast Asian History (History 795)****Art in Landscape: The Traditional Arts in Southeast Asia (History of Art 106)****Introduction to Art History: Asian Traditions (History of Art 280)****[Studies in Indian and Southeast Asian Art (History of Art 386) Not offered 1980–81.]****[Traditional Arts in Southeast Asia (History of Art 488) Not offered 1980–81.]****[Problems of Art Criticism (History of Art 596) Not offered 1980–81.]****Seminar on Agricultural Development in Southeast Asia (International Agriculture 601)**
See also Asian Studies 604.**Administration of Agricultural and Rural Development (International Agriculture 603)****Special Studies of Problems of Agriculture in the Tropics (International Agriculture 602)****Comparative Methodology (Linguistics 404)****Sociolinguistics (Linguistics 405–406)****Comparative Thai (Linguistics 578)****Field Methods (Linguistics 600)****Old Javanese (Linguistics 651–652)**

Seminar in Southeast Asian Languages (Linguistics 653–654)

Malayo-Polynesian Linguistics (Linguistics 655–656)

Seminar in Austro-Asiatic Linguistics (Linguistics 657–658)

Directed Research (Linguistics 701–702)

Thai Dialectology (Linguistics 751)

Comparative Thai (Linguistics 752)

Tibeto-Burman Linguistics (Linguistics 753)

Independent Study in Music (Music 301–302)

Gamelan Ensemble (Music 445–446)

Rural Development and Cultural Change (Rural Sociology 355)

Subsistence Agriculture in Transition (Rural Sociology 357)

Peasants, Water, and Development (Rural Sociology 754)

Related Courses in Other Departments

Other courses dealing extensively with Southeast Asia are: Anthropology 306, 420, 611, 628; Agricultural Economics 660; Agronomy 401; Architecture 667–668; Asian Studies 250, 351, 352, 650; Business and Public Administration NCE 514 (also International Agriculture 603 and Government 692); Communication Arts 624, 626; Education 627, 628, 629; Government 348, 350, 605, 647, 692; History 190, 191; History of Art 482, 580; International Agriculture 600, 602, 603, 703; Nutritional Sciences 680, 695; and Rural Sociology 650.

Southeast Asia—Language Courses

Basic Course (Burmese 101–102)

Burmese Reading (Burmese 201–202)

Composition and Conversation (Burmese 203–204)

Advanced Burmese Reading (Burmese 301–302)

Basic Course (Cambodian 101–102)

Cambodian Reading (Cambodian 201–202)

Composition and Conversation (Cambodian 203–204)

Advanced Cambodian (Cambodian 301–302)

Directed Individual Study (Cambodian 401–402)

Structure of Cambodian (Cambodian 404)

Basic Course (Cebuano Bisayan 101–102)

Elementary Course (Indonesian 101–102)

Indonesian Reading (Indonesian 201–202)

Composition and Conversation (Indonesian 203–204)

Linguistic Structure of Indonesian (Indonesian 300)

Readings in Indonesian and Malay (Indonesian 301–302)

Advanced Indonesian Conversation and Composition (Indonesian 303–304)

Advanced Readings in Indonesian and Malay Literature (Indonesian 401–402)

Advanced Readings in Indonesian and Malay Literature (Indonesian 305–306)

FALCON (full-time intensive course, Indonesian 161–162)

Elementary Javanese (Javanese 131–132)

Intermediate Javanese (Javanese 133–134)

Intermediate Javanese Readings (Javanese 201–202)

Directed Individual Study (Javanese 203–204)

Basic Course (Tagalog 101–102)

Tagalog Reading (Tagalog 201–202)

Linguistic Structure of Tagalog (Tagalog 300)

Basic Course (Thai 101–102)

Thai Reading (Thai 201–202)

Composition and Conversation (Thai 203–204)

Advanced Thai (Thai 301–302)

Directed Individual Study (Thai 401–402)

Basic Course (Vietnamese 101–102)

Vietnamese Reading (Vietnamese 201–202)

Composition and Conversation (Vietnamese 203–204)

Advanced Vietnamese (Vietnamese 301–302)

Vietnamese Literature (Vietnamese 303–304)

Directed Individual Study (Vietnamese 401–402)

Astronomy

101 The Universe Beyond the Solar System Fall. 4 credits. Prerequisite: high school algebra. Lects, M W F 11:15; lab, M, T, or W 7:30–10 p.m. Y. Terzian.

An examination of the universe and our place in it, and the possible existence of life and intelligence elsewhere in the cosmos. The physical nature of stars, galaxies, and quasi-stellar sources. The birth, evolution, and death of stars and the formation of the chemical elements, including discussions of supernovae, pulsars, neutron stars, and black holes. The physical state, composition, and influence of the interstellar material on the evolution of our galaxy. Modern theories of the structure and evolution of the universe.

102 The Solar System and Earth Spring. 4 credits. Prerequisites: high school algebra and Astronomy 101 or permission of instructor.

Lec, M W F 11:15; lab, M, T, or W 7:30–10 p.m. Exams will be given in the evening. P. Gierasch. Formation of the solar system. Environments and internal structures of planets. Formation and structure of the earth and its atmosphere, and the evolution of the earth's surface and climate. Origin of life. The effects of civilization on our planet.

103 The Universe Beyond the Solar System Fall. 3 credits. This course does not satisfy the distribution requirement in physical sciences. Identical to 101 except for omission of the laboratory (see description above).

104 The Solar System and Earth Spring. 3 credits. This course does not satisfy the distribution requirement in physical sciences. Identical to 102 except for omission of the laboratory (see description above).

111 Theories of the World: Stars, Galaxies, and Cosmology Spring. 4 credits. Intended for engineering and physical sciences freshmen. Prerequisite: introductory calculus or coregistration in Mathematics 111 or 191.

Lecs, M W F 10:10; rec, one hour each week to be arranged; plus some evening observing periods. J. R. Houck.

The formation and evolution of stars. Supernovae, pulsars, quasars, and black holes. The interstellar medium. The structure and evolution of galaxies. Cosmology.

112 Theories of the World: The Solar System, Planets, and Life Fall. 4 credits. Intended for engineering and physical sciences freshmen. Prerequisite: introductory calculus or coregistration in Mathematics 111 or 191.

Lecs, M W F 10:10; rec, one hour each week to be arranged; and some evening labs to be arranged. S. Ostro, T. Gold.

The origin of the solar system. Celestial mechanics. The physics of planetary atmospheres, surfaces, and interiors. Spacecraft results. Prebiology and the origin of life. The detection of life elsewhere in the universe.

201 Our Home in the Universe Fall. 2 credits. No prerequisites.

T R 2:30. T. Gold.

A general discussion of man's relation to the physical universe; the nature of space and time as understood in modern physics; the universe of galaxies and stars, and the particular system of planets and satellites encircling one average such star, our sun. The origin and evolution of our solar system, as revealed by modern planetary exploration. The great uncertainties that remain.

215 Information and Knowledge in Science and Engineering (also Arts and Sciences 200) Fall. 4 credits. No prerequisites.

T R 10:10–11:35. M. Harwit.

Topics to be covered include the exact and probabilistic laws of nature; messages, information content, and entropy; the Heisenberg uncertainty principle as a fundamental limitation on what we can know about the behavior of physical systems; coding of messages, cryptography, unbreakable codes, error correcting codes; self-replicating machines; transmission of genetic information in biology; mutations and biological evolution; transmission, storage, and processing of information in machines and in animals; robots and artificial intelligence; transmission of information across the universe—astronomical data and communication with intelligent civilizations. Level of *Scientific American*.

332 Elements of Astrophysics Spring. 4 credits. Prerequisites: calculus; Physics 213. Physics 214 strongly recommended.

Lecs, M W F 11:15. S. Beckwith

An introduction to astronomy with emphasis on the application of physics to the study of the universe. Physical laws of radiation. Theories of the solar system. Distance, size, mass, and age of stars, galaxies, and the universe; stellar evolution and nucleosynthesis; interstellar matter and star formation. Supernovae, pulsars, and black holes. Galaxies and quasars. Introduction to cosmology. Intended for students interested in astronomy, physics, and engineering.

431 Introduction to Astrophysics and Space Sciences I Fall. 4 credits. Prerequisites: Physics 214 and 318 or their equivalent. There are no astronomy course prerequisites.

M W F 10:10. J. R. Houck, S. Beckwith.

A systematic development of modern astrophysical concepts for physical science majors. The cosmic

distance scale; dynamics and masses of astronomical bodies; atomic and electromagnetic processes in space. Introduction to star formation, stellar structure, stellar atmospheres, and the interstellar medium. At the level of *Astrophysical Concepts* by Harwit.

432 Introduction to Astrophysics and Space Sciences II Spring. 4 credits. Prerequisite:

Astronomy 431 or permission of instructor.
M W F 10:10. M. Harwit, J. Cordes.

Formation of the chemical elements. Origin of the solar system; interstellar dust and gas, cosmic rays; stellar systems, clusters, galaxies and quasars. Cosmology. Exobiology. Emphasis is on the formation of stars, galaxies, and the solar system. At the level of *Astrophysical Concepts* by Harwit.

[433 The Sun Fall. Not offered 1980–81.]

[434 The Evolution of Planets Spring. Not offered 1980–81.]

440 Independent Study in Astronomy Fall or spring. 2–4 credits. Prerequisite: permission of instructor. Recommended: familiarity with the topics covered in Astronomy 332, 431, or 434.

Hours to be arranged. Staff.
Individual work on selected topics. A program of study is devised by the student and instructor.

[490 Senior Seminar Fall. Not offered 1980–81.]

509 General Relativity (also Physics 553) Fall. 4 credits. Prerequisite: knowledge of special relativity at the level of, for example, *Classical Mechanics* by Goldstein.

T R 8:30–9:55. S. Teukolsky.
A systematic introduction to Einstein's theory, with emphasis on modern coordinate-free methods of computation. Topics include: review of special relativity, modern differential geometry, foundations of general relativity, laws of physics in the presence of a gravitational field, experimental tests of gravitation theories. At the level of *Gravitation* by Misner, Thorne, and Wheeler.

510 Applications of General Relativity (also Physics 554) Spring. 4 credits. Prerequisite: 509.

T R 10:10–11:35. S. Teukolsky.
A continuation of Astronomy 509 with emphasis on applications to astrophysics and cosmology. Topics include: relativistic stars, gravitational collapse and black holes, gravitational waves, cosmology.

[511 High Energy Astrophysics Spring. Not offered 1980–81.]

516 Galactic Structure and Stellar Dynamics Spring. 4 credits.

T R 10:10–11:30. S. Shapiro.
The kinematics and distribution of stars in the solar neighborhood. The dynamical structure, composition, and evolution of our galaxy. Characteristics and classifications of galaxies and clusters of galaxies. Theory of N-body systems, stellar encounters, relaxation and stellar evaporation rates. Introduction to the Boltzmann and Fokker-Planck equations with applications. Theory of spiral structure. Relativistic star clusters; star clusters with massive black holes. Binary and rotating star systems.

[520 Radio Astronomy Fall. Not offered 1980–81.]

[521 Radio Astrophysics Spring. Not offered 1980–81.]

523 Signal Processing in Astronomy Spring. 4 credits. Prerequisites: mathematical background equivalent to undergraduate physical science curriculum; familiarity with FORTRAN programming.

T R 2:30–4. J. Cordes, S. Ostro.
Topics will include Fourier analysis of discrete and continuous time series, spectral analysis, parameter estimation, probability theory and stochastic processes with an orientation towards applications in

observational radio astronomy and astrophysics. Discussion of applications such as interferometry, image processing, scintillation theory, planetary radar, and pulsar studies. Course work will include applications on the IBM 370.

[525 Observational Techniques of Optical Astronomy Spring. Not offered 1980–81.]

555 Theory of the Interstellar Medium Fall. 4 credits.

M W F 2:30. E. Salpeter.
Summary of observational data; theories of ionization and thermal equilibrium of the gas; grain formation and destruction; cloud structure and star formation; interstellar effects of cosmic rays. (Will probably include some guest lectures by Prof. R. Lovelace.)

[560 Theory of Stellar Structure and Evolution (also Physics 667) Fall. Not offered 1980–81.]

570 Physics of the Planets Spring. 4 credits.

Hours to be arranged. C. Sagan.
Physics and chemistry of planetary atmospheres, surfaces and interiors; the roles of convective, conductive, and radiative transport; optical, infrared, radio, radar, and space-probe information; applications to exobiology and to the earth as a planet.

[571 Mechanics of the Solar System Spring. Not offered 1980–81.]

575 Radiative Transfer and Planetary Atmospheres Fall. 4 credits.

Hours to be arranged. P. Gierasch.
Introduction to radiative transfer. Scattering and line formation. Energy balance and thermal structure. Energy transport by motions; elements of circulation theory. Observations. At the level of *Radiative Transfer* by Chandrasekhar.

[579 Celestial Mechanics (also Engineering T&AM 672) Spring. Not offered 1980–81.]

620 Seminar: Advanced Radio Astronomy Fall. 2 credits.

Hours to be arranged. J. Cordes, F. Drake, S. Ostro, and Y. Terzian.
Advanced topics in radio astrophysics and radio astronomical data accumulation and processing methods.

[633 Seminar: Infrared Astronomy Spring. Not offered 1980–81.]

640 Advanced Study and Research Fall or spring. Credit to be arranged.

Hours to be arranged. Staff.
Guided reading and seminars on topics not currently covered in regular courses.

[660 Cosmic Electrodynamics (also Engineering A&EP 608) Spring. Not offered 1980–81.]

[671 Special Topics in Planetary Astronomy Fall. Not offered 1980–81.]

[673 Seminar: Current Problems in Planetary Fluid Dynamics Spring. Not offered 1980–81.]

[680 Seminar: Cosmic Rays and High-Energy Electromagnetic Radiation (also Physics 680) Spring. Not offered 1980–81.]

699 Seminar: Current Problems in Theoretical Astrophysics Fall. 3 credits. May be repeated for credit.

T R 10:10–11:35. S. Shapiro.
Study of the latest problems in theoretical astrophysics; content changes from year to year.

Burmese, Cambodian, and Cebuano (Bisayan)

See Modern Languages, Literatures, and Linguistics, p. 92.

Chemistry

Preliminary examinations for all courses may be given in the evening

103–104 Introduction to Chemistry 103, fall; 104, spring. 3 credits each term. Enrollment limited. Prerequisite for Chemistry 104: Chemistry 103. Recommended for students who have not had high school chemistry and for those needing a less mathematical course than Chemistry 207–208.

Lecs, M W 11:15 or 12:20; lab, T or R 8–11, or F 10:10–1:10, or M, W, or F 1:25–4:25. Prelims: 6:30 p.m. Oct. 16, Nov. 18, Mar. 17, and Apr. 23. Fall, H. A. Scheraga; spring, J. E. McMurry.

An introduction to chemistry with emphasis on the important principles and facts of inorganic and organic chemistry.

[200 Man in his Chemical Environment Fall.

3 credits. Prerequisites: 103–104 or 207–208. Enrollment limited. Offered alternate years. Not offered 1980–81.

Lec T R 12:20; rec, T 1:25 or R 10:10 or 1:25. The chemical aspects of the human environment, including the composition and properties of materials as these affect our environment. Chemical limitations on the balance between survival and quality of living.]

207–208 General Chemistry 207, fall; 208, spring. 4 credits each term. Enrollment limited.

Recommended for those students who will take further courses in chemistry. Prerequisite for 207: high school chemistry. Prerequisite for 208: Chemistry 207 or 103–104.

Lecs, fall, T R 9:05, 10:10, or 12:20; spring, T R 9:05 or 10:10. Lab: fall, T W R or S 8–11; F 10:10–1:10; M T W R or F 1:25–4:25; spring, M T W R or F 12:20–4:25 or S 8–12. Prelims: 6:30 p.m. Oct. 7, Nov. 11, Mar. 10, Apr. 21. Fall, R. C. Fay, M. J. Sienko; spring M. J. Sienko, L. Que.

The important chemical principles and facts are covered, with considerable attention given to the quantitative aspects and to the techniques important for further work in chemistry. Second-term laboratory includes a systematic study of qualitative analysis.

Note: Entering students exceptionally well prepared in chemistry may receive advanced placement credit for Chemistry 207–208 by demonstrating competence in the advanced placement examination of the College Entrance Examination Board or in the departmental examination given at Cornell before classes start in the fall.

215–216 General Chemistry and Inorganic Qualitative Analysis 215, fall; 216, spring. Fall,

4 credits; spring, 5 credits. Recommended for students who intend to specialize in chemistry or in closely related fields. Prerequisites: good performance in high school chemistry and physics and in mathematics SAT. Coregistration in a calculus course at the level of Mathematics 111 or 191 is required for students who have not taken high school calculus. Prerequisite for Chemistry 216: Chemistry 215. Enrollment limited.

Fall: lec, M W F 12:20; lab, M T W R, or F 1:25–4:25. Spring: lec or rec, M W F 12:20; two labs, M T 1:25–4:25, T R 10:10–1:10, W F 1:25–4:25, or R 1:25–4:25 and S 8–11. Prelims: 6:30 p.m. Sept. 25, Oct. 23, Nov. 18, Feb. 19, Mar. 17, Apr. 21. Fall, B. A. Baird, G. G. Hammes; spring, R. F. Porter.

An intensive systematic study of the laws and concepts of chemistry, with considerable emphasis

Biological Sciences

See p. 134.

on quantitative aspects. Second term includes systematics of inorganic chemistry. Laboratory work covers both qualitative and quantitative analysis.

251 Introduction to Experimental Organic Chemistry Fall. 2 credits. Recommended for nonchemistry majors. Prerequisite or corequisite: 253 or 357 or permission of instructor.

Lec, M or F 8 (all students attend first lecture); lab, M T W or R 1:25–4:25, or T or R 8–11.
D. B. Collum, B. Ganem.

An introduction to synthesis and the separation and handling of materials including applications of many types of chromatography, simple and fractional distillation, crystallization, extraction, and others.

252 Elementary Experimental Organic Chemistry Spring. 2 credits. Recommended for non-chemistry majors. Prerequisite: Chemistry 251.

Lec, M 8; lab, M, T, W, or R 1:25–4:25.
D. B. Collum.

A continuation of Chemistry 251.

253 Elementary Organic Chemistry Fall. 4 credits. Primarily for students in the premedical and biological curricula. Enrollment limited to 480 students. Prerequisite: Chemistry 104 with grade of C or better or Chemistry 208 or 216.

Lecs, M W F S 10:10; make-up lec may be given in the evening. J. R. Rasmussen.

The occurrence and properties of organic molecules and the mechanisms of organic reactions, including a brief introduction to the organic chemistry of biological systems, are studied.

Note: Premedical students should determine the entrance requirements of the particular medical school they wish to enter. Students may earn 6 credits by taking Chemistry 251–253 or 8 credits by taking Chemistry 253–301 or 253, 251, and 252.

287–288 Introductory Physical Chemistry 287, fall; 288, spring. 3 credits each term. Prerequisites: Chemistry 208 or 216 and Mathematics 111–112, or permission of instructor. Prerequisite for 288: Chemistry 287.

Lecs, M W F 9:05; rec, M, W, or F 1:25. Fall,
B. Widom; spring, P. L. Houston.

A systematic treatment of the fundamental principles of physical chemistry.

289–290 Introductory Physical Chemistry Laboratory 289, fall; 290, spring. 2 credits each term. Prerequisite for 290: Chemistry 289. Coregistration in 287–288 is required.

Lec, T or R 1:25; lab, M T W R or F 1:25–4:25. Fall,
J. R. Wiesenfeld; spring, E. R. Grant.

Quantitative and qualitative methods basic to the experimental study of physical chemistry.

300 Quantitative Chemistry Fall. 2 credits. Prerequisite: Chemistry 208 or advanced placement in chemistry.

Lec, F 12:20; lab, M, T, W, R, or F 1:25–4:25 or T R 8–11. Organizational meeting on first class day of semester, 12:20. G. H. Morrison.

Common quantitative procedures and techniques essential to laboratory work in the sciences are emphasized. The relationships between theories and applications are stressed.

301 Experimental Chemistry I Spring. 4 credits. Prerequisite: Chemistry 216 or 300, and 253 or 357 or 359. Concurrent registration in Chemistry 253 is not recommended.

Lecs, M W 8; 2 labs, M W 1:25–4:25 or T R 8–11, or T R 1:25–4:25. J. R. Rasmussen.

An introduction to synthesis and the separation and handling of materials, including applications of many types of chromatography, simple and fractional distillation, crystallization, extraction, and others.

302 Experimental Chemistry II Fall. 4 credits. Enrollment limited; preference given to chemistry majors. Prerequisite: Chemistry 301.

Lecs, M W 9:05; 2 labs, M W 1:25–4:25, T R 9–12, T R 1:25–4:25, or F 1:25–4:25 and S 9–12.

J. M. Burlitch, B. K. Carpenter.

Various aspects of qualitative and quantitative analysis of both inorganic and organic compounds, including optical spectroscopy, NMR, mass spectroscopy, GCMS, and electrochemical methods are surveyed.

303 Experimental Chemistry III Spring. 4 credits. Each lab limited to 18 students. Prerequisites: Chemistry 302, 389, 390, co-registration in the latter is permissible; knowledge of computer programming is essential.

Lecs, M W 9:05 (some weeks lec may be on F instead of W); 2 labs M W 1:25–4:25 or T R 8–11 or 1:25–4:25. R. E. Hughes, F. W. McLafferty.

An introduction to the techniques of vacuum line construction and operation; the principles and assembly of electronic measuring devices, optics, and kinetics.

357–358 Introductory Organic Chemistry 357, fall; 358, spring. 3 credits each term. Prerequisites: Chemistry 208 or 216 or advanced placement in chemistry. Concurrent registration in Chemistry 251 in the fall term and Chemistry 301 in the spring term is recommended. Prerequisite for Chemistry 358: Chemistry 357.

Lecs, M W F 9:05; optional rec may be offered. Fall,
J. Meinwald; spring, J. C. Clardy.

A systematic study of the more important classes of carbon compounds—reactions of their functional groups, methods of synthesis, relations, and uses.

359–360 Organic Chemistry I and II 359, fall; 360, spring. 4 credits each term. Enrollment limited. Recommended for students who intend to specialize in chemistry or closely related fields. Prerequisites: Chemistry 216, or 208 with a grade of B or better, or consent of instructor. Prerequisite for Chemistry 360: Chemistry 359.

Lecs, M W F 9:05; make-up lecs, W 7:30 p.m.
M. J. Goldstein.

A rigorous and systematic study of organic and organometallic compounds, their structures, the mechanisms of their reactions, and the ways that they are synthesized in nature and in the laboratory.

389–390 Physical Chemistry I and II 389, fall; 390, spring. 4 credits each term. Prerequisites: Mathematics 214, 215, 216, or ideally, 221–222; Physics 208, Chemistry 208 or 216 or permission of instructor. Prerequisite for Chemistry 390: Chemistry 389.

Lecs, M W F 10:10; rec and make-up lec, W 7:30 p.m. Exams: fall, R 8:40 p.m. Sept. 18, Oct. 9, Oct. 30, Nov. 16, and Dec. 11. Fall, R. Hoffmann; spring, A. C. Albracht.

The principles of physical chemistry are studied from the standpoint of the laws of thermodynamics, kinetic theory, and quantum chemistry.

[404 Advanced Measurements Laboratory Fall. 4 credits. Prerequisite: Chemistry 303. Not offered 1980–81.

Lab, M T R 1:25–4:25; plus occasional evening lec. Alternate hours may be arranged if necessary.

Applications of modern experimental techniques in a variety of fields. Emphasis is on kinetics, spectroscopy, and electronics.]

[405 Techniques of Modern Synthetic Chemistry Spring. 4 credits. Enrollment limited. Prerequisite: Chemistry 302. Selection of students will be based on grades in Chemistry 301 and 302. With permission of the instructor, graduate students may perform a minimum of three two-week experiments on a prearranged schedule.

Lab time required: 12 hours each week including at least two 4-hour sessions in 2 sections (M W 1:25 or T R 1:25). First meeting will be at 4:30 p.m. on first class day of semester. Lec, first week only, at times to be arranged. Not offered 1980–81.

The syntheses of complex organic and inorganic molecules will be carried out with emphasis on the following techniques: vacuum line, high pressure, high temperature solid state, inert atmosphere, nonaqueous solvents, radioactive labeling, photochemical and electrochemical methods, solid phase peptide synthesis, and macro and micro techniques. Elementary glassblowing.]

421 Introduction to Inorganic Research Fall or spring. 2–4 credits. Prerequisites: Chemistry 303 and 389–390, or Chemistry 287–288, and Chemistry 289–290 with an average of B– or better, or permission of instructor.

Selected faculty.
Informal advanced laboratory and library work, planned in consultation with a staff member, preparing and characterizing inorganic substances and culminating in a written report.

443 Introduction to Analytical Research Fall or spring. 2–4 credits. Prerequisites: Chemistry 303 and 390 with an average of B– or better or permission of instructor.

Selected faculty.
Informal research in analytical chemistry involving both laboratory and library work.

461 Introduction to Organic Research Fall or spring. 2–4 credits. Enrollment limited to those having a record of B– or better in prerequisite courses. Prerequisites: Chemistry 302 and 358 or 360 or permission of instructor.

Selected faculty.
Informal research in organic chemistry involving both laboratory and library work.

477 Introduction to Research in Physical Chemistry Fall or spring. 2–4 credits. Prerequisites: Chemistry 390 with an average of B– or better and permission of instructor.

Selected faculty.
Informal laboratory and library work in physical chemistry, planned in consultation with a staff member.

498 Honors Seminar Spring. Noncredit. Admission by departmental invitation. See the *Announcement of Academic Information* for criteria for selection. Additional prerequisite or corequisites: outstanding performance in either (1) two coherent 4-credit units of research in a course such as Chemistry 421, 433, 461, or 477; or (2) one 4-credit unit in a course such as Chemistry 421, 433, 461, or 477 and summer research equivalent to at least 4 credits in the same subject.

R. E. Hughes.
Informal presentations and discussions of selected topics in which all students participate. Individual research is on advanced problems in chemistry under the guidance of a faculty member, culminating in a written report.

600 General Chemistry Colloquium Fall and spring. Noncredit. Required of all graduate students except those majoring in organic or bioorganic chemistry. Open to qualified juniors and seniors.
R 4:40.

A series of talks representative of all fields of current research interest in chemistry other than organic chemistry, given by research associates, faculty members, and distinguished visitors.

605 Advanced Inorganic Chemistry I: Symmetry and Structure Fall. 4 credits. Prerequisite: Chemistry 389–390 or equivalent or permission of instructor.

Lecs, M W F 11:15. L. Que.
This is the first of a three-term sequence. Symmetry and structure of discrete molecules, translational symmetry of arrays of molecules in crystals. Group theory at the level of Cotton's *Chemical Application of Group Theory*, Schonland's *Molecular Symmetry*, and Hall's *Group Theory and Symmetry in Chemistry*. Applications include molecular orbital theory,

hybridization, and molecular vibrations. Readings in the chemistry of nontransition elements at the level of Cotton and Wilkinson's *Advanced Inorganic Chemistry*.

606 Advanced Inorganic Chemistry II: Structure and Dynamics Spring. 4 credits. Prerequisite: Chemistry 605 or permission of instructor.

Lecs, M W F 9:05. R. C. Fay.
The second of a three-term sequence. The development of general background and systematics through which structure, stereochemistry, and reaction mechanism of inorganic and organometallic compounds can be understood and anticipated. Readings at the level of Coates, Green and Wade's *Organometallic Compounds* and Basolo and Pearson's *Inorganic Reaction Mechanisms*.

[607 Advanced Inorganic Chemistry III: Structure and Properties Spring. 4 credits. Prerequisite: Chemistry 605 or permission of instructor. Not offered 1980-81.

Lecs, M W F 11:15.
The third of a three-term sequence. Introduction to ligand field theory and solid-state structure and properties, at the level of Figgis' *Introduction to Ligand Fields*, Krebs' *Fundamentals of Inorganic Crystal Chemistry* and Sach's *Solid State Theory*. Readings in transition metal chemistry at the level of Cotton and Wilkinson's *Advanced Inorganic Chemistry*]

[622 Chemical Communication (also Biological Sciences 623) Fall. 3 credits. Intended primarily for research-oriented students. Limited to 30 students. Prerequisites: Chemistry 358, Biological Sciences 102, and Biochemistry 231. Offered alternate years. Not offered 1980-81.

Lecs, M W F 1:25. J. Meinwald, T. Eisner, W. Roelofs, and guest speakers.
The production, transmission, and reception of chemical signals in communicative interactions of animals, plants, and microorganisms. Communication involving insects is emphasized. Specific topics are treated, with varying emphasis on chemical, biochemical, neurobiological, ecological, and evolutionary principles.]

625 Advanced Analytical Chemistry I Fall. 4 credits. Open to undergraduates with permission of instructor. Prerequisite: Chemistry 288 or 390 or equivalents.

Lecs, M W F 8; exams, T 7:30 p.m. W. D. Cooke, F. W. McLafferty.
The application of molecular spectroscopy to chemical problems. Topics in ultraviolet, infrared, NMR, Raman, and mass spectroscopy are discussed.

[627 Advanced Analytical Chemistry II Spring. 3 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390 or equivalent. Offered alternate years. Not offered 1980-81.

Lecs, T R 10:10; problem sessions and exams, T 7:30. F. W. McLafferty.
Modern analytical methods, including electron, Mössbauer, and Fourier spectroscopy; mass spectrometry; methods applicable to macromolecules; information theory.]

628 Advanced Analytical Chemistry III Spring. 3 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390 or equivalents. Offered alternate years.

Lecs, T R 10:10. G. H. Morrison.
Modern trace, micro, and surface methods of analysis, including atomic spectrometry, solids mass spectrometry, activation analysis, microscopes, microprobes, and electron spectroscopy.

650-651 Organic and Organometallic Chemistry Seminar 650, fall; 651, spring. Noncredit. Required of all graduate students majoring in organic or bioorganic chemistry. Open to qualified juniors and seniors.

M 8:15 p.m.

A series of talks representative of all fields of current research interest in organic and organometallic chemistry, given by research associates, faculty members, and distinguished visitors.

665 Advanced Organic Chemistry Fall. 4 credits. Primarily for graduate students and upperclass undergraduates. Prerequisites: Chemistry 253 or 358 or 360 and 390 or equivalents or permission of instructor.

Lecs, M W F 12:20; make-up lectures and exams, W 7:30 p.m. B. K. Carpenter.
A survey of reaction mechanisms and reactive intermediates in organic chemistry. Applications of qualitative molecular orbital theory will be emphasized.

666 Synthetic Organic Chemistry Spring. 4 credits. Primarily for graduate students and upperclass undergraduates. Prerequisites: Chemistry 665 or permission of instructor.

Lecs, T R 8-9:30; an additional lec will be arranged. B. Ganem.
Modern techniques of synthesis; applications of organic reaction mechanisms to the problems encountered in rational multistep synthesis, with particular emphasis on modern developments in synthetic planning.

[668 Chemical Aspects of Biological Processes Fall. 4 credits. Prerequisites: Chemistry 358 or 360 and 390 or 288 or equivalents. Not offered 1980-81.

Lecs, M W F 10:10.
Biochemical systems, bioenergetics, enzymes, metabolic pathways, chemical evolution. This course forms the chemical basis for the graduate program in molecular biology.]

672 Enzyme Catalysis and Regulation Spring. 4 credits. Primarily for graduate students in chemistry and biochemistry. Prerequisites: Chemistry 358 or 360 and 390 or equivalents, and a course in general biochemistry.

Lecs, M W F 11:15 and occasionally W 7 p.m. G. G. Hammes.
Protein structure and dynamics, steady state and transient kinetics, binding isotherms, chemical modification enzymes, application of NMR, EPR, and fluorescence, acid-base catalysis, allosterism; discussion of specific enzymes to illustrate general principles.

[677 Chemistry of Nucleic Acids Spring. 4 credits. Primarily for graduate students. Prerequisites: Chemistry 358 or 360, and 390 or equivalents. S-U grades only. Offered alternate years. Not offered 1980-81.

Lecs, M W F 8. D. A. Usher.
Properties, synthesis, and reactions of nucleic acids.]

678 Thermodynamics Spring. 4 credits. Primarily for graduate students. Prerequisite: 288 or 390 or equivalents.

Lecs, T R 8:30-9:55; disc to be arranged. R. F. Porter.
Development of the general laws of equilibrium and nonequilibrium thermodynamics and investigation of their statistical basis. Applications to the study of physicochemical equilibrium and steady states in gases, liquids, solids, and liquid solutions.

681 Physical Chemistry III Fall. 4 credits. Prerequisites: Chemistry 288 or 390; Mathematics 214, 215, 216, 217, and Physics 208; or equivalents. Lecs, M W F 10:10, occasional lectures W 7:30 p.m. J. H. Freed.

An introduction to the principles of quantum theory and statistical mechanics, atomic and molecular spectra, and elementary valence theory. At the level of *Atoms and Molecules* by Karplus and Porter.

686 Physical Chemistry of Proteins Spring. 4 credits. Primarily for graduate students. Prerequisites: Chemistry 288 or 390 or equivalents.

Offered alternate years.

Lecs, M W F 8, S 11:15, and occasionally W 7:30 p.m. H. A. Scheraga.
Chemical constitution, molecular weight, and structural basis of proteins; thermodynamic, hydrodynamic, optical, and electrical properties; protein and enzyme reactions; statistical mechanics of helix-coil transition in biopolymers; conformation of biopolymers: protein folding.

700 Baker Lectures Fall, on dates to be announced. Noncredit.

R. N. Zare, Stanford University.
Distinguished scientists who have made significant contributions to chemistry present lectures for periods varying from a few weeks to a full term.

701-702 Introductory Graduate Seminar in Analytical, Inorganic, and Physical Chemistry

701, fall; 702, spring. Noncredit. Required of all first-year graduate students majoring in analytical, inorganic, physical, theoretical, and biophysical chemistry.
Hours to be arranged. F. W. McLafferty.

[716 Selected Topics in Advanced Inorganic Chemistry Fall. 3 credits. Prerequisite: Chemistry 390 or equivalent. S-U grades only. Not offered 1980-81.

Lecs, T R 12:20.
Topics vary.]

765 Physical Organic Chemistry I Spring. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 665 or permission of instructor.

Lecs, M W F 11:15.
Continues and extends the approach of Chemistry 665 to more complicated organic reactions. Emphasis is on applications of reaction kinetics and isotope effects to gain an understanding of reaction mechanisms.

[766 Physical Organic Chemistry II Spring. 3 credits. Primarily for graduate students. Prerequisite: Chemistry 765 or permission of instructor. Not offered 1980-81.
Quantitative aspects of organic chemistry.]

[770 Selected Topics in Organic Chemistry Fall. 3 credits. Primarily for graduate students. Prerequisites: Chemistry 665-666 or permission of instructor. Not offered 1980-81.
Lecs, M W 11:15.
Topics vary.]

[774 Chemistry of Natural Products Spring. 3 credits. Primarily for graduate students. Prerequisites: Chemistry 665-666. Not offered 1980-81.

Lecs, T R 12:20.
Particular attention is devoted to methods of structure determination and synthesis as applied to selected terpenes, steroids, alkaloids, and antibiotics.]

780 Principles of Chemical Kinetics Fall. 4 credits. Prerequisite: Chemistry 681 or permission of instructor.

Lecs, M W F 9:05 and occasionally T 7 p.m. P. L. Houston.
Principles and theories of chemical kinetics; special topics such as fast reactions in liquids, enzymatic reactions, energy transfer, and molecular beams.

782 Special Topics in Biophysical and Bioorganic Chemistry Spring. Noncredit. Primarily for graduate students.

Lecs, T R 11:15. Dates to be announced.
Topics, which are presented by distinguished visitors, vary from year to year.

789 X-ray Crystallography Spring; offered only when sufficient registration warrants. 4 credits. Prerequisite: Chemistry 288 or 390 or permission of instructor.

Hours to be arranged. J. C. Clardy.
A beginning course in the application of x-ray crystallography to structural chemistry. Topics include symmetry properties of crystals, diffraction of x-rays by crystals, interpretation of diffraction data and refinement of structures. The chemical information available from a diffraction experiment is stressed and theoretical aspects are illustrated by conducting an actual structure determination as a classroom exercise. At the level of Ladd and Palmer's *Structure Determination by X-ray Crystallography*.

793 Quantum Mechanics I Fall. 4 credits.
Prerequisites: Chemistry 681, coregistration in Mathematics 421, and Physics 431 or equivalents or permission of instructor.

Lecs, T R S 9:05. A. C. Albrecht.
Schrödinger's equation, wave packets, uncertainty principle, WKB theory, matrix mechanics, orbital and spin angular momentum, exclusion principle, perturbation theory, variational principle, Born-Oppenheimer approximation. At the level of Bohm's *Quantum Theory*.

794 Quantum Mechanics II Spring. 4 credits.
Prerequisites: Chemistry 793 or equivalent and coregistration in Physics 432 and Mathematics 422, or permission of instructor.

Lecs, M W F 10:10. J. H. Freed.
Time-dependent phenomena in quantum mechanics and interaction with radiation. Spectroscopy. Elementary theory of ESR and NMR. Electronic structure of atoms and molecules.

796 Statistical Mechanics (also Physics 562) Spring. 4 credits. Primarily for graduate students.
Prerequisite: Chemistry 793 or equivalent.

Lecs, T R 8:30-9:50. M. E. Fisher.
Thermodynamic assemblies; Legendre transformation. Ergodic and information theory ideas. Ensembles and partition functions; equivalences and fluctuations; indistinguishability. Thermodynamic properties of ideal gases and crystals; Third Law; chemical equilibria. Imperfect gases; correlation functions and their applications. Ideal paramagnets. Ising models and lattice gases. At the level of Kubo's *Statistical Mechanics*.

798 Selected Topics in Physical Chemistry Spring. 3 credits.

Lecs, T R S 9:05. R. Hoffmann.
Topics vary. In spring 1981 the topic will be the electronic structure of organic, organometallic, and inorganic molecules.

Chinese

See Department of Asian Studies, p. 55, and Modern Languages, Literatures, and Linguistics, p. 92.

Classics

Classical Civilization

Knowledge of Greek or Latin is not needed for these courses.

100 Word Power: Greek and Latin Elements in the English Language Fall. 3 credits.
T R 10:10-11:25. G. M. Messing.

This course gives the student with no knowledge of Classical languages an understanding of how the Greek and Latin elements, which make up over half our English vocabulary, operate in both literary and scientific English usage. Attention is paid to how words acquire their meaning and to enlarging each student's working knowledge of vocabulary and grammar.

109 An Introduction to Rhetoric Spring. 3 credits.
M W F 9:05. F. M. Ahl.

Good writing demands an ear sensitive to the subtleties and nuances of the spoken language as well as a knowledge of the conventions of written usage. Many literary texts, such as plays, demand the human voice for their fullest realization. This course is designed to develop practical skills in many aspects of oral and written communication, using ancient and modern authors as models. Live readings and oral presentations will be an important part of this course, as well as the usual (and some unusual) exercises in writing.

118 The Greek Image of Man Spring. 3 credits.
Freshman Seminar.
T R 9:05-10:20. P. T. Mitsis.

An examination of the mystic, tragic, and philosophical views of man presented in Homer, Hesiod, the Pre-Socratics, Aeschylus, Sophocles, Euripides, Plato, Aristotle, Epicurus, and the Stoics.

119.1 Freshman Seminar in Greek Literature Fall and spring. 3 credits.
M W F 11:15. Fall, S. B. Rogers; spring, Y. R. Perez.
Topics for both semesters will be announced in the Freshman Seminar supplement.

119.2 Freshman Seminar in Greek Literature Fall and spring. 3 credits.

M W F 9:05. Fall, P. L. Corrigan; spring, B. Heiden.
Topic for fall: Love, sex, and family life in ancient Greece. This course examines Greek views on human sexuality and sex roles. We shall look for evidence of these views in the art, mythology, and literature of ancient Greece, as well as in its social, cultural, and legal institutions. Numerous authors from most periods of Hellenic antiquity will be read in translation, in addition to several modern theorists on the psychology of love and sexuality. Special attention will be given to the roles of women in Greek society and to the origins of modern sexual morality. The spring topic will be announced in the Freshman Seminar supplement.

120 Life Under the Caesars: The Satirist's View Fall. 3 credits. Freshman Seminar.
M W F 12:20. S. C. Farrand.

The most memorable sketches of everyday and not-so-everyday life in imperial Rome (in fact the source of many of our stereotypes) are found in the varied works we call satire. With the texts commonly included in this genre and excerpts drawn from drama, narrative, and epic as primary evidence, this course will investigate different authors' characterizations of recurrent themes, such as: love as a constructive and destructive force; the ramifications of an expanding empire; and political leaders as a continuing, if precarious, inspiration in describing society's ills.

150 The Myths of Greece and Rome Fall. 3 credits. T R 11:15-12:30. F. M. Ahl.
An introductory course on the myths of Greece and Rome for students interested in acquiring a basic background in Greek and Roman myths and legends as they occur in ancient literature and art. It should serve as a foundation for those interested in pursuing various theories as well as for those seeking to improve their grasp of mythical motifs in later European and American literature. But the primary purpose will be to acquaint the student with the "stories" themselves, and, where appropriate, to compare Greek and Roman myths with those of the Celts and other European peoples.

211 The Greek Experience Fall. 3 credits.
M W F 11:15. F. M. Ahl.
An introduction to the literature and thought of ancient Greece with emphasis on their oral and dramatic presentation and intellectual and visual contexts. There will be analysis of tragedy and comedy, satire, and epic and lyric poetry; also selected prose works, augmented by films, slides, play readings, and individual student interpretations.

212 The Roman Experience Spring. 3 credits.
M W F 11:15. J. R. Ginsburg.
An introduction to the civilization of the Romans as expressed in their literature, art, and social and political institutions. This course will examine not only the intellectual life of the Romans, but what it meant for men and women of all social classes to live in the Roman world. Selected readings in translation of works of literature, history, and philosophy, supplemented by slides and other visual materials.

220 Introduction to Classical Archaeology (also History of Art 220)
See description below under "Classical Archaeology."

[221 Minoan-Mycenaean Art and Archaeology (also History of Art 221)] Not offered 1980-81.]

[222 The Individual and Society in Classical Athens] Not offered 1980-81.]

[224 Greek Philosophy] Not offered 1980-81.]

[225 Hellenistic and Roman Philosophy] Not offered 1980-81.]

226 The Genius of Christianity Fall. 3 credits.
T R 2:30-3:45. J. J. O'Donnell.
An evocation of the spirit of the Christian religion over the course of its history. Lectures and class discussions will examine four major themes: New Testament, monasticism, the Reformation, and modernism in theology. Authors read will include theologians, apologists, poets, and mystics from all periods.

232-233 Archaeology in Action I and II
See description below under "Classical Archaeology."

[236 Greek Mythology (also Comparative Literature 236)] Not offered 1980-81.]

[237 Greek and Roman Mystery Religions] Not offered 1980-81.]

238 The Ancient Epic Spring. 3 credits.
M W F 1:25. A. Edwards.
A close reading of the Homeric epics and Vergil's *Aeneid*. The *Iliad* and the *Odyssey* will be considered as oral poetry and in terms of their place in a traditional society, but with reference to modern interpretations. The *Aeneid* will be read as a major rewriting of Homer for a new audience.

245 Greek and Roman Historians Spring. 3 credits.
M W F 12:20. J. R. Ginsburg.
Study of historical writing in antiquity through selected readings (in translation) from the Greek and Roman historians. Among the topics to be examined are the historian's task as understood by the ancients; the method, narrative technique, and accuracy of the Greek and Roman historians; their attitudes to the events which they relate.

[270 Cicero and His Age (also History 270)] Not offered 1980-81.]

[300 Greek and Roman Drama (also Comparative Literature 300)] Not offered 1980-81.]

[304 Roman Law] Not offered 1980-81.]

309 Dendrochronology of the Aegean
See description below under "Classical Archaeology."

320 Arts and Monuments of Athens (also History of Art 320)

See description below under "Classical Archaeology."

[321 Archaeology of Cyprus (also History of Art 321) Not offered 1980–81.]

[322 Greeks and Their Eastern Neighbors Not offered 1980–81.]

323 Painting in the Greek and Roman World (also History of Art 323)

See description below under "Classical Archaeology."

[325 Greek Vase Painting (also History of Art 325) Not offered 1980–81.]

[326 Art and Archaeology of Archaic Greece (also History of Art 326) Not offered 1980–81.]

[327 Greek and Roman Coins (also History of Art 327) Not offered 1980–81.]

[329 Greek Sculpture (also History of Art 329) Not offered 1980–81.]

[330 Art in Pompeii: Origins and Echoes (also History of Art 330) Not offered 1980–81.]

[331 Greek Foundations of Western Literature (also Comparative Literature 331) Not offered 1980–81.]

[333 Latin Foundations of Western Literature (also Comparative Literature 333) Not offered 1980–81.]

[336 Foundations of Western Thought: Plato and His Influence Not offered 1980–81.]

[337 Ancient Philosophy of Science Not offered 1980–81.]

[339 Ancient Wit: An Introduction to the Theory and Form of Comic and Satiric Writing in Greece and Rome (also Comparative Literature 339) Not offered 1980–81.]

[363 Women in Classical Greece and Rome (also Women's Studies 363) Not offered 1980–81.]

[365 Cicero and His Age (also History 365) Not offered 1980–81.]

[426 Augustine Not offered 1980–81.]

[428 The Church of the Fathers Not offered 1980–81.]

[430 Genre and Period in Greek and Roman Literature (also Comparative Literature 430) Not offered 1980–81.]

[610 Language of Myth (also Anthropology 610) Not offered 1980–81.]

629 Seminar in Classical Archaeology

See description below under "Classical Archaeology."

[630 Seminar in Classical Greek Archaeology Not offered 1980–81.]

711–712 Independent Study for Graduate Students

Greek

101 Greek for Beginners Fall or spring. 4 credits. Fall: M T W F 12:30, P. T. Mitsis. Spring: M T W F 12:20, A. T. Edwards.

Introduction to Attic Greek. Designed to enable the student to read the ancient authors as soon as possible.

103 Attic Greek Fall or spring. 4 credits. Prerequisite: Classics 101 or equivalent.

Fall: M T W F 12:20, J. E. Coleman. Spring: M T W F 12:20, P. T. Mitsis.

[111–112 Modern Greek Not offered 1980–81.]

201 Attic Authors Fall. 3 credits. Prerequisite: Classics 103 or equivalent. M W F 12:20.

Plato's *Apology* and other selected readings.

203 Homer Spring. 3 credits. Prerequisite: Classics 103 or equivalent.

M W F 9:05. Readings in the Homeric epic.

[204 Plato Not offered 1980–81.]

[209–210 Greek Composition Not offered 1980–81.]

[301 Greek Historians Not offered 1980–81.]

[302 Greek Tragedy Not offered 1980–81.]

[305 Attic Comedy Not offered 1980–81.]

306 Greek Melic, Elegiac, and Bucolic Poetry Spring. 4 credits. Prerequisite: Classics 203 or 204 or equivalent.

T R 10:10–11:25. G. M. Kirkwood.

307 Plato Fall. 4 credits. Prerequisite: Classics 203 or 204 or equivalent. M W F 9:05. P. T. Mitsis.

308 New Testament Greek Fall. 4 credits. Prerequisite: two terms of 200-level Greek or permission of instructor.

T R 12:20–1:35, W 2:30–3:30. J. J. O'Donnell. Readings in New Testament texts (1980: *Mark and John*) discussed in seminar format, with one session a week devoted exclusively to problems with language and translation exercises. Meets jointly twice a week with Comparative Literature 429, for which students without reading knowledge of Greek should register.

[310 Greek Undergraduate Seminar Not offered 1980–81.]

401–402 Independent Study Limited to qualified majors.

[417 Advanced Readings in Greek Literature Not offered 1980–81.]

[418 Advanced Readings in Greek Literature: Hesiod Not offered 1980–81.]

419 Advanced Greek Composition Fall. 2 credits. Prerequisite: Classics 209–219 or equivalent. Hours to be arranged. G. M. Messing.

421 Advanced Readings in Greek Orators Spring. 4 credits.

T R 1:25–2:40. G. M. Kirkwood.

[442 Greek Philosophy Not offered 1980–81.]

671 Graduate Seminar in Greek Literature: The Political Structure of Classical Athens Fall. 4 credits.

T 3–5. K. Clinton, L. Abel. The basic work to be discussed will be the Aristotelian *Athenaion Politeia*, which outlines the history of the political constitution and describes the actual structure of the state in the second half of the fourth century. In addition, functions and activities of the Athenian state will be illustrated, as much as possible, through epigraphic and other historical documents.

672 Graduate Seminar in Greek Literature: Pindar and Choral Lyric Spring. 4 credits. R 3–5. G. M. Kirkwood.

681 Patristic Seminar Fall. 4 credits. F 2:30–4:30. J. J. O'Donnell. Augustine, *Confessions*.

701–702 Independent Study for Graduate Students

Latin

105 Latin for Beginners Fall. 4 credits.

M T W F 8, D. T. McGuire; M T W F 10:10, B. Heiden; M T W F 1:25, Y. R. Perez. An introductory course in the essentials of the Latin language, designed for rapid progress toward reading the principal Latin writers.

106 Elementary Latin Spring. 4 credits.

Prerequisite: Classics 105 or placement by departmental examination. M T W F 8, D. J. McGuire; M T W F 10:10, P. Kirkwood; M T W F 1:25, S. C. Farraud. A continuation of Classics 105, using readings from various authors.

107 Intensive Latin Spring. 7 credits.

M T W R F 8, plus an additional session to be arranged. P. Kirkwood. The course work of Classics 105 and 106 is combined in one term.

108 Latin in Review Fall. 3 credits. Prerequisite: placement by departmental examination. M W F 11:15.

205 Intermediate Latin Fall. 3 credits. Prerequisite: Classics 106 or 108 or placement by departmental examination.

Sec 1, M W F 10:10; sec 2, M W F 1:25. J. R. Ginsburg. Section 2: Reading of Sallust's *The Conspiracy of Catiline* with attention to narrative techniques and the historical background.

[207 Catullus Not offered 1980–81.]

[208 Roman Drama Not offered 1980–81.]

216 Vergil Spring. 3 credits. Prerequisite: one term of 200-level Latin.

M W F 1:25. W. R. Johnson. Selections from Vergil's *Aeneid* will be read with emphasis on Vergil's use of the epic tradition, his own poetic milieu, his poetic techniques, and his relation to the politics of his time.

241 Latin Composition Fall. 2 credits. Prerequisite: Classics 106 or 108 or equivalent. R 1:25, and one hour to be arranged. K. Clinton.

242 Latin Composition Spring. 2 credits. Prerequisite: Classics 241 or permission of instructor. T R 2:30–3:45.

[312 Latin Undergraduate Seminar Not offered 1980–81.]

314 The Augustan Age Fall. 4 credits. Prerequisite: two terms of 200-level Latin. M W F 10:10. W. R. Johnson.

[315 Roman Satire Not offered 1980–81.]

[316 Roman Philosophical Writers Not offered 1980–81.]

[317 Roman Historiography Not offered 1980–81.]

[318 Roman Elegy: Tibullus, Propertius, Ovid Not offered 1980–81.]

[319 Readings in Cicero (also History 319) Not offered 1980–81.]

[366 Late Latin Not offered 1980–81.]

368 Medieval Latin Literature Fall. 4 credits.

Prerequisite: one term of 200-level Latin or permission of instructor.

M 2:30-4:30. J. J. O'Donnell.

Introduction to medieval Latin language and literature. Readings in 1980 will concentrate on poetry, liturgy, and scripture.

411 Advanced Readings in Latin Literature Fall.

4 credits. For advanced undergraduates and graduate students. Prerequisite: two terms of 300-level Latin or permission of instructor.

M 11:15. J. R. Ginsburg.

412 Advanced Readings in Latin Literature

Spring. 4 credits. For advanced undergraduates and graduate students. Prerequisite: two terms of 300-level Latin or permission of instructor.

T R 11:15-12:30. F. M. Ahl.

[441 Advanced Latin Composition Not offered 1980-81.]

451-452 Independent Study Fall or spring. Credit to be arranged. Limited to qualified majors.

[460 The Latin Poems of Milton Not offered 1980-81.]

679 Seminar: Horace's Epistles Fall. 4 credits.
R 3-5. W. R. Johnson.

680 Seminar: Tacitus Spring. 4 credits.
T 3-5. J. R. Ginsburg.

751-752 Independent Study for Graduate Students**Classical Archaeology**

The following courses may be used toward satisfaction of the intercollege concentration in archaeology, see Archaeology, p. 53, and above, under "Classical Civilization," for other courses dealing with Classical art and architecture.

[200 Mediterranean Archaeology (also Ancient Mediterranean Studies 200 and Near Eastern Studies 280) Not offered 1980-81.]

[206 Rise of Classical Greece Not offered 1980-81.]

220 Introduction to Classical Archaeology (also History of Art 220) Fall. 3 credits.

M W F 10:10. J. E. Coleman.

Classical Archaeology is the study of the material culture of the ancient Greeks and Romans. This course, while providing a general framework for an understanding of the complexities of this culture, concentrates for the most part on specific subject matter. Subjects are chosen for their value in illustrating specific questions about the past and the process by which scholars seek to answer these questions. They vary somewhat from year to year but may include among others: architecture, painting, sculpture, the development of writing, burial customs, coins. The subjects are examined from both descriptive and interpretive points of view. Descriptive methods are studied along with the actual subject matter. From the interpretive point of view, questions are raised for discussion concerning such matters as development of technology and art, ancient and modern theories of aesthetics, and the interrelationship between material culture and the literature and history of the Greeks and Romans. Students are given access to antiquities and casts of ancient works of art in the Cornell collections, and they are expected to write one paper involving both description and interpretation.

[221 Minoan-Mycenaean Art and Archaeology (also History of Art 221) Not offered 1980-81.]

[222 The Individual and Society in Classical Athens Not offered 1980-81.]

232-233 Archaeology in Action I and II 232, fall; 233, spring. 3 credits each term. Prerequisites: Archaeology 100, Classics 220, or permission of the instructor.

Lec, M 2:30; 2 labs to be arranged. P. I. Kuniholm. Objects from the Classical, Hellenistic, and Roman periods are "dug" out of Cornell basements, identified, cleaned, restored, catalogued, and photographed and are considered in their appropriate historic, artistic, and cultural contexts.

309 Dendrochronology of the Aegean Fall or spring. Variable credit. Limited to 10 students. Prerequisite: permission of the instructor.

Lec, M 12:20; 2 labs to be arranged. P. I. Kuniholm. Participation in a research project of dating modern and ancient tree ring samples from the Aegean and Mediterranean. Supervised reading and laboratory work. A possibility exists for summer fieldwork in Greece or Turkey.

320 Arts and Monuments of Athens (also History of Art 320) Spring. 4 credits.

M W F 2:30. A. Ramage.

[321 Archaeology of Cyprus (also History of Art 321) Not offered 1980-81.]

[322 Greeks and Their Eastern Neighbors Not offered 1980-81.]

323 Painting in the Greek and Roman World (also History of Art 323) Spring. 4 credits.

M W F 9:05. A. Ramage.

[325 Greek Vase Painting (also History of Art 325) Not offered 1980-81.]

[326 Art and Archaeology of Archaic Greece (also History of Art 326) Not offered 1980-81.]

[327 Greek and Roman Coins (also History of Art 327) Not offered 1980-81.]

[329 Greek Sculpture (also History of Art 329) Not offered 1980-81.]

[330 Art in Pompeii: Origins and Echoes (also History of Art 330) Not offered 1980-81.]

350 The Arts of the Roman Empire (also History of Art 322) Fall. 3 credits.

M W F 9:05. A. Ramage.

629 Seminar in Classical Archaeology Fall. 4 credits.

W 3-5. J. E. Coleman.

In 1980 the seminar will focus on the shaft graves at Mycenae and will examine the evidence from the shaft graves for mainland continuity and for influences from Crete, the Cycladic islands, and abroad.

[630 Seminar in Classical Greek Archaeology Not offered 1980-81.]

Related Courses in Other Departments

[The Ancient City: Plato and Machiavelli (History 261) Not offered 1980-81.]

The Emergence of Greek Democracy (History 265)

The Roman Republic (History 267)

[Rome of the Caesars (History 268) Not offered 1980-81.]

[Archaic Greece, 776-500 B.C. (History 450) Not offered 1980-81.]

[Greece from Cleisthenes to Cleon, 514-429 B.C. (History 452) Not offered 1980-81.]

[Thucydides and the Peloponnesian War, 432-404 B.C. (History 453) Not offered 1980-81.]

[Greece in the Age of Lysander and Agesilaus, 410-360 B.C. (History 454) Not offered 1980-81.]

[Philip of Macedon and Alexander the Great (History 455) Not offered 1980-81.]

[Roman Imperialism (History 460) Not offered 1980-81.]

The Roman Revolution (History 461)

[The High Roman Empire (History 462) Not offered 1980-81.]

[Decline and Fall of the Roman Empire (History 463) Not offered 1980-81.]

[Science in Classical Antiquity (History 481-482) Not offered 1980-81.]

[Social and Economic History of Ancient Rome (History 561) Not offered 1980-81.]

[Roman Africa (History 562) Not offered 1980-81.]

[Graduate Seminar in Ancient Classical History (History 661) Not offered 1980-81.]

[Numismatics (History of Art 424) Not offered 1980-81.]

[Ancient Thought (Philosophy 210) Not offered 1980-81.]

Ancient Philosophy (Philosophy 211) Fall.

[Plato (Philosophy 309) Not offered 1980-81.]

Aristotle (Philosophy 310) Spring.

[Topics in Ancient Philosophy (Philosophy 314) Not offered 1980-81.]

Plato and Aristotle (Philosophy 413) Spring.

Ancient Philosophy (Philosophy 611) Fall.

The Jews of the Ancient and Muslim Near East: 450 B.C.E.-1204 C.E. (Near Eastern Studies 244)

The Jews of the Christian West: 476-1948 (Near Eastern Studies 245)

[Ancient Seafaring (Near Eastern Studies 249) Not offered 1980-81.]

[Introduction to Biblical Archaeology (Near Eastern Studies 285) Not offered 1980-81.]

Folklore in the Ancient Near East (Near Eastern Studies 384)

[Interconnections in the Eastern Mediterranean World in Antiquity (Near Eastern Studies 385) Not offered 1980-81.]

[Archaeology of the Ancient Near East (Near Eastern Studies 387 and Archaeology 310) Not offered 1980-81.]

[Archaeology of Ancient Egypt (Near Eastern Studies 388) Not offered 1980-81.]

[Seminar in Syro-Palestinian Archaeology (Near Eastern Studies 481) Not offered 1980-81.]

Great Books (Comparative Literature 201)

Comedy (Comparative Literature 312)

Comparative Literature

100-level courses See Freshman Seminar brochure.

201–202 Great Books 201, fall; 202, spring. 4 credits. Comparative Literature 201 is not a prerequisite to 202.

Fall, M W F 10:10, W. J. Kennedy. Spring, T R 2:30–3:45, T. Bahti.

A reading each semester of seminal texts that represent and have often shaped Western culture, and ought to be part of every college student's education. By analyzing, interpreting, and evaluating them the course will develop essential critical reading abilities. 201: selections from the Bible, Homer, Plato, Virgil, Dante, Shakespeare, and Cervantes. 202: selections from Goethe, Wordsworth, Stendhal, Baudelaire, Proust, Rilke, Brecht, and others.

295 Culture as Semiotic System Fall. 4 credits.

T R 12:20–1:35, J. Culler.

Adopting the semiotic perspective, we will study culture as a series of systems of convention or sign systems. Readings will focus on phenomena such as literature, advertising, schizophrenia, fashion, food, and tourism. No previous knowledge assumed.

310 Introduction to Psychopathological Texts Spring. 4 credits.

T R 12:20–1:35, S. L. Gilman.

A survey of the theories of language and thought disruption in schizophrenia (from the nineteenth century through Bateson and Laing) as well as a close reading of major texts (published and unpublished) written by schizophrenics (including the Schreber case).

312 Comedy Spring. 4 credits.

M W F 12:20, W. J. Kennedy.

Discussion of comic styles (classical, colloquial, improvisational, absurd) and modes of comedy (satire, romance, farce, grotesque) in drama and narrative fiction from Aristophanes to Nabokov, with special attention to Chaucer, Rabelais, Molière, Shaw, and Ionesco.

326 Christianity and Judaism Spring. 4 credits. Not open to freshmen.

M W F 11:15, C. M. Carmichael.

A study of the New Testament as a product of first-century Palestinian and Hellenistic Judaism. Other text (also in translation): *Passover Haggadah*.

328 Literature of the Old Testament Fall. 4 credits. Not open to freshmen.

M W F 11:15, C. M. Carmichael.

Analysis of selected material in translation.

343 Medieval Literature Fall. 4 credits.

M W F 12:20, R. E. Kaske.

Analysis and interpretation of great medieval literary works in translation. Though readings will vary somewhat from year to year a typical program would be *Beowulf*; *Nibelungenlied*; *Njáls saga*; a romance of Chrétien; *Wolfram's Parzival*; *Gottfried's Tristan*; and/or *Sir Gawain and the Green Knight*.

[344 Medieval Literature; Dante in Translation (also Italian 334) 4 credits. G. Mazzotta. Not offered 1980–81.]

352 Classic and Renaissance Drama (also Theatre Arts 325) Fall. 4 credits.

T R 2:30–3:45, T. Murray

Readings in comparative drama from the Greeks to Shakespeare and Corneille, including such dramatists as Aeschylus, Sophocles, Aristophanes, Calderón, Lope de Vega, Shakespeare, Jonson, and Corneille. Attention will be given to the development of early dramatic theory and to the relation between text and performance.

353 European Drama, 1660 to 1900 (also Theatre Arts 326) Spring. 4 credits.

T R 10:10–11:25, S. Williams.

354 Modern Drama (also Theatre Arts 327)

Spring. 4 credits. M W F 1:25, A. Caputi.

356 The Literature of Europe in the Renaissance Fall. 4 credits.

M W F 10:10, C. Levy.

Renaissance readings mainly in the tradition of Christian humanism: the work of such authors as Petrarch, Castiglione, Machiavelli, Erasmus, More, Montaigne, Marlowe, Shakespeare, and Milton, with introductory readings in Augustine's *Confessions*.

357 The Literature of Europe Since 1800 Spring. 4 credits.

M W F 9:05, T. L. Jeffers.

A study of European writers' search for values, with emphasis on forms and themes peculiar to the modern tradition. Attention to developing students' abilities to speak to each other in discussion and in essays. Probable reading list: Stendhal, *The Red and the Black*; James, *The Ambassadors*; Mann, *Dr. Faustus*; Proust, *Swann's Way*; Dostoevsky, *Brothers Karamazov*; Kafka, *The Castle*.

359 Being, God, Mind: Humanistic Revolutions From Plato to Vico (also Romance Studies 459) Fall. 4 credits.

T R 10:10, C. M. Arroyo.

A study of the origins of scientific language: body and soul, matter and form, act and potentiality, being. A study of the ideological background of Western literatures: the conception of human personality and the presentation of character, the conception of reality, and the sense of literary structures. A study of the fusion of Greek thought and the Bible, and its reflection on the development of the ideas of freedom and equality in Western thought.

360 Biology and Theology: Approaches to the Origin of Life, Evolution, Heritage and Freedom, Sexuality and Death (also Romance Studies 460) Spring. 4 credits.

T R 2:30–3:45, C. M. Arroyo.

A historical exploration of the conflicts between biology and the understanding of theological concepts about freedom and universal values. Readings include scientific material, biblical exegesis, and philosophical and theological texts by Bergson, Heidegger, and Rahner.

363–364 The European Novel Fall and spring. 4 credits. Comparative Literature 363 is not a prerequisite to 364.

Fall: T R 2:30–3:45, W. W. Holdheim. Spring: T R 2:30–3:45, K. Gottschalk.

Close reading of approximately eight works each term. 363: From Cervantes to Dostoevsky. 364: From Flaubert to Nabokov. Authors to be read will include Sterne, Voltaire, Balzac, Tolstoy, Mann, and Proust. The works discussed will illustrate novelistic subgenres such as the picaresque novel, the novel of manners, the philosophical tale, the historical novel, the detective story, and the Bildungsroman.

379 The Russian Connection (also Russian 379) Spring. 4 credits.

M W F 10:10, P. Carden.

Russian literature in its European context. We will discuss great works of the Russian prose tradition in their reciprocal relations with European prose. Among the Russian works to be studied will be Pushkin's *Eugene Onegin*, Gogol's short stories, Tolstoy's *War and Peace*, Dostoevsky's *The Idiot*, and Chekhov's short stories. Among European authors whose work helped to shape or was in some degree shaped by Russian literature, we will look at Byron, Musset, Hoffmann, Stendhal, Sand, Maupassant, and Gide. In English translation.

380 Literature and Society Fall. 4 credits.

T R 12:20–1:35, W. Cohen.

Practical application of Marxian models to the relationship between major literary forms and the successive stages of Western civilization of which they are characteristic. Readings include Virgil, early Germanic heroic poetry (including *Beowulf*), Chrétien de Troyes, Shakespeare, Swift, Balzac, T. S. Eliot, Woolf, and Garcia Marquez.

381 History and Theory of Drama Spring. 4 credits.

T R 12:20–1:35, W. Cohen.

A historical survey of European drama, based on the relationship between communalism and individualism in ages of social transition, crisis, and revolution. Emphasis on ancient Athens, the Renaissance, and the modern period. Playwrights include the Greek tragedians, Aristophanes, Shakespeare, Corneille, Racine, Büchner, Ibsen, Lorca, Brecht, and contemporary American authors.

395 Introduction to Twentieth-Century Criticism Fall. 4 credits.

M W F 2:30–3:20, T. Bahti.

Major modern critics and critical movements representing historical, philosophic, ideological, and various formal approaches to literature will be considered both historically and critically. Texts will be drawn from Lukács, the Russian formalists, Benjamin, Heidegger, Auerbach, Frye, structuralism and post-structuralism, and others. Readings available in English.

416 Hume and Rousseau Spring. 4 credits.

Prerequisite: reading knowledge of French.

T R 10:10–11:25, N. Hertz.

Readings in the major works: Hume's *Treatise on Human Nature*, selections from his essays on economics, politics, and literature, his *Dialogues Concerning Natural Religion*; Rousseau's *Confessions*, his novel *La Nouvelle Héloïse*, and selections from his writings on education, government, and the arts.

419–420 Independent Study Fall and spring.

Variable credit. Comparative Literature 419 is not a prerequisite to 420.

Hours to be arranged. Staff.

421 Old Testament Seminar Fall. 4 credits.

Limited to 20 students.

W 2:30–4:30, C. M. Carmichael.

Identification and discussion of problems in the Old Testament.

426 New Testament Seminar Spring. 4 credits.

Limited to 20 students.

W 2:30–4:30, C. M. Carmichael.

Identification and discussion of problems in the New Testament.

429 Readings in the New Testament Fall.

4 credits. No prerequisites.

T R 12:20 and W 2:30, J. P. Bishop, J. O'Donnell. Close readings of representative texts from the New Testament in modern scholarly editions, with the help of appropriate commentary, introductory and specialized. The focus in 1980 will be on Mark and John. All readings will be in English, but repeated reference to the Greek original will be made. Graduate students and undergraduates from other colleges who are interested in the material should not feel inhibited from enrolling. The approach will be primarily exegetical: that is, we will try to find out what the texts say and what they mean by what they say. Thus we can hope to stay open to scholarly and religious issues alike. In 1980 Comparative Literature 429 will overlap with Classics 308. This means that the regular twice-a-week meetings of 429 will be taught together by Jonathan Bishop of the English department and James O'Donnell of the Classics department. Those students who enroll in 429 may complete all the work of that course in this way.

Students who enroll in Classics 308 will take a third hour a week on Wednesday at 2:30 in which the same readings will be repeated in Greek, with special attention to textual and philological problems. Students who have enrolled in 429 and find as the term proceeds that they would like to sit in on the Greek sessions will be welcome to do so.

446 Allegory and Symbolism Spring. 4 credits.

T R 12:20–1:35. C. Kaske.
Plato's *Republic* (brief selections); Dante, *Divine Comedy: Inferno*, selections from *Purgatorio* and *Paradiso*; the *Romance of the Rose* (substantial selections); mystical lyrics of St. John of the Cross; *Faust, Part II*; Kafka. Some consideration of terminology, and of author's stated intentions.

452 Renaissance Public Theater Fall. 4 credits.

F 1:25–3:25. W. Cohen.
Relations among history, ideology, theater, and dramatic form, approached primarily from a Marxian perspective. Focus on England and Spain, but attention to France, Italy, Germany, Holland, etc. according to student interest. Readings, available in English, include Marlowe, Shakespeare, Jonson, Lope, Tirso, Calderón, Hardy, Molière, Ruzante, Aretino, *commedia dell'arte*, Vondel, and Sachs.

474 Hegel's Phenomenology In Context Spring. 4 credits.

W 2:30–4:30. T. Bahti.
Primarily a close reading of Hegel's *Phenomenology of Mind* with the aid of the commentaries by Hyppolite and Kojève, the seminar will also consider the work in its traditional and contemporary contexts: conversion narrative (Augustine's *Confessions*) and romantic and idealist argument (Kant, Fichte, Schiller, Hölderlin, Schlegel, and others). As a secondary matter, various interpretations of Hegel will be introduced.

479 Fiction and the Irrational Spring. 4 credits.

Intended mainly for upperclass and first-year graduate students.
W 1:25–3:15. E. Rosenberg.
A study of some seven or eight novels and novellas to be chosen from among Dostoevsky's *The Devils*, Tolstoy's *Kreutzer Sonata*, Flaubert's *Madame Bovary*, Walpole's *Castle of Otranto*, De Quincey's *Confessions of An English Opium Eater*, Mann's *Dr. Faustus*, and selected shorter works by E. T. A. Hoffmann, Gogol, Kafka, and Mann.

490 Verga, D'Annunzio, and Pirandello (also Italian 490) Fall. 4 credits.

W 3:30–5:30. A. Grossvogel.
Three Italian writers at the crossroads of naturalism, symbolism, and the avant-garde. The course will focus on their narratives and dramas and will illustrate their poetics. Reading knowledge of Italian desirable; lectures in English. An hour of discussion in Italian will be arranged for students who know the language.

496 The Aesthetics of Coincidence (also Romance Studies 496) Spring. 4 credits.

R 2–4. R. Klein.
Superstitious coincidence—the conjunction of events that have no causal relation but that seem unmistakably to signify one another—has been taken, at least since Baudelaire, as an exemplary poetic experience. It finds its theoretical grounds in the Romantic doctrine of correspondances between man and nature and in Jungian psychology and Surrealist aesthetics. Readings in this course will include works of Jung, Freud, Breton, Poe, and other more contemporary writers.

606 Critical Perspectives: Roland Barthes Fall. 4 credits.

T 2:30–4:30. J. Culler.
This seminar will use the writings of Roland Barthes as a way of discussing various ways of writing criticism and the relations among them. Structuralism, semiotics, psychoanalysis, culture criticism, and autobiography are the major projects that will be considered, but they will be discussed more as resources for critical writing than as theories.

619 Independent Study Fall. 4 credits.

Hours to be arranged. Staff.

635 Jean Paul and the Eighteenth-Century Humorous Novel (also German Literature 635)

Spring. 4 credits.
R 2:30. P. W. Nutting.
Jean Paul's theory of humor will be used as a starting point in the discussion of the English humorous novels as well as his own in order to determine what social and structural function humor played in eighteenth-century fiction. Other theories of the comic (Hegel, Vischer, Freud, Bergson) will also be discussed in order to determine their relevancy in light of contemporary developments in narrative theory.

699 Hermeneutics Fall. 4 credits. Prerequisite for undergraduates: permission of instructor.

W 1:25–3:25. W. W. Holdheim.
An intensive study of H. G. Gadamer's work *Truth and Method* (in translation) will lead to an examination of such problems as: the structure of humanistic and historical knowledge and its relation to theoretical knowledge, "objectivity" and "subjectivity" in interpretation; the role of language in human existence; the nature of the aesthetic phenomenon. Various modern intellectual trends will be located and evaluated in terms of an overall theory of understanding. The course is open to qualified undergraduates after consultation with the instructor.

Related Courses in Other Departments

Many of these courses are conducted in English, and readings are in translation.

Chinese Philosophical Literature (Asian Studies 371)

Twentieth-Century Chinese Literature (Asian Studies 373)

Japanese Poetry and Drama (Asian Studies 375)

Modern Japanese Fiction (Asian Studies 376)

Southeast Asian Literature in Translation (Asian Studies 379)

Computer Science

For complete course descriptions, see the computer science listings in the "College of Engineering" section.

100 Introduction to Computer Programming Fall or spring. 3 credits. S-U grades optional. Students who contemplate taking both Computer Science 101 and 100 must take 101 first.

2 lec, 1 rec (optional); 3 evening tests, final.

101 The Computer Age Spring. 3 credits. S-U grades optional. Credit will not be granted for both Computer Science 100 and 101 unless 101 is taken first.

2 lec, 1 rec.

102 Introduction to FORTRAN Programming Fall or spring, weeks 1–5 only. 1 credit. S-U grades optional. Credit will not be granted for both Computer Science 100 and 102 unless 102 is taken first.

103 Introduction to PASCAL Fall or spring, weeks 6–9 only. 1 credit. S-U grades optional. Prerequisite: Computer Science 100 or equivalent programming experience.

104 Introduction to APL Programming Fall or spring, weeks 2–5 only. 1 credit. Prerequisite: Computer Science 100 or equivalent programming experience. S-U grades optional.

107 Introduction to Interactive Computing with CMS Fall or spring, weeks 2–5 only. 1 credit.

Prerequisite: Computer Science 100 or equivalent programming experience. S-U grades only.

108 Introduction to Statistical Packages Fall or spring, weeks 10–13 only. 1 credit. S-U grades only.

109 Multistep Job Processing and JCL Fall or spring, weeks 6–9 only. 1 credit. Prerequisite: Computer Science 100 or equivalent programming experience. S-U grades only.

211 Computers and Programming Fall or spring. 3 credits. Prerequisite: Computer Science 100 or equivalent programming experience. 2 lec, 1 lab.

280 Discrete Structures Fall. 4 credits. 3 lec. Prerequisite: Computer Science 211 or permission of instructor.

305 Social Issues in Computing Fall. 3 credits. Prerequisites: Computer Science 100 or 101 or permission of instructor. 2 lec-sems.

314 Introduction to Computer Systems and Organization Fall or spring. 4 credits. Prerequisite: Computer Science 211 or equivalent. 2 lec, 1 lab.

321 Numerical Methods Fall or spring. 4 credits. Prerequisites: Mathematics 221 or 293, and knowledge of FORTRAN equivalent to what is taught in Computer Science 100. 3 lec.

410 Data Structures Fall. 4 credits. Prerequisite or corequisite: Computer Science 314. 3 lec.

414 Systems Programming and Operating Systems Spring. 4 credits. Prerequisite: Computer Science 314 or permission of instructor. 3 lec.

417–418 Interactive Computer Graphics (also Architecture 334) 417, fall; 418, spring. 4 credits each term. Prerequisite: Computer Science 314. 2 lec, 1 lab.

432 Introduction to Simulation and Database Systems (also Engineering OR&IE 383) Spring. 4 credits. Prerequisite: Computer Science 211. 2 lec, 1 rec.

434 Introduction to Database Systems Spring, weeks 7–14 only. 2 credits. Prerequisite: Computer Science 211 or equivalent. 2 lec, 1 rec.

481–482 Introduction to Theory of Computing I and II 481, fall; 482, spring. 4 credits each term. Prerequisites: Computer Science 211 and 280, or equivalent course work in mathematics, or permission of instructor. 3 lec.

490 Independent Reading and Research Fall or spring. 1–4 credits.

600 Computer Science and Programming Fall. 1 credit. Prerequisite: graduate standing in computer science or permission of instructor.

611 Advanced Programming Languages Fall. 4 credits. Prerequisite: Computer Science 410 or equivalent. 3 lec.

612 Translator Writing Spring. 4 credits. Prerequisites: Computer Science 410 and 481 or permission of instructor. 3 lec.

613 Concurrent Programming and Operating Systems Principles Fall. 4 credits. Prerequisites: Computer Science 410 and 414 or permission of instructor. 3 lecs.

615 Machine Organization Spring. 4 credits. Prerequisite: Computer Science 314 or permission of instructor. 3 lecs. Not offered 1980-81.]

618 Picture Processing Spring. 4 credits. Prerequisite: Computer Science 611 or permission of instructor. 3 lecs. Not offered 1980-81.]

621-622 Numerical Analysis 621, fall; 622, spring. 4 credits each term. Prerequisites: a course in mathematics beyond freshman and sophomore calculus, such as Mathematics 411, 421, or 431; and a working knowledge of FORTRAN. 3 lecs.

623 Short Course on Linear and Nonlinear Least Squares Fall, weeks 1-6. 2 credits. Prerequisite: Computer Science 321 or equivalent or permission of instructor.

624 Short Course on Spline Approximation Fall, weeks 7-12. 2 credits. Prerequisite: Computer Science 321 or equivalent or permission of instructor.

632 Analysis of Database Systems Fall. 4 credits. Prerequisites: Computer Science 410 and either 432 or permission of instructor. 2 lecs.

635 Information Organization and Retrieval Spring. 4 credits. Prerequisite: Computer Science 410 or equivalent. 2 lecs.

681 Theory of Algorithms and Computing I Fall. 4 credits. Prerequisite: Computer Science 482 or permission of instructor. 3 lecs.

682 Theory of Algorithms and Computing II Spring. 4 credits. Prerequisite: Computer Science 481 or permission of instructor. 3 lecs.

709 Computer Science Graduate Seminar Fall or spring. 1 credit each semester. Intended for graduate students interested in computer science. 1 sem.

711 Theory of Programming Languages Spring. 4 credits. Prerequisites: Computer Science 611 and 481. Offered alternate years. 2 lecs.

[712 Theoretical Aspects of Compiler Construction Spring. 4 credits. Prerequisites: Computer Science 612 and 481. Offered alternate years. 2 lecs. Not offered 1980-81.]

713 Seminar in Operating Systems Fall or spring. 4 credits. Prerequisite: Computer Science 613 or permission of instructor. 1 sem.

719 Seminar in Programming Fall or spring. 4 credits. Prerequisite: Computer Science 611 or permission of instructor. 1 sem.

721 Advanced Numerical Analysis Fall. 4 credits. Prerequisite: Computer Science 621 or 622 or permission of instructor. Alternates with Computer Science 722.

722 Advanced Numerical Analysis Spring. 4 credits. Alternates with Computer Science 721. See Computer Science 721 description.

[723 Numerical Solution of Ordinary Differential Equations and Integral Equations Fall. 4 credits. Prerequisite: Computer Science 622 or permission of instructor. Not offered 1980-81.]

[725 Numerical Solution of Partial Differential Equations Spring. 4 credits. Prerequisite: Computer Science 622 or permission of instructor. Hours to be arranged. Not offered 1980-81.]

727 Matrix Computations Fall. 4 credits. Prerequisite: Computer Science 621 or permission of instructor.

729 Seminar in Numerical Analysis Fall or spring. 4 credits. Prerequisite: permission of instructor.

[733 Selected Topics in Information Processing (also Engineering OR&IE 789) Not offered 1980-81.]

734 Seminar in File Processing Fall. Credit and hours to be arranged. Prerequisite: Computer Science 733.

739 Seminar in Information Organization and Retrieval Fall or spring. 4 credits. Prerequisite: Computer Science 635.

[741 Advanced Theory of Computing Fall. 4 credits. Prerequisites: Computer Science 681 and 682, or permission of instructor. Offered alternate years (alternates with Computer Science 782). Not offered 1980-81.]

782 Advanced Theory of Computing Spring. 4 credits. Offered alternate years (alternates with Computer Science 781).

789 Seminar in Automata Theory Fall or Spring. 4 credits. Prerequisite: permission of instructor. 1 sem.

790 Special Investigations in Computer Science Fall or spring. Prerequisite: permission of a computer science adviser.

890 Special Investigations in Computer Science Fall or spring. Prerequisite: permission of a computer science adviser.

990 Special Investigations in Computer Science Fall or spring. Prerequisite: permission of a computer science adviser.

Dutch

See Modern Languages, Literatures, and Linguistics, p. 92.

Economics

101 Introductory Economics Fall or spring. 3 credits.

Lecs. and disc. Staff. Analysis of aggregate economic activity in relation to the level, stability, and growth of national income. Topics discussed may include the determination and effects of unemployment, inflation, balance of payments deficits, and economic development, and how these may be influenced by monetary, fiscal, and other policies.

102 Introductory Economics Fall or spring. 3 credits.

Lecs. and disc. Staff. Explanation and evaluation of how the price system operates in determining what goods are produced, how goods are produced, and who receives income, and how the price system is modified and influenced by private organizations and government policy.

General Courses

301 Economics of Market Failure Spring. 4 credits. Prerequisite: Economics 102. R. Welsh.

The course will review briefly the welfare properties of the perfectly competitive market model and will then consider a range of situations in which these properties are modified and where there may be a case for some form of government intervention. The cases to be considered will include (a) the presence of externalities, pollution, and the economics of the environment; (b) the provision of public goods, the free-rider problem; (c) uncertainty and imperfect information, an analysis in the context of labour and insurance markets, and the market for medical care; (d) the regulation of natural monopoly and public utility pricing; (e) the failure of the market to achieve desired redistributive objectives, direct and indirect taxation as instruments of redistribution.

302 The Impact and Control of Technological Change (also Government 302 and City and Regional Planning 440) Spring. 4 credits.

S. Del Sesto. Examines social, environmental, and economic implications of technological change in the United States in the context of possible policies and strategies of control. Several specific cases will be considered in detail, followed by a broader investigation of the problems of a modern technological society. Alternative political-economic solutions will be explored.

[304 Economics and the Law Spring. 4 credits. Prerequisite: Economics 311 or permission of instructor. Not offered 1980-81.]

306 Economics of Defense Spending Spring. 4 credits. Prerequisite: Economics 102. J. Reppy, with guest lectures by visitors to the Cornell Peace Studies Program.

The economic aspects of defense spending are analyzed. Emphasis is on the procurement of weapons systems. Topics covered include an overview of the defense budget, special characteristics of the defense market, the structure of the defense industry, and the economic behavior of defense firms.

308 Economic Analysis of Government (also Engineering CEE B302) Spring. 4 credits. Prerequisites: one year of college-level mathematics plus Engineering CEE B301 or Economics 311. Staff.

Government intervention in a market economy is analyzed. Public goods, public finance, cost-benefit analysis, environment regulation, and macroeconomic topics are covered.

[309 Capitalism and Socialism (also I&LR 347) Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1980-81.]

311 Intermediate Microeconomic Theory Fall or spring. 4 credits. Prerequisites: Economics 101-102 or permission of instructor. Economics 311.5 has a more mathematical approach and is designed to accommodate students in engineering. Staff.

The pricing processes in a private enterprise economy are analyzed under varying competitive conditions and their role in the allocation of resources and the functional distribution of national income is considered.

312 Intermediate Macroeconomic Theory Fall or spring. 4 credits. Prerequisites: Economics 101-102 or permission of instructor. Staff.

The theory of national income determination and economic growth in alternative models of the national

economy is introduced. The interaction and relation of aspects of these models of empirical aggregate economic analysis is examined.

[315 History of Economic Thought Fall. 4 credits. Prerequisites: Economics 101–102 or permission of instructor. Not offered 1980–81.]

317 Intermediate Mathematical Economics I Fall. 4 credits.

M. Nermuth.
Introduction of calculus and matrix algebra; problems of maximization of a function of several variables. Economic examples are used to illustrate and teach the mathematical concepts.

318 Intermediate Mathematical Economics II Spring. 4 credits.

M. Nermuth.
Advanced techniques of optimization and application to economic theory.

319 Quantitative Methods Fall. 4 credits.
R. Joyeux.

320 Quantitative Methods Spring. 4 credits. Prerequisites: thorough understanding of microeconomic and macroeconomic theory and some elementary calculus.

R. Joyeux.
The use of quantitative analysis in economics is introduced. Topics include index numbers, input-output analysis, elementary decision theory, and an introduction to hypothesis testing and the formulation and estimation of econometric models.

Economic History

[321 Economic History of Ancient Medieval Europe 4 credits. Prerequisite: permission of instructor. Not offered 1980–81.]

[322 Economic History of Modern Europe: 1750 to the Present Fall. 4 credits. Open to upperclass students with some background in economics or history, or with permission of instructor. M. R. Haines. Not offered 1980–81.]

323 American Economic History Fall. 4 credits. Prerequisites: Economics 101–102, or permission of instructor.

P. D. McClelland.
Problems in American economic history from the first settlements to early industrialization are surveyed.

324 American Economic History Fall. 4 credits. Prerequisites: Economics 101–102, or permission of instructor.

P. D. McClelland.

325 Economic History of Latin America Fall. 4 credits. Open to upperclass students with some background in economics or history, or with permission of instructor.

T. Davis.

326 History of American Business Enterprise Spring. 4 credits. Prerequisites: Economics 101–102 or equivalents.

P. D. McClelland.
History of the changing structure of American business, from 1800 to the present, with major emphasis upon developments after the Civil War. The focus of the course will be the changing structure of challenges (for example, the rise of unions, development of a national capital market, changing role of government) and the various responses of business organizations and entrepreneurs to those challenges.

330 The Soviet Union: Politics, Economics, and Culture (also Government 330 and Russian 330) Fall. 4 credits. Economics majors cannot use this course to fulfill major requirements.

G. Staller, M. Rush, and G. Gibian.
Interdisciplinary survey of the USSR since the Revolution, with emphasis on contemporary developments.

Money, Banking, and Public Finance

331 Money and Credit Spring. 4 credits. Prerequisites: Economics 101–102.

U. M. Possen.
A systematic treatment of the determinants of the money supply and the volume of credit. Economic analysis of credit markets and financial institutions in the United States.

333 Theory and Practice of Asset Markets Fall. 4 credits. Prerequisites: Economics 311–312.

T. Davis.
The theory and decision making in the presence of uncertainty and the practical aspects of particular asset markets are examined.

335 Public Finance: Resource Allocation Fall. 4 credits. Prerequisites: Economics 101–102.

E. Grinols.
The role of government in allocating resources through taxes and expenditures is analyzed; emphasis is on the federal government. Criteria for evaluation are developed and applied to specific policies.

[336 Collective Choice: Theory and Applications Fall. 4 credits. Prerequisite: Economics 311, or permission of instructor. Not offered 1980–81.]

[338 Macroeconomic Policy Fall. 4 credits. Prerequisite: Economics 312. Not offered 1980–81.

U. M. Possen.
The use of fiscal and monetary policies for achieving full employment, price-level stability, and appropriate economic growth are studied.]

Labor Economics

[341 Labor Economics Fall. 4 credits. Prerequisites: Economics 101–102. W. Galenson. Not offered 1980–81.]

[342 Problems in Labor Economics (also I&LR 343) Fall. 4 credits. Prerequisites: Economics 311 or I&LR 240. Not offered 1980–81.

R. Ehrenberg.
The theory and empirical analysis of labor markets and their applications to policy issues are considered in depth. Specific topics vary each semester. The course is designed to increase each student's competence in applying microeconomic theory and econometrics to policy issues through an econometric research project.]

Organization, Performance, and Control of Industry

351 Industrial Organization Fall. 4 credits. Prerequisites: Economics 101–102. Recommended: Economics 312.

W. Greene.
An examination of the basic factors that lead to less competitive markets in the United States economy, and of the factors that may countervail these factors. Both theoretical and empirical generalizations are emphasized, rather than studies of specific industries. The first third of the course is abstract theoretical modeling of competition, oligopoly, and monopoly markets, followed by an examination of the relationship between market structure (e.g., number of firms and markets shares) and its conduct and performance.

352 Public Regulation of Business Spring. 4 credits. Prerequisite: Economics 351 or permission of the instructor.

R. Masson.

Questions of public policy concerning patents and antitrust are surveyed. Incentives of firms under current law are considered. These questions, along with theories of social costs, are used to examine how patent laws, antitrust laws, or endorsement policies could best be designed. Some past cases that have shaped the current interpretation of the laws are considered.

[354 Economics of Regulation Spring. 4 credits. Not offered 1980–81.]

355 Economics of the American System of Private Enterprise Fall. 4 credits. Prerequisites: Economics 101–102 and Economics 311–312, or equivalents.

A critical examination of the private sector of the United States economy: its history, some leading current issues involving it, and its relation to theoretical and philosophical interpretations of the market economy.

356 Economics of the American System of Private Enterprise Spring. 4 credits. Prerequisites: Economics 101–102 and Economics 311–312, or equivalents.

R. Frank.
For course description, see Economics 355 above.

International and Comparative Economics

361 International Trade Theory and Policy Fall. 4 credits. Prerequisites: Economics 101–102 or permission of instructor.

L. Ebrill.
The principles that have guided the formulation of international trade and commercial policies are surveyed. The evolution of the theory of international trade, principles and practices of commercial policy, problems of regional integration and customs unions, and institutions and practices of state trading are considered.

362 International Monetary Theory and Policy Spring. 4 credits. Prerequisites: Economics 101–102 or permission of instructor.

R. Owen.
The principles that guided the formulation of international financial policies are surveyed. The evolution of the theory of balance of payments adjustment, international monetary standards, international capital movements, economic aid, international monetary institutions, and proposals for international monetary reforms are considered.

[364 The United States In the World Economy Spring. 4 credits. Prerequisites: Economics 101–102 or permission of instructor. Not offered 1980–81.]

[365 Economic Policy and Development in Southeast Asia Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1980–81.]

[366 Introduction to the Japanese Economy Spring. 4 credits. Not offered 1980–81.]

367 Comparative Economic Systems: Soviet Union and Europe Fall. 4 credits. Prerequisite: Economics 311–312 or permission of instructor.

G. J. Staller.
Discussion of approaches to comparison of economic systems. Consideration of abstract models (market economy, central planning, decentralized socialist market) as well as national economies (France and Sweden, Yugoslavia and Soviet Union). Possibility of convergence of economic systems is explored.

368 Comparative Economics: United States, Europe, and the Soviet Union Spring. 4 credits. Prerequisites: Economics 101–102. Intended for students who are not majoring in economics.

G. Staller.

European and Soviet economies after the Second World War are surveyed. The European countries studied include France, Sweden, and Italy in the West, and Yugoslavia plus another country in the East. A descriptive and institutional approach is used and designed for nonmajors.

371 Public Policy and Economic Development Fall. 4 credits.
F. Golay.

Study of the problem of sustaining accelerated economic growth in less-developed countries. Trade-offs between growth, welfare and equity, the legacy of colonialism, relevance of history and economic theory, problems of capital formation, economic planning and international specialization, and the interaction of industrialization, agricultural development, and population change are emphasized.

[372 Applied Economic Development Spring 4 credits. F. Golay. Not offered 1980-81.]

373 International Specialization and Economic Development Spring. 4 credits. Prerequisites: Economics 101-102 or permission of the instructor. F. Golay.

The assessment of the gains and risks and the appropriate role for specialization and trade in economic development, management of the external disequilibrium attending serious efforts to accelerate economic development, and the processes, institution, and opportunities for innovation in transferring income from the relatively developed countries to those less developed.

[374 National and International Food Economics (also Nutritional Sciences 457) Spring. 3 credits. Prerequisites: a college course in economics and junior standing or permission of instructor. Not offered 1980-81.

E. Thorbecke.
Examination of individual components essential for an understanding of the United States and world food economies. Analysis of the world food economy. Review and analysis of: (a) the major economic factors determining the demand for food, the composition of food consumption and nutritional intake; and (b) the major economic factors affecting food production and supply. Examination and evaluation of the effectiveness of various food policies and programs in altering food consumption patterns. Principles of nutritional planning in developing countries within the context of the process of economic and social development.]

378 Economics, Population, and Development Fall. 4 credits.
R. Avery.

The economic aspects of population and the interaction between population change and economic change are introduced. Particular attention is paid to economic views of fertility, mortality, and migration, and to the impact of population growth on economic growth, development, modernization, resources, and the environment.

[381 Economics of Workers' Management in Yugoslavia Spring. 4 credits. Prerequisites: Economics 311-312 or permission of instructor. Not offered 1980-81.

J. Svejnar.
The doctrine and practice of self-management and workers' cooperation is surveyed, and the organizational structure and institutional form of the participatory economy is studied. Special attention is given to the outcome of the decision-making process at the level of the enterprise, the consistency of these outcomes with national plans, and the policies used to implement them. Examples are drawn from the Yugoslav experience and, depending on student interest, the discussion may cover other foreign experiences such as those of Algeria, the Basque region, Chile, Israel, Peru. Emphasis is on new developments and new possibilities of implementing

democratic, worker-owned and worker-managed enterprises in the United States. Appropriate institutions and legal forms of self-management in the United States are examined using theoretical analyses developed in the course.]

382 The Practice and Implementation of Self-Management Fall. 4 credits. Prerequisite: Economics 311-312 or permission of the instructor. J. Vaneck.

The various forms of labor participation in the world today are described, and how producer cooperatives and labor-managed firms and systems can be created is explained. Extensive use is made of the theory of labor-managed systems. The history of various doctrines and self-managed experiences is considered.

Related Course in Another Department

Comparative Economic Systems: Soviet Russia (I&LR 34)

Honors Program

391 Honors Seminar Fall. 4 credits. Required of all seniors honors candidates. S. Marston.
Selected readings in the economics of public issues.

392 Honors Seminar Spring. 4 credits. Required of all senior honors candidates. S. Marston.
A continuation of Economics 391.

399 Readings in Economics Fall or spring. Variable credit.
Department Faculty.

Graduate Courses and Seminars

503 Nonparametric Methods for Peace Scientists and Regional Scientists Fall. 4 credits.
W. Isard.

Topics to be covered include: advantages and disadvantages of parametric and nonparametric methods; problems involved in measurement; nonparametric methods based on one sample and many samples; nonparametric methods requiring only nominal measurement, and those requiring only ordinal measurement; nonparametric measures of association; procedures for non-normal distributions.

[504 Economics and the Law Fall 4 credits. Not offered 1980-81.
Staff.
See Economics 304 for course description.]

505 Interdependent Decision Making Fall. 4 credits.
W. Isard.

The basic elements in interdependent decision-making situations are examined. Situations where decision makers have different sets of objectives which they wish to achieve and employ different criteria for evaluating performance are focused on. The use of maximizing incremental procedures, game theory, and diverse methods for establishing priorities and cooperative action as well as recursive, interactive approaches to resolve conflict are considered. Coalition theory and related topics are covered.

509 Microeconomic Theory I Fall. 4 credits.
D. Easley.
Topics in consumer and producer theory.

510 Microeconomic Theory II Spring. 4 credits.
M. Majumdar.
Topics in consumer and producer theory, equilibrium models and their application, externalities and public goods, intertemporal choice, simple dynamic models and resource depletion, choice under uncertainty.

513 Macroeconomic Theory: Static Income Determination Fall. 4 credits.
M. Gertler.

514 Macroeconomic Theory: Dynamic Models, Growth, and Inflation Spring. 4 credits.
U. Possen.

517 Intermediate Mathematical Economics I Fall. 4 credits.
D. Easley.

518 Intermediate Mathematical Economics II Spring. 4 credits.
M. Nermuth.
See Economics 318 for course description.

519 Quantitative Methods Spring. 4 credits.
R. Joyeux.

520 Quantitative Methods Fall. 4 credits.
Prerequisites: good control of microeconomic and macroeconomic theory and some knowledge of calculus, linear algebra, and probability; or permission of instructor.
W. Greene.

The application of quantitative analysis to testing of economic theories provides a framework for study and evaluation of cross-section and time-series data, methodology and theory of economic measurement, statistical techniques, empirical studies, and economic forecasting.

[521 Economic History of Ancient Medieval Europe Fall. 4 credits. Not offered 1980-81.]

[522 Economic History of Modern Europe: 1750 to the Present Fall. 4 credits. M. R. Haines. Not offered 1980-81.]

523 American Economic History Fall. 4 credits.
P. D. McClelland.
See Economics 323 for course description.

524 American Economic History Spring. 4 credits.
P. D. McClelland.
See Economics 324 for course description.

525 Economic History of Latin America Fall. 4 credits.
T. E. Davis.
See Economics 325 for course description.

[536 Collective Choice: Theory and Applications Spring. 4 credits. Not offered 1980-81.]

551 Industrial Organization Fall. 4 credits.
W. Greene.
See Economics 351 for course description.

552 Public Regulation of Business Spring. 4 credits.
R. Masson.
See Economics 352 for course description.

555 Economics of the American System of Private Enterprise Fall. 4 credits. Prerequisites: Economics 101-102 and Economics 311-312 or equivalents.
R. Frank.
See Economics 355 for course description.

556 Economics of the American System of Private Enterprise Spring. 4 credits. Prerequisites: Economics 101-102 and Economics 311-312 or equivalents.
R. Frank.
See Economics 356 for course description.

561 International Trade Theory and Policy Fall. 4 credits. Prerequisites: Economics 101-102 or permission of instructor.
L. Ebrill.
See Economics 361 for course description.

562 International Monetary Theory and Policy

Spring. 4 credits. Prerequisites: Economics 101-102 or permission of instructor.

R. Owen.
See Economics 362 for course description.

565 Economic Problems of Latin America

Spring. 4 credits.

T. E. Davis.

[566 Introduction to the Japanese Economy

Spring. 4 credits. Not offered 1980-81.]

567 Comparative Economic Systems: Soviet Union and Europe

Fall. 4 credits.

G. J. Staller.
See Economics 367 for course description.

568 Comparative Economics: United States, Europe, and Soviet Union

Spring. 4 credits.

Prerequisites: Economics 101-102.

G. Staller.
See Economics 368 for course description.

571 Public Policy and Economic Development

Fall. 4 credits.

F. Golay.
See Economics 371 for course description.

[572 Applied Economic Development

Spring. 4 credits. F. Golay. Not offered 1980-81.]

573 International Specialization and Economic Development

Spring. 4 credits. Prerequisites:

Economics 101-102 or permission of the instructor.
F. Golay.
See Economics 373 for course description.

578 Economics, Population, and Development

Fall. 4 credits.

R. Avery.
See Economics 378 for course description.

[581 Economics of Workers' Management in Yugoslavia

Fall. 4 credits. Prerequisites: Economics 311-312, or permission of instructor. Not offered 1980-81.

J. Svejnar.
See Economics 381 for course description.]

582 The Practice and Implementation of Self-Management

Fall. 4 credits.

J. Vanek.
See Economics 382 for description.

599 Readings in Economics

Fall or spring.

Variable credit.
Department faculty.

603 Seminar in Peace Science

Fall. 4 credits.

W. Isard.
Among topics to be covered at an advanced level are: game theory, coalition theory, bargaining and negotiation processes, cooperative procedures, microbehavior models, macrosocial processes, and general systems analysis.

605 Advanced Social Theory for Peace Scientists

Spring. 4 credits. Prerequisites:

Economics 505, and knowledge of microeconomic theory.
W. Isard.
Study of diverse social science hypotheses and theories as they relate to, and can be synthesized within, multiregional, multinational, and generally multigroup conflict and cooperative frameworks. Particular attention will be given to developments stemming from microeconomics and general systems theory. Dynamical analyses will be emphasized.

[611 Advanced Microeconomic Theory

Spring. 4 credits. H. Wan. Not offered 1980-81.]

[612 Advanced Macroeconomic Theory

Fall. 4 credits. S. Marston. Not offered 1980-81.]

617 Mathematical Economics

Fall. 4 credits.

M. Nermuth.
618 Mathematical Economics Spring. 4 credits.
D. Easley.

619 Econometrics

Fall. 4 credits. Prerequisites:

calculus and linear algebra. Recommended: Economics 520 or equivalent.
R. Joyeux
Detailed examination of regression models at the level of H. Theil, *Principles of Econometrics*. Emphasis is on theoretical aspects rather than practical applications. Topics include distribution theory and the use of sufficient statistics, the classical regression model, generalized least squares, modified generalized least squares, and the multivariate regression model.

620 Econometrics

Spring. 4 credits. Prerequisites:

calculus and linear algebra plus Economics 619 or permission of instructor. Recommended: Economics 520 or equivalent.

N. Kiefer.
Advanced topics in econometrics, such as asymptotic distribution theory, errors in variable and latent variable models (e.g. factor analysis), simultaneous equation models with particular attention to problems of identification, time series analysis, qualitative response models, and aggregation.

[623 American Economic History

Fall. 4 credits.

Not offered 1980-81.]

[624 American Economic History

Spring. 4 credits. Not offered 1980-81.]

[626 Methods in Economic History

Spring. 4 credits. Not offered 1980-81.]

631 Monetary Theory and Policy

Fall. 4 credits.

H. Wan and M. Gertler.

632 Monetary Theory and Policy

Spring. 4 credits.

H. Wan and M. Gertler.

635 Public Finance: Resource Allocation and Fiscal Policy

Fall. 4 credits.

L. Ebrill.

636 Public Finance: Resource Allocation and Fiscal Policy

Spring. 4 credits.

L. Ebrill.

[638 Public Finance: Local Government and Urban Structure

Fall. 4 credits. R. E. Schuler. Not offered 1980-81.]

641 Seminar in Labor Economics

Fall. 4 credits.

R. Ehrenberg.

642 Seminar in Labor Economics

Spring. 4 credits.

R. Butler.

[644 The Labor Market and Public Policy: A Comparative View

Spring. 4 credits. Not offered 1980-81.]

647 Economics of Evaluation (also I&LR 647)

Spring. 4 credits.

R. Ehrenberg.

See I&LR 647 for course description.

[648 Issues in Latin America

Spring. 4 credits.

Not offered 1980-81.]

651 Industrial Organization and Regulation

Fall. 4 credits.

G. Hay

652 Industrial Organization and Regulation

Spring. 4 credits.

R. Masson.

661 International Economics: Pure Theory and Policy

Fall. 4 credits.

E. Grinols.

[662 The International Economic Order

Fall. 4 credits. Prerequisites: Economics 361-362 and acquaintance with conventional trade analysis. Not offered 1980-81.

J. Vanek.

Conventional international economics is becoming increasingly irrelevant in explaining major international trade and finance phenomena of the world. Discussions attempt to (1) present a systematic critique of neoclassical trade and exchange theory; (2) purify analytical tools using empirical observations; (3) incorporate analysis from the Marxian and unequal tradition, and (4) produce an overall synthesis, especially with respect to international economic relations between poor and rich countries.]

664 International Economics: Balance of Payments and International Finance

Spring. 4 credits.

R. Owen.

[670 Economic Demography and Development

Fall. 4 credits. Not offered 1980-81.]

[671 Economics of Development

Spring. 4 credits. E. Thorbecke. Not offered 1980-81.]

[672 Economics of Development

Fall. 4 credits.

G. Fields. Not offered 1980-81.]

673 Development in a Polarized World

Fall. 4 credits. Prerequisites: Economics 311-312.

F. Golay.

The impact of the international economic order on the development efforts of less-developed countries. Emphasis is on such topics as the gains from trade, commercial policy and industrialization, risks of specialization, synthesis of development theory and trade theory, the North-South confrontation, proposals for reform of the international economic order, commodity agreements and development, international income transfers, and direct foreign investment.

[674 Economic Systems

Spring. 4 credits.

G. J. Staller. Not offered 1980-81.]

[678 Economic Growth in Southeast Asia

Spring. 4 credits. Not offered 1980-81.]

[679 Theory of Quantitative Economic Policy

Spring. 4 credits. M. Gertler. Not offered 1980-81.]

681 Economics of Participation and Labor-Management Systems: Theory

Fall. 4 credits.

J. Vanek.

The theory of labor-management economies is developed systematically and literature on that and related subjects is surveyed. Theories of the participatory firm, industry and general equilibrium are covered together with a microeconomic theory and analysis of special dimensions of the system. Efficient decision-making processes within the firm are also studied. Illustrative references to Yugoslavia and other real instances of labor participation are made throughout.

[682 The Practice and Implementation of Self-Management

Spring. 4 credits.

J. Svejnar. Not offered 1980-81.]

684 Seminars in Advanced Economics

Fall and spring. Variable credit.

Staff.

English

Students should consult the *Announcement of Academic Information* and the department's guide, "Suggestions for Prospective Majors in English."

Courses for Sophomores

Although courses numbered in the 200's are primarily for sophomores, some of them are open to qualified freshmen and to upperclass students. Courses approved for the major are English 201, 202, and all courses numbered 300 or above except English 496. In addition to English 201–202, students may count up to two 200-level courses toward the major from "Courses Approved for the Major," listed below.

201–202 The English Literary Tradition 201, fall; 202, spring, 4 credits each term. Open to all undergraduates. English 201 is not a prerequisite to 202. May be counted toward the English major.

Fall: M W F 11:15; M. Radzinowicz, S. Elledge.
Spring: M W F 11:15; M. H. Abrams, R. Parker.
Interpretation of major works ranging from *Beowulf* through those of Yeats. English 201 surveys Old English poetry, Chaucer, medieval romances, Spenser, Shakespeare, Donne, and Milton. 202 includes Dryden, Swift, Pope, Samuel Johnson, Blake, Jane Austen, the major Romantic and Victorian poets, Shaw, and Yeats. The course will be conducted by a combination of lectures and intensive seminars in special topics.

Courses Primarily for Nonmajors

205–206 Readings in English and American Literature 205, fall; 206, spring, 3 credits each term. Open to all undergraduates. English 205 is not a prerequisite to 206.

Fall: M W F 10:10; R. T. Farrell. Spring: M W F 10:10; S. M. Parrish.
English 205: The purpose of this course is to provide students with a substantial introduction to three areas: the Renaissance (and Metaphysical) tradition, the eighteenth century, and the early American novel. The course outline was decided after long consultation with the fifty students who took the course in 1979. If students wish to read ahead, they might well take up the American works first. These will be selections from the *Viking Portable Melville*, James Fenimore Cooper's *The Pioneers*, and Henry James's *The Europeans*. The course will deal with literature in its cultural context; for example, the Renaissance and Metaphysical segment will include performance of the music, poetry, and drama of the period. There will be a take-home mid-term examination, five short papers, and a final paper. Students will have the option of substituting dramatic readings of poems or plays for two of the five short papers.

English 206 covers literature since the mid-nineteenth century, including such authors as Browning, Shaw, D. H. Lawrence, Hardy, Yeats, Hemingway, Faulkner, and Robert Frost. Two lectures and a small discussion section each week. Two short papers and a final.

210 Medieval Romance: The Voyage to the Otherworld Spring, 3 credits.

T R 10:10. T. D. Hill.
The course will survey some representative medieval narratives concerned with voyages to the otherworld or with the impinging of the otherworld upon ordinary experience. The syllabus will normally include some representative Old Irish otherworld literature, selections from the *Mabinogion*, selections from the *Lais* of Marie de France, Chrétien de Troyes' *Erec*, *Yvain*, and *Lancelot*, the Middle English *Sir Orfeo*, *Sir Gawain and the Green Knight* and the *Tam Lin* ballads. We will finish by looking at a few modern "otherworld" romances, such as ones by Lewis Carroll, J. R. R. Tolkien, and Madeleine L'Engle. All

readings will be in modern English. Requirements: three brief (two to three typed pages) papers and a final exam designed to test the students' reading.

227 Shakespeare Fall or spring, 3 credits. Each section limited to 25 students.

M W F 10:10 or 1:25 or T R 12:20–1:35 or 2:30–3:45. C. Levy and others.
A critical study of representative plays from the principal periods of Shakespeare's career.

248 Feminist Issues in Nineteenth- and Twentieth-Century Literature (also Women's Studies 249) Spring, 4 credits.

M W F 1:25. M. Jacobus.
An introductory course in writing by and about women, exploring the relation between women, literature, and feminism. There will be five main areas of concern: work and home; education and marriage; sexuality; motherhood; and the woman artist or writer herself. Readings will include novels by Charlotte Brontë, Charles Dickens, Elizabeth Gaskell, George Eliot, Thomas Hardy, Virginia Woolf, D. H. Lawrence, Sylvia Plath, Margaret Atwood, and Adrienne Rich, as well as a variety of texts drawn from writers on women and feminism from Mary Wollstonecraft to the present day.

285 Writing About the Arts at Cornell Spring, 3 credits.

T R 11:15. T. Murray.
The course will train students to describe works of art including painting, sculpture, architecture, literature, and dramatic productions. It will focus on developing students' sensitivity to critical choices and positions. As a means of promoting appreciation of the creative arts on campus, the course will study artifacts being displayed, performed, and read on campus. Ideally, the course will encourage and contribute to public review of campus artistic events.

288–289 Expository Writing 288, fall; 289, spring, 3 credits each term. Each section limited to 18 students.

M W 9:05 or 10:10 or T R 2:30; plus conferences to be arranged. T. Jeffers, R. Farrell and others.
This course is intended to meet the needs of undergraduates from a range of disciplines who wish to gain skill in expository writing. Under the instructor's direction, students will write on topics related to their own interests. A substantial amount of new writing or a revision of an earlier essay will be expected each week. Since the class is the primary audience for the essay, attendance and participation in discussion by all students are essential. In addition to regularly scheduled class meetings, instructors will hold frequent conferences with students.

200-Level Courses Approved for the Major

Students may take up to two of the following courses for credit toward the English major.

207 Twentieth-Century Biography Spring, 4 credits.

M W F 12:20. D. Novarr.
An introduction to some forms of modern biography, traditional and experimental, to see how writers have represented and illuminated character and achievement. Subjects range from Leonardo da Vinci and Martin Luther to George Washington, F. Scott Fitzgerald, and Marilyn Monroe; writers from Freud and Erikson to Lytton Strachey, Virginia Woolf, and Norman Mailer. Consideration of the values of biography, biographical "truth," the relation of biography to history, psychology, ethics, and the novel.

247 Major Nineteenth-Century Female Novelists (also Women's Studies 248) Fall, 4 credits.

M W F 1:25. J. F. Blackall.
Readings include Austen, *Persuasion*; E. Brontë, *Wuthering Heights*; C. Brontë, *Jane Eyre* and *Villette*; Gaskell, *Mary Barton* or *North and South*; Stowe, *Uncle Tom's Cabin*; Eliot, *The Mill on the Floss*;

Chopin, *The Awakening*; and two imaginative sequels to *Jane Eyre* — James's "The Turn of the Screw" and Jean Rhys's *Wide Sargasso Sea*. In addition to examining the novels as works of fiction, the course will consider the biographical and social circumstances surrounding these works, their critical reception within their own time, and the themes and subject matter that these novelists elected to write about.

253 The Modern Novel Fall, 4 credits.
T R 8:40–9:55. B. Rosecrance.

A survey of English, European, and American novels and shorter fiction, with some attention to their contemporary historical and intellectual contexts. Works by such writers as Conrad, Joyce, Lawrence, Forster, Woolf, Mann, Kafka, Nabokov, Faulkner, and one or two contemporary Americans will be considered.

254 Modern Poetry Spring, 4 credits.
M W F 11:15. R. Kirschten.

We will trace major emotional and technical achievements in British and American lyric poetry in the modern period. Emphasis is on the lyric voice and its bases of appeal in eliciting reader response. Poets featured include Hopkins, Yeats, Eliot, Frost, Stevens, Cummings, Dylan Thomas, and Marianne Moore.

267 Twentieth-Century Southern Fiction Spring, 4 credits.

M W F 12:20. L. Herrin.
The course will deal exclusively with the fiction of the twentieth-century American South — arguably, in time and place, the richest concentration of writers we have — and will proceed more or less chronologically. After a brief background survey, the course will begin with William Faulkner, then move to Thomas Wolfe, James Agee, and Robert Penn Warren. The stories and short novels of Katherine Anne Porter, Flannery O'Connor, Carson McCullers, and Eudora Welty will make up one part of the course, as will the short work of three black writers, Richard Wright, Ernest Gaines, and Gayl Jones. The semester will end with novels by two contemporaries, William Styron and Walker Percy, and, if time permits, by one or two others. Short interpretative papers and class discussion.

277 Folklore and Literature Fall, 4 credits. Limited to 15 students.

T R 2:30. A. Lurie.
Readings in traditional British, Irish, and American folklore — tales, ballads, rhymes, fables, legends, ghost stories, etc. — and study of literary works which make extensive use of folklore materials, such as *Beowulf*; *Sir Gawain and the Green Knight*; excerpts from the Arthurian legends as retold by Malory, Tennyson, and T. H. White; poems in ballad form by Scott, Coleridge, Yeats, Auden, and others; *Macbeth*; *The Beggar's Opera*; ghost stories by Dickens, Poe, James, and others; Christina Rossetti's *Goblin Market*; Tolkien's *The Hobbit*; beast epics or fables such as Orwell's *Animal Farm* or Adams' *WaterShip Down*; and John Gardner's *Grendel*.

290 Literature and Value Spring, 4 credits.
T R 10:10–11:25. J. McConkey and others.

Each week a different member of the department discusses a poem, group of poems, story, play, or novel that is of particular importance to him or her, perhaps as a work that contributed to the person's decision to devote a lifetime to the study of literature or to the writing of fiction or verse, perhaps as a work that has affinity with their present-day attitudes and values. In following meetings that week, class members will discuss in detail the same or related works. Students will be encouraged to explore, in their papers for the course as well as their discussions, the relationship between specific texts and their own experiences, attitudes, and values.

Courses which Satisfy the Major Prerequisite

270 The Reading of Fiction Fall or spring. 3 credits. Recommended for prospective majors in English. Fall: open to freshmen who have received advanced placement in English. Spring: open to other qualified freshmen. Upperclass students admitted as space permits. Each section limited to 22 students. May be used to satisfy either the Freshman Seminar requirement or the distribution requirement in the humanities, but not both.

M W F 1:25 or 2:30 or 11:15 or T R 12:20–1:35 or 10:10–11:25. J. Blackall, C. Chase, D. Fried, and others.

Forms of modern fiction, with emphasis on the short story and novella. Critical study of works by English, American, and Continental writers from 1880 to the present — Chekhov, James, Conrad, Faulkner, Mann, Kafka, and others.

271 The Reading of Poetry Fall or spring.

3 credits. Recommended for prospective majors in English. Fall: open to freshmen who have received advanced placement in English. Spring: open to other qualified freshmen. Upperclass students admitted as space permits. Each section limited to 22 students. May be used to satisfy either the Freshman Seminar requirement or the distribution requirement in the humanities, but not both.

M W F 10:10 or 1:25 or T R 10:10–11:25.

B. Rosecrance and others.

Designed to sharpen the student's ability to understand and respond to poetry. Readings in the major periods, modes, and genres of poetry written in English.

272 Introduction to Drama Fall or spring.

3 credits. Recommended for prospective majors in English. Fall: open to freshmen who have received advanced placement in English. Spring: open to other qualified freshmen. Upperclass students admitted as space permits. Each section limited to 22 students. May be used to satisfy either the Freshman Seminar requirement or the distribution requirement in the humanities, but not both.

Fall: T R 10:10–11:25 or 2:30–3:45. Spring: M W F 11:15 or 12:20. B. Adams, T. Murray, and others.

Selected masterworks by such playwrights as Sophocles, Ibsen, and Shaw introduce the chief idioms and styles of Western dramatic tradition. The course work will consist of discussions and papers, as well as a special project related to the plays being produced by the Department of Theatre Arts. The course will be taught in small sections.

275 The American Literary Tradition Fall or spring.

3 credits. Recommended for prospective majors in American studies.

Fall: M W F 9:05; spring: hours to be arranged. D. Fried.

The problem of an American national literature is explored through the reading and discussion of eight texts representing the four principal periods in American literary history. Not a survey, this course focuses on the relations of the texts to each other, the role of Americanness in those relationships, and the assumptions about history with which critical appreciation must engage. Among the writers whose work is studied are Franklin, Hawthorne, Thoreau, Mark Twain, Henry James, Frost, and Faulkner.

280–281 Creative Writing 280, fall; 281, spring. 3 credits each term. Recommended for prospective majors in English. Prerequisite for English 281: recommendation from English 280 instructor. Each section limited to 18 students.

M W 9:05 or 12:20 or 2:30 or 3:35 or T R 9:05 or 12:20 or 2:30. P. Janowitz, R. Kirschten, and others.

An introductory course in the theory and practice of writing narrative prose, poetry, and allied forms.

Courses for Sophomores, Juniors and Seniors

Courses at the 300 level are open to juniors and seniors, and to others with the permission of the instructor. There are no specific prerequisites, except as noted for English 382–383 and 384–385.

Major Periods of English Literature

310 Old English Literature in Translation Spring. 4 credits.

T R 12:20. T. D. Hill.

Cultural backgrounds, reading, and critical analysis of Anglo-Saxon poetry in translation, pagan and Christian epic, elegy, heroic legend, and other forms. Attention will be given to the relations of this literature to that of later periods.

313 Middle English Literature in Translation Spring. 4 credits.

M W F 1:25. R. Kasse.

Readings from Middle English literature in translation, excluding Chaucer. Though selections vary, Arthurian romances such as Lagamon's *Brut*, the *Alliterative Morte Arthure*, *Sir Gawain and the Green Knight*, and Malory's *Morte d'Arthur*; Middle English lyrics and plays; and major poems such as *Piers Plowman*, *The Pearl*, and the other works of the *Gawain-poet*, Gower's *Confessio Amantis*, *The Owl and the Nightingale*, and *The Land of Cockayne*.

320 Renaissance Literature Spring. 4 credits.

M W F 12:20. B. B. Adams.

The major literary movements of the sixteenth and seventeenth centuries are surveyed, with particular attention to the works of Spenser, Marlowe, Shakespeare, Donne, Jonson, Webster, Herbert, and Milton.

330 Restoration and Eighteenth-Century Literature Spring. 4 credits.

M W F 1:25. F. Bogel.

A broad survey covering works by the major poets, dramatists, and novelists of the period, with particular emphasis on Dryden, Pope, Swift, Fielding, Sterne, and Johnson.

333 The Eighteenth-Century English Novel Fall. 4 credits.

M W F 1:25. H. Shaw.

Form and meaning in the eighteenth-century English novel. The course concentrates first on Richardson and Fielding, then on experiments with novel form toward the end of the century, and finally on the ways in which Austen and Scott draw upon and transform elements of the eighteenth-century tradition in fiction. Works by Richardson, Fielding, Sterne, Smollett, Radcliffe, Austen, and Scott.

340 The Romantic Poets Fall. 4 credits.

M W F 11:15. S. M. Parrish.

A close reading of the poems of Blake, Coleridge, Wordsworth, Byron, Shelley, and Keats, together with some of their letters and their critical writings.

345 The Victorian Period Spring. 4 credits.

T R 12:20–1:35. D. Mermin.

The poetry of Tennyson, Browning, Arnold, and the Pre-Raphaelites; two novels, *Great Expectations* and *Middlemarch*; selections from works by Carlyle, Ruskin, Mill, Darwin, Pater, and others; plays by Wilde and Shaw.

350 The Early Twentieth Century (to 1914) Fall. 4 credits.

M W F 10:10. D. R. Schwarz.

Critical study of major works by Hardy, Conrad, Lawrence, Joyce, Eliot, Yeats, Hopkins, Wilde, and others. While the emphasis will be upon individual works, some attempt will be made to place the authors and works within the context of literary and intellectual history. The course will seek to define the development of literary modernism in England by

reference to these authors' innovations in themes and techniques. These literary works will be examined as part of a transition in British culture that takes place between 1890 and 1914.

351 Modern Literature since 1914 Spring. 4 credits.

M W F 10:10. P. L. Marcus.

Interpretations of modern English and Anglo-Irish poetry, fiction, and drama. Lectures and discussions. Some attention will be given to intellectual history and to parallel movements in the other arts. Authors will include Joyce (*Ulysses*), Yeats, Eliot, Shaw, Lawrence, Woolf, O'Casey, Auden, and Beckett.

Major English Authors

319 Chaucer Spring. 4 credits.

M W F 11:15. R. E. Kasse.

The main emphasis is on *Troilus and The Canterbury Tales*, but some attention will also be given to the early poems and the question of Chaucer's development as a poet.

327 Shakespeare Fall. 4 credits.

M W F 9:05. H. S. McMillin.

An introduction to the works of Shakespeare, based on a selection of plays representative of the stages of his artistic development and the range of his achievement.

329 Milton Fall. 4 credits.

M W F 9:05. M. Radzinowicz.

An introduction to the poetry of John Milton. Of the major poems, *Comus*, *Lycidas*, *Paradise Lost*, and *Samson Agonistes* will be closely read; other of Milton's works will be considered only when necessary to establish context.

Major Periods of American Literature

361 Early American Literature Fall. 4 credits.

M W F 11:15. M. J. Colacurcio.

The literature of ideas produced by America's Puritan and Enlightenment writers: Bradford, Taylor, Edwards, and Franklin. The first achievements of the national literature: Irving, Cooper, Poe, and Hawthorne.

362 The American Renaissance Spring. 4 credits. English 361 recommended, but not a prerequisite.

M W F 10:10. M. J. Colacurcio.

America's literary maturity at mid-century: the individual masterpieces and the interrelated careers of Emerson, Thoreau, Hawthorne, Melville, Whitman, and Dickinson.

363 The Age of Realism and Naturalism Fall. 4 credits.

T R 10:10. C. Strout.

The literary expression of new attitudes toward American society and the individual between the Civil War and the early years of the twentieth century, primarily as exemplified in representative writings by Mark Twain, W. D. Howells, Henry James, Mary Wilkins Freeman, Charles W. Chesnut, Henry Adams, Stephen Crane, and Theodore Dreiser.

364 American Literature in the Twentieth Century Spring. 4 credits.

M W F 9:05. J. Bishop.

A pursuit of the idea of modernity through a variety of American texts from just before the First World War to the present. The authors represented include the principal poets from Frost to Lowell; Fitzgerald, Hemingway, and Faulkner from the standard writers of prose fiction; and some more recent black writers, women writers, critics, and journalists.

Genres and Special Topics

366 The Earlier American Novel: Brockden Brown to Henry James Fall. 4 credits.

T R 2:30–3:45. D. E. McCall.

A survey of major American novels of the nineteenth century. Writers studied include Hawthorne, Melville, Mark Twain, Howells, Chopin, and James.

367 The Modern American Novel Spring, 4 credits.

M W F 1:25. W. Slatoff.

A survey of major American novels of the twentieth century. Writers studied include Dreiser, Crane, Fitzgerald, Hemingway, West, Wright, Faulkner, Agee.

370 The Nineteenth-Century English Novel Spring, 4 credits.

M W F 12:20. T. L. Jeffers.

Survey of works by major English novelists in the nineteenth century. Probable reading list will include Austen, *Pride and Prejudice*; Thackeray, *Henry Esmond*; Dickens, *Little Dorrit*; Eliot, *Middlemarch*; Meredith, *The Egoist*; Hardy, *Tess of the d'Urbervilles*; Conrad, *Nostramo*.

Creative and Expository Writing

382-383 Narrative Writing 382, fall; 383, spring, 4 credits each term. Prerequisite: English 280-281 or permission of instructor. Each section limited to 15 students.

T R 12:20 or 2:30; plus conferences to be arranged. Fall: J. McConkey, W. Slatoff; spring: A. Caputi, H. Brodkey.

The writing of fiction; study of models; analysis of students' work.

384-385 Verse Writing 384, fall; 385, spring, 4 credits each term. Prerequisite: English 280-281 or permission of instructor. Each section limited to 15 students.

T 2:30-4:25. Fall: A. R. Ammons, P. Janowitz; spring: R. Morgan, K. McClane.

The writing of poetry; study of models; analysis of students' poems; personal conferences.

386 Seminar in Writing: Autobiography Fall, 4 credits.

T R 11:15. T. L. Jeffers.

A course in autobiographical writing, complemented by study of autobiographies of artists, scientists, politicians, philosophers, soldiers, nonprofessional workers. Frequent essays in which students begin to write their own autobiographies. Attention to the different forms autobiography can take, and to the different shapes adult life can be given. Readings in such authors as Augustine, Gibbon, Darwin, Mill, Henry Adams, Graves, T. E. Lawrence, Orwell, C. S. Lewis, and Malcolm X.

388-389 The Art of the Essay 388, fall; 389, spring, 4 credits each term. Prerequisite: permission of instructor. Each section limited to 18 students.

T R 11:15 and conferences to be arranged.

For both English majors and nonmajors who have done well in such courses as Freshman Seminars or English 288-289, and who desire intensive practice in writing expository and personal essays; particular, but not exclusive, emphasis on expository techniques of analysis and persuasion.

Courses for Advanced Undergraduates

Most courses of the 400 level are limited in enrollment and require the permission of the instructor.

402 Topics in Criticism: Semiotics and Cultural Criticism Spring, 4 credits.

T R 12:20. L. Green.

An introduction to critical assumptions underlying semiotics such as the belief that signs and, consequently, texts, have value only within a cultural and historical context. As one of the field's original thinkers, Saussure, put it, semiotics is "the study of the life of signs within society." The course will examine the possibilities of cultural and historical criticism inherent in semiotics. We will read texts by Saussure, Marx, and Freud as well as their revisionary descendants, Derrida, Foucault, and

Althusser. In addition, we will explore practical applications of such theorizing in the literary criticism of Barthes, Eagleton, and Jameson.

405 Readings in the Humanities: The Sacred and the Profane Fall, 4 credits.

T R 12:20. J. McConkey.

A study of perhaps the most fundamental concern of literature: the relationship between the sacred (the intuited Oneness within or beyond the phenomenal world) and the profane (the phenomenal world, in all its variety and disparate meanings). The texts will be selected to represent changing emphasis in this relationship from the time of Augustine to our own century and to give students a perspective on contemporary attitudes to this dual concern. Texts will include Augustine's *Confessions*; *Tristan and Iseult* (the Bedier version); Shakespeare's *Tempest*; Fielding's *Tom Jones*; Eliot's *Mill on the Floss*; and Forster's *A Passage to India*. Several short papers and a longer essay.

407 Seminar in the Theory and Practice of Translation (also English 607) Spring, 4 credits.

Limited to 15 students.

T 3:35-5:30. E. Fogel.

Students will be expected to produce finished translations from writers of their choice and, with the aim of clarifying their principles of translation, to evaluate the work of notable modern translators. Topics to be considered: literal, free, and faithful translation; paraphrase and "imitation"; problems of prosody, rhetoric, and diction; self-translation (Nabokov, Beckett, Borges, and others).

408 Evolution of Epic Spring, 4 credits

T R 10:10-11:25. M. Radzinowicz.

The course is concerned with the poetic and thematic transformation of a genre often and prematurely called dead. It will explore such topics as epic tradition and poetic originality; the bard and his presence or absence; the social and historical components of heroic virtue; and unity and fragmentation in long poems. Readings, sometimes in selections, will include Spenser, *The Faerie Queene*; Milton, *Paradise Lost*; Dryden, *The Hind and the Panther*; Blake, *Milton*; Wordsworth, *The Prelude*; Whitman, *Song of Myself*; Melville, *Clarel*; William Carlos Williams, *Paterson*. A final epic poem may be chosen by the class from among Berryman, *Dream Songs*; Lowell, *History*; David Jones, *Anathemata*.

415 The English Language (also English 615) Spring, 4 credits.

Hours to be arranged. B. B. Adams.

A basic survey of the historical development of English from the Anglo-Saxon period to the present, with special reference to the needs and interests of students of literature.

421 Spenser (also English 621) Fall, 4 credits.

T R 12:20-1:35. C. Kaske.

Epithalamion, selections from *Amoretti*, *Muiopotmos*, *Mother Hubbard's Tale*, *Fowre Hymnes*, *Mutabilitie Cantos* will occupy one third of the course. Graduate students will read the entire *Faerie Queene*, while undergraduates will read selections totaling about half of it.

425 Readings in Seventeenth-Century Poetry: Donne, Jonson, Marvell, Dryden Fall, 4 credits.

T R 10:10-11:25. D. Novarr.

Critical study of poems by four influential writers of the Metaphysical and neoclassical traditions. Emphasis on technique and genre (lyric, love elegy, epithalamion, epigram, epistle, ode, satire, mock-epic, and others).

426 Poetry and Music in the English Renaissance (also Music 426 and English 626) Spring, 4 credits.

W F 12:20-1:35. B. Rosecrance (English) and E. Murray (music).

A survey of English poems and their musical settings from late medieval times to the early seventeenth

century, with emphasis on the interrelations of music and text. Some attention will also be given to historical background and social context. The course will consider selected medieval lyrics, the words and music of the early Tudor songbooks, relevant European settings and texts, the English madrigal composers, and the ayre. Besides anonymous settings and lyrics, settings by Fayrfax, Henry VIII, Tallis, Byrd, Gibbons, Morley, Weelkes, Wilbye, Dowland, and Campion; lyrics by Wyatt, Vaux, Surrey, Raleigh, Spenser, Sidney, Shakespeare, Campion, and Donne will be represented. No theoretical training in music is assumed.

427 Studies in Shakespeare Spring, 4 credits.

T R 8:40. T. Murray.

The course will cover several Shakespeare plays and have two primary concerns. First, it shall focus on the development of the students' abilities to read Shakespeare with care and critical attention. Second, it will provide an introduction to certain critical approaches to Shakespeare: psychoanalytic, philosophical, semiotic, structural, and rhetorical. Several critical essays will be discussed. In addition to a term paper, students will write two short analyses of plays and lead seminar discussions based on them.

429 Milton and Romantic Poetry Spring, 4 credits.

T R 10:10. C. Chase.

This course will focus on the poetry of Milton and on three of the Romantic poets for whom his influence was essential: Blake, Wordsworth, and Shelley. Reading Milton, we will try to see what in his poems the Romantics found important for their sense of their position in the history of English poetry. Reading Blake, Wordsworth, and Shelley, we will look at the different kinds of impact Milton's poetry had on their writing—the role of allusion, the psychological effect of recognizing a great predecessor, and conceptions of history and poetry drawn from reading *Paradise Lost* and Milton's other works.

432 The Age of Johnson (also English 632) Fall, 4 credits.

T R 10:10-11:25. D. D. Eddy.

A study of the prose and poetry of Dr. Johnson, Boswell's *Life of Johnson*, and representative works of Goldsmith, Reynolds, and others.

434 Restoration and Eighteenth-Century Drama Fall, 4 credits.

M W F 12:20. L. Brown.

A course in the form and development of English drama in the Restoration and eighteenth century. This course will consider the relation between the changes in dramatic form and the changes in society from 1660 to 1780. In particular, it will trace the conflicted transition from Restoration aristocratic plays to eighteenth-century bourgeois drama. And finally, it will attempt to formulate an answer to a major generic question of the century: Why does the drama decline in this period of literary history? Readings will include plays by Dryden, Etherege, Wycherley, Otway, Congreve, Rowe, Steele, Gay, Fielding, Lillo, Goldsmith, and Sheridan.

441 Wordsworth and Keats Fall, 4 credits.

M W F 10:10. R. Parker.

Readings in Wordsworth's major narrative and lyric poems in the decade 1797-1806, and in all of Keats's major poems. Related readings in prefaces, letters, and contemporary criticism. Some attention to formal, biographical, and literary contexts, but the primary focus is on the poems themselves.

447 Victorian Poetry Spring, 4 credits.

T R 2:30-3:45. P. Sawyer.

A close study of Tennyson, Browning, Hopkins, and Hardy. We will give particular attention to the development of the dramatic monologue (the poet speaking through the mask of a character), the creation of new, sometimes idiosyncratic styles (the poet speaking through the mask of his voice), and

two recurrent themes — the relation of individual poetic vision to social needs and the experience of nature as a "terrible beauty" in which God is elusive or absent. The readings will include three longer poems, *In Memoriam*, *Idylls of the King*, and *The Wreck of the Deutschland*.

450 The History of the Book Spring. 4 credits. Prerequisite: permission of instructors. Limited to 20 students.

M 7–9 p.m. D. Eddy and P. Kahn. Morphology of letters (calligraphy and type). Abbreviations and their cultural significance. Printing and its terminology. The book trade. Texts and their transmission. The book as a physical object. The impact of the book on social and economic changes. The book as a work of art.

452 English Literature and Its Intellectual Contexts: Edwardians and After (also English 654) Fall. 4 credits.

T 1:25. B. Rosecrance. A study of selected twentieth-century English novelists, critics, historians and philosophers. Novelists will include Arnold Bennett, D. H. Lawrence, E. M. Forster, and Virginia Woolf. Other figures to be considered are Leslie Stephen, G. B. Shaw, T. E. Hulme, F. M. Ford, A. Orage, Roger Fry, Clive Bell, G. E. Moore, Leonard Woolf, J. M. Keynes, and Lytton Strachey. Although the course will focus on the late Edwardian and Georgian contexts, we will consider intellectual and artistic developments after World War I, concluding with selected fiction of Virginia Woolf. Besides the fiction, we will discuss such topics as Postimpressionism, the role of intellectual and literary periodicals, and the Bloomsbury movement's concern with philosophy, politics, and the writing of history.

457 Contemporary Fiction Spring. 4 credits. M W F 12:20. H. Brodkey. Topic for 1981 to be announced.

459 Four Modern Masters: Pirandello, Brecht, Beckett, Pinter Fall. 4 credits. M W F 2:30. A. Caputi.

A study of selected works by these figures against the background of modernism since World War I.

462 Dickinson and Whitman (also Women's Studies 462) Fall. 4 credits.

M W F 1:25. D. Fried. A study of poems and selected letters by Emily Dickinson, and of *Leaves of Grass* and selected prose by Walt Whitman. We shall discuss Dickinson's and Whitman's individual achievements and their complementary voices in American literature. Topics will include their modes of poetic autobiography, their critique of religion, and the variety of critical responses these two idiosyncratic writers have subsequently generated. We shall consider biographical, psychological, historical, and feminist approaches to their work. Requirements will include seminar presentations and two short papers culminating in a longer essay.

464 American History and the Literary Imagination (also English 691) Spring. 4 credits. W 1:25–3:20. C. Strout.

A study of the interplay between the literary and historical imaginations in various forms of narrative with a focus on certain controversial American events such as the Salem Witchcraft trial, the Nat Turner slave revolt, Huey Long's career, the Oppenheimer Security Hearing, the Rosenberg spy case, and the March on the Pentagon. Texts include literary works by Hawthorne, Adams, Twain, Mailer, Styron, Warren, Miller, and Doctorow; pertinent documents; and readings in controversies over interpretation and the overlap between history and literature.

465 Mark Twain and Henry James (also English 663) Fall. 4 credits.

M 1:25–3:25. C. Strout. A comparative study of the literary careers of Mark

Twain and Henry James in relation to selected stories, novels, and essays in their biographical and cultural contexts.

466 The Artist in Society: Poetry of the Sixties and Seventies Spring. 4 credits.

M W F 9:05. P. Janowitz. The seminar will examine the ways in which poetry has been shaped by the artist's psychological predisposition, historical context, and the cultural milieu. Readings will include poets in translation as well as English and American poets. Poets whose works we will examine will include Robert Lowell, Alan Ginsberg, A. R. Ammons, Charles Bukowski, Elizabeth Bishop, Denise Levertov, Frank O'Hara, Ted Hughes, and Philip Levine. Grades will be based on papers, oral reports, and contributions to class.

467 Afro-American Literature Spring. 4 credits. Limited to 20 students.

T R 8:40–9:55. K. McClane. A survey of Afro-American literature from Charles Chesnut to the present, with emphasis on the history, cultural assumptions, and relationship of Afro-Americans to "mainstream" America. Much of our interest will be in defining what is indeed a survival aesthetic — be it in the folkloric tradition of High John De Conquer or the double-edged satisfactions of the blues. Readings will include Dubois, Cullen, Hurston, Hughes, Wright, Ellison, Baldwin, and Imamu Baraka.

469 Modern American Poetry Fall. 4 credits. Limited to 15 students.

T R 10:10. E. Fogel. A reading of outstanding poems by American poets, including Whitman, Dickinson, Frost, Eliot, Stevens, Williams, Lowell, and Ammons.

470 Modern British Fiction Spring. 4 credits. M W F 9:05. P. L. Marcus.

Intensive study of works by D. H. Lawrence (*The Rainbow*, *Women in Love*), James Joyce (*Ulysses*), and Virginia Woolf (*Mrs. Dalloway*, *To the Lighthouse*). Topics include the impact of the First World War, tradition and experiment, "male and female," the significance of art.

471 History into Fiction Fall. 4 credits. Open to nonmajors.

T R 12:20. H. Shaw. What makes a historical novel "historical"? Answers to this question are sought by exploring works of historical fiction by such authors as Scott, Balzac, Thackeray, Dickens, and Tolstoy. Some attention is given to literary theory, the philosophy of history, and the various authors' historical sources, but the primary focus is on the works themselves. Our discussions should provide a fruitful meeting ground for people with different areas of interest and expertise; non-English majors are welcome.

474 The Bildungsroman in English Fall. 4 credits. M W F 12:20. T. L. Jeffers.

A study of novels about growing up, with emphasis on the moral, sexual, and social development of the self. Much attention to helping students speak to one another in essays and in discussion. Probable reading list: Dickens, *David Copperfield*; Eliot, *The Mill on the Floss*; James, *What Maisie Knew*; Forster, *The Longest Journey*; Joyce, *A Portrait of the Artist as a Young Man*; Woolf, *Jacob's Room*; Dreiser, *An American Tragedy*; Drabble, *Jerusalem the Golden*.

478 Women and Writing: Wollstonecraft to Woolf (also Women's Studies 478) Fall. 4 credits.

M W F 11:15. M. Jacobus. The course will focus on works by and about women, clustering in four main areas: Romantics and after (such writers as Mary Wollstonecraft, Mary Shelley, Emily Brontë), Victorians (Charlotte Brontë, Tennyson, Elizabeth Barrett Browning), the New Woman Fiction of the 1890s (Hardy, Olive Schreiner, Gissing), and modernists (Gertrude Stein, Katherine Mansfield, Virginia Woolf). The aim will be twofold: first, to

consider questions about women's writing and the representation of women and women's issues; second, to complement an examination of the sexual and political ideology in literature with readings from seminal feminist documents and with current theoretical work towards a specifically feminist critique.

479 Reading Woman Poets (also Women's Studies 479) Spring. 4 credits.

T R 12:20. S. Siegel. An examination of the traditional controversy over whether or not reading, writing, and gender are related to one another. Detailed study of the autobiographical, critical, and poetic writings of Amy Lowell, Hilda Doolittle, Marianne Moore, Sylvia Plath, and Adrienne Rich. The seminar will consider salient departures from conventional poetic modes and themes and the pressures each poet has felt to be significant in her attempt to shape herself, her esthetic, and her poetry. Discussion will begin with a specific question which will recur throughout the semester: How would Virginia Woolf have read these poets?

480–481 Seminar in Writing 480, fall; 481, spring. 4 credits. Limited to 15 students. Prerequisites: English 382–383 or 384–385, and permission of instructor.

T 12:20–2:15. Fall: D. McCall; spring: J. McConkey. Intended for those writers who have already gained a basic mastery of technique. Students normally enroll for both terms and should be capable of a major project — a collection of stories or poems, a group of personal essays, or perhaps a novel — to be completed by the end of the second semester. Seminars are used for discussions of the students' manuscripts and published works that individual members have found of exceptional value.

482 Poetics for Poets and Critics Spring. 4 credits. Limited to 10 students.

M 7–9:30 p.m. J. Stalworthy. Designed for poets prepared to take Yeats's advice, "learn your trade, / Sing whatever is well made," and for critics wishing to study the ways in which the principal verse forms of English poetry have been adopted and adapted through the centuries. Each week's assignment will be an example of the form under discussion, from blank verse and ballad, sonnet and villanelle, to "shaped" and "concrete" poems.

491 Honors Seminar I: Forms of Distance in Modern Fiction Fall. 4 credits.

T R 2:30. W. Slatoff. A study of selected modern novels with emphasis on the problems of sympathy and distance which engage the authors, characters, and readers. Readings will probably include Conrad's *Secret Agent*; Forster's *A Room with a View* and *A Passage to India*; Woolf's *To the Lighthouse*; Greene's *The Heart of the Matter*; Patrick White's *The Aunt's Story*; West's *Miss Lonelyhearts*; Faulkner's *As I Lay Dying*; Nabokov's *Lolita*; Baldwin's *Another Country*; and Agee's *Let Us Now Praise Famous Men*.

492 Honors Seminar II: Poetry and Poetics: Victorian and Modern Spring. 4 credits.

T R 12:20. D. Mermin. A study of post-Romantic poetic theory and practice, focusing on the works of Browning, Arnold, Yeats, and Eliot, and considering such topics as generic innovation, the relation of the poet to his readers, and the use of myth.

Courses Primarily for Graduate Students

Permission of the instructor is a prerequisite for admission to courses numbered in the 600s. These are primarily intended for graduate students, although qualified undergraduates are not excluded. Undergraduates seeking admission to a 600-level

course should consult the appropriate instructor. The list of courses given below is illustrative only; a definitive list, together with course descriptions and class-meeting times, will be published in a separate department brochure before course enrollment each term.

- 601 The Vikings** Fall. 4 credits.
R. T. Farrell.
- 607 Theory and Practice of Translation** Spring. 4 credits.
E. Fogel.
- 612 Beowulf** Spring. 4 credits.
R. T. Farrell.
- 613 Middle English Literature** Fall. 4 credits.
R. E. Kaske.
- 615 History of the English Language** Spring. 4 credits.
B. B. Adams.
- 619 Chaucer** Spring. 4 credits.
R. E. Kaske.
- 621 Spenser** Fall. 4 credits.
C. Kaske.
- 623 The Metaphysical Poets** Fall. 4 credits.
D. Novarr.
- 627 Shakespeare: The Histories and Comedies** Spring. 4 credits.
S. McMillin.
- 630 Studies in the Eighteenth Century** Spring. 4 credits.
Instructor to be announced.
- 632 The Age of Johnson** Fall. 4 credits.
D. D. Eddy.
- 635 Austen and Scott** Fall. 4 credits.
H. Shaw.
- 641 The Other Romantics: DeQuincey, Hazlitt, Lamb** Fall. 4 credits.
M. Jacobus.
- 642 Romantic Masterworks** Spring. 4 credits.
M. H. Abrams.
- 645 Victorian Poetry** Fall. 4 credits.
D. Mermin.
- 654 English Literature and Its Intellectual Contexts in the Early Twentieth Century** Fall. 4 credits.
B. Rosecrance.
- 663 Twain and James** Fall. 4 credits.
C. Strout.
- 664 Frost and Elliot** Spring. 4 credits.
J. Bishop.
- 665 Williams and Stevens** Fall. 4 credits.
L. Green.
- 667 Modern American Literature: Forms of Hope and Despair** Spring. 4 credits.
W. Slatoff.
- 671 Conrad, Lawrence, Joyce** Fall. 4 credits.
D. Schwarz.
- 692 Freud and Literature** Fall. 4 credits.
N. Hertz.
- 693 Semiotics and Marxist Literary Criticism** Spring. 4 credits.
L. Green.

Graduate Seminars

Permission of the instructor is a prerequisite for admission to any course numbered in the 700s. Most of these courses may be limited in enrollment at the discretion of the instructor. For course descriptions see the department brochure.

- 701 Introduction to Research and Scholarly Methods** Fall. 2 credits.
S. M. Parrish.
- 702 Introduction to Criticism and Literary Theory** Spring. 2 credits.
J. Culler.
- 727 Studies in Shakespeare (The Sources)** Fall. 5 credits.
B. B. Adams.
- 729 Milton** Spring. 5 credits.
M. Radzinowicz.
- 741 Keats** Spring. 5 credits.
S. M. Parrish.
- 755 Hardy** Spring. 5 credits.
M. Jacobus.
- 759 Woolf** Spring. 5 credits.
S. Siegel.
- 780.1 Writing Seminar** Fall. 5 credits.
A. Lurie.
- 780.2 Writing Seminar** Fall. 5 credits.
R. Morgan.
- 781.1 Writing Seminar: Poetry** Spring. 5 credits.
A. R. Ammons.
- 781.2 Writing Seminar: Prose** Spring. 5 credits.
L. Herrin.
- 793 Master's Essay** Fall or spring. Noncredit.
Staff.
- 794 Directed Study** Fall or spring. 5 credits.
Staff.
- 795 Group Study** Fall or spring. 5 credits.
Staff.
- 796 Teaching and Research** Fall or spring. 5 credits.
Staff.

Related Courses in Other Departments

In addition to courses offered by the Departments of Comparative Literature and Women's Studies and the Africana Studies and Research Center, the following courses will be of particular interest to English majors and graduate students in English.

Classics

Word Power (Classics 100)

Introduction to Rhetoric (Classics 109)

Myths of Greece and Rome (Classics 150)

Ancient Epic (Classics 238)

Greek and Roman Historians (Classics 245)

Comparative Literature

Culture as Semiotic System (Comparative Literature 295)

Comedy (Comparative Literature 312)

Medieval Literature (Comparative Literature 343-344)

Classic and Renaissance Drama (Comparative Literature 352)

Literature of Europe in the Renaissance (Comparative Literature 356)

Literature of Europe since 1800 (Comparative Literature 357)

European Novel (Comparative Literature 363-364)

History and Theory of Drama (Comparative Literature 381)

Hume and Rousseau (Comparative Literature 416)

Readings in the New Testament (Comparative Literature 429)

Allegory and Symbolism (Comparative Literature 446)

Renaissance Public Theater (Comparative Literature 452)

Critical Perspectives: Roland Barthes (Comparative Literature 606)

Society for the Humanities

Culture and Ideology (Society for the Humanities 419)

The Formal Versus the Formless: A Reading of Contemporary American Poetry (Society for the Humanities 421)

The Tradition of the New in American Poetry (Society for the Humanities 422)

The Roots of Narrative (Society for the Humanities 427)

Primitivism in Nineteenth and Early Twentieth Century Art and Thought (Society for the Humanities 428)

Theatre Arts

American Drama and Theatre (Theatre Arts 336)

European Drama (Comparative Literature 353)

Play and Period (Theatre Arts 424)

Theatre and Society (Theatre Arts 434)

Seminar in Dramatic Criticism (Theatre Arts 636)

Seminar in Dramatic Theory (Theatre Arts 637)

French

See Modern Languages, Literatures, and Linguistics, p. 92 and Department of Romance Studies, p. 101.

Geological Sciences

Freshman and Sophomore Courses

101 Introductory Geological Sciences Fall or spring. 3 credits.

2 lecs, 1 lab, evening exams, field trips.

C. S. Hutchison, fall; J. M. Bird, spring.
Understanding the natural earth, weathering, erosion, the evolution of coast lines and river valleys,

glaciation, the origins of earthquakes and mountains, the genesis of volcanoes, and the drifting of continents. Studies of ground water, mineral deposits, petroleum, and coal. Recognizing major minerals and rocks, interpretation of topographic and geologic maps.

102 Introduction to Historical Geology Spring. 3 credits. Prerequisite: Geological Sciences 101 or permission of instructor.

2 lecs, 1 lab, evening exams. J. L. Cisne.
A continuation of 101. History of the earth and life in terms of evolutionary processes. The geologic record, its formation, and interpretation of earth history. Introduction to the evolution of life and to fossils and their use in reconstructing past environments and dating rocks.

103 Earth Science Fall. 3 credits (see Geol 105, Earth Science Laboratory)

3 lecs. T. Jordan.
Physical geography, including earth and lunar orbits that determine seasons and tides. Figure and structure of the earth; climatic regions; atmospheric and oceanic circulation, erosion by rivers, glaciers, wind, and waves, climatic change.

105 Earth Science Laboratory Fall. 1 credit. To be taken concurrently with Geol 103, Earth Science.

T. Jordan.
Astronomical determination of position and seasonal events. Topographic mapping and map interpretation. Minerals and rocks, world climatic regions.

107 Frontiers of Geology I Fall. 1 credit. May be taken concurrently with or after Geological sciences 101.

1 lec. J. L. Cisne and staff.
Lectures by members of the department on selected fundamental topics of current interest, such as continental drift and related tectonic processes, volcanoes, earthquake prediction, natural energy sources, and mineral resources.

108 Frontiers of Geology II Spring. 1 credit. May be taken concurrently with or after Geological Sciences 101 or 102.

1 lec. J. L. Cisne and staff.
Lectures by members of the department on selected fundamental topics of current interest such as plate tectonics, the evolution of mountain belts and island arcs, the deep structure of continents, ecology and evolution of fossil organisms, correlation of strata by fossils, sea-level changes, and fossil fuels.

[131 Geology and the Environment Fall. 3 credits. Field trips. Not offered 1980–81.

2 lecs, 1 lab.
The principles of geological science, with emphasis on the physical phenomena and rock properties as they influence the natural environments of man.]

262 Mineral and Energy Resources and the Environment Spring. 3 credits.

2 lecs, 3 exercises; reading assignments, term projects. A. K. Gibbs.
Occurrence, location, and scientific principles underlying the availability of mineral and energy resources of today and tomorrow. Limitations on utilization imposed by economic and environmental factors, hazards, patterns of usage, and industrial development. Relation to national and international policy and conservation.

Junior, Senior, and Graduate Courses

Of the following, the core courses Geological Sciences 325, 345, 355–356, 376, and 388 may be taken by those who have successfully completed Geological Sciences 101–102 or the equivalent, or who can demonstrate to the instructor that they have adequate preparation in mathematics, physics, chemistry, biology, or engineering.

325 Structural Geology and Sedimentation Spring. 4 credits. Prerequisite: Geological Sciences 101 or permission of instructor.

3 lecs, 1 lab. C. S. Hutchison.
Nature, origin, and recognition of geologic structures. Behavior of geologic materials. Geomechanical and tectonic principles applied to the solution of geologic problems. Introduction to the sedimentary processes and petrology of sedimentary rocks. Description, classification, provenance, transportation, depositional environment of sediments, and diagenesis of sediments.

345 Geomorphology Spring. 4 credits. Prerequisite: Geological Sciences 102 or permission of instructor. Normal fall course offered spring 1981.

2 lecs, 1 lab. A. L. Bloom.
Description and interpretation of land forms in terms of structure, process, and stage.

355 Mineralogy, Petrology and Geochemistry I Fall. 4 credits. Prerequisite: Geological Sciences 101 or permission of the instructor.

2 lecs, 2 labs; assigned problems and readings. W. A. Bassett.
Examination of minerals by hand specimen properties and optical microscopy. Geological setting, classification, crystal structures, phase relations, chemical properties, and physical properties of minerals are studied. X-ray diffraction is introduced.

356 Mineralogy, Petrology, and Geochemistry II Spring. 4 credits.

2 lecs, 1 lab; assigned problems and readings; field trips. R. W. Kay.
Principles of phase equilibrium as applied to igneous and metamorphic systems. Description, classification, chemistry, origin, regional distribution, and dating of igneous and metamorphic rocks. Geochemical distribution of trace elements and isotopes in igneous and metamorphic systems. The petrological evolution of the planets.

376 Historical Geology and Stratigraphy Fall. 4 credits. Recommended prerequisite: Geological Sciences 102.

2 lecs, 2 labs. J. L. Cisne, S. Bachman.
Formation of sedimentary rocks. Depositional processes. Depositional environments and their recognition in the stratigraphic record. Correlation of strata in relation to time and environment. Seismic stratigraphy. Geological age determination. Reconstruction of paleogeography and interpretation of earth history from stratigraphic evidence.

388 Geophysics and Geotectonics Spring. 4 credits. Prerequisites: Mathematics 112 and Physics 208 or equivalent.

3 lecs, 1 lab. B. L. Isacks.
Global tectonics and the deep structure of the solid earth as revealed by investigations of earthquakes, earthquake waves, the earth's gravitational and magnetic fields, and heat flow.

410 Experiments and Techniques in Earth Sciences Spring. 2 credits. Prerequisites: Physics 207–208 and Mathematics 191–192 or equivalents, or permission of instructor.

S. Kaufman.
Lab and field experiments chosen in accordance with students' interests. Familiarization with instruments and techniques used in earth sciences. Independent work is stressed.

423 Petroleum Geology Fall. 3 credits. Recommended prerequisite: Geological Sciences 325.

2 lecs, 1 lab; field trip. S. B. Bachman.
Introduction to hydrocarbon exploration and development. Source rock and fluid migration studies, oil and gas entrapment, reservoir rocks. Exploration techniques including basin analysis, subsurface mapping, seismic reflection methods and processing, seismic mapping, seismic stratigraphy.

Drilling techniques, well logs and their use in stratigraphic and structural interpretations, leasing and economics, career development.

[424 Tectonics of Orogenic Zones; Modern and Ancient Spring. 3 credits. Prerequisite: permission of instructors. Offered alternate years. Not offered 1980–81.

1 lec. W. B. Travers, D. E. Karig.
A comparative study of island arcs and mountain ranges.]

[428 Geomechanics Spring. 3 credits. Prerequisites: Mathematics 240 or 296, Geological Sciences 101. Not offered 1980–81.

3 lecs. D. L. Turcotte.
Use of mathematical analysis to explain such geological observations as ocean ridges — their thermal structure, elevation, heat flow, and gravity; ocean trenches — the structure and mechanics of the bending lithosphere; folding — buckling, viscous, and plastic flow, faulting — a detailed mechanical and geological study of the San Andreas fault; intrusives — geothermal power.]

431 The Earth's Crust: Structure, Composition, and Evolution Fall. 3 credits. Prerequisites: Geological Sciences 356 and 388.

3 lecs. L. D. Brown.
Structure and composition of the crust from geophysical observations, analysis of xenoliths, and extrapolation of petrological laboratory data. Radioisotopic considerations. The nature of the crust-mantle boundary. Thermal and rheological structure of the crust. Oceanic vs. continental crust. Origin and evolution of oceanic and continental crust.

432 Digital Processing and Analysis of Geophysical Data Spring. 3 credits. Prerequisites: Geological Sciences 488 and familiarity with a programming language.

3 lecs. L. D. Brown, S. Kaufman.
Sampling theory. Fourier, Laplace, and Z-transform techniques. Spectral and cepstral analysis. Temporal and spatial filtering. Geophysical modeling. Deconvolution, migration, and velocity analysis of reflection data. Downward and upward continuation of potential field data.

[433 Interpretation of Seismic Reflection Data Spring. 3 credits. Prerequisite: Geological Sciences 488 or equivalent. Not offered 1980–81.

2 lecs, 1 lab. L. D. Brown, S. Kaufman.
Techniques for inferring geologic structure and lithology from multichannel seismic reflection data. Data processing sequences; migration, velocity analysis, correlation criteria, resolution considerations, wave form analysis, and synthetic seismograms. Synergistic approaches to interpretation. Seismic stratigraphy.]

454 Modern Petrology Fall. 3 credits. Prerequisite: Geological Sciences 356. Offered alternate years.

2½ lecs, ½ lab. R. W. Kay.
Magmas and metamorphism in the context of plate tectonics. Major and trace element chemistry and phase petrology as monitors of the creation and modification of igneous rocks. Temperature and stress in the crust and mantle and their influence on reaction rates and textures of metamorphic rocks. Application of experimental studies to natural systems. Reading from the literature and petrographic examination of pertinent examples.

455 Isotope Geology Fall. 3 credits. Prerequisite: Geological Sciences 355–356 or equivalent.

3 lecs. R. W. Kay.
Nucleosynthetic processes and the isotopic abundance of the elements. Dating by Pb, Ar, Sr, and Nd isotope variations. Theories of crustal and mantle evolution. Pleistocene chronology using U-series and ¹⁴C dating. Time constants for geochemical cycles. The use of O and H isotopes as tracers in the earth's hydrosphere, and hydrothermal circulation systems.

456 Chemical Geology Spring. 3 credits.

Prerequisite: Geological Sciences 355–356 or equivalent.

3 lec. W. A. Bassett, R. W. Kay.

Crystallography and crystal chemistry of minerals and the methods for their study. Thermodynamic evaluation of homogeneous and heterogeneous equilibrium and disequilibrium processes of geologic interest. Topics include crystal symmetry, mineral structures, x-ray diffraction, mineral equilibrium, and diffusion in minerals.

461 Mineral Deposits I Fall. 4 credits. Prerequisite:

Geological Sciences 356 or permission of instructor.

3 lec., 1 lab, field trip. A. K. Gibbs.

Introduction to mineral resources; sedimentary and magmatic deposits; topics in geochemistry; ore microscopy; and exploration methods.

462 Mineral Deposits II Spring. 4 credits.

Prerequisite: Geological Sciences 461 or permission of instructor.

3 lec., 1 lab, field trips. A. K. Gibbs.

Hydrothermal ore deposits; sulphide systems; related geochemical topics; mineral exploration.

471 Invertebrate Paleontology and Biostratigraphy Fall. 4 credits. Prerequisite:

Geological Sciences 102 and 376 or permission of instructor. Recommended prerequisite: some knowledge of biology.

2 lec., 1 lab. J. L. Cisne.

Fossil invertebrates. Anatomy, classification, and identification of stratigraphically important groups. Applications of paleontology to geochronology and reconstruction of past environments.

473 Stratigraphy Spring. 3 credits. Prerequisite:

Geological Sciences 376 or permission of instructor.

2 lec., 1 lab, field trip. S. B. Bachman.

Interaction of sedimentation and tectonics in development of stratigraphic sequences. Framework of deep ocean, active margin, passive margin, and cratonic sedimentation and stratigraphy. Seismic stratigraphy and the effects of sea-level changes on the stratigraphic record; sedimentary petrology and tectonism. Examples of modern and ancient margin and cratonic development.

[483 Marine Tectonics Fall. 3 credits.

Prerequisites: Geological Sciences 325 and a course in physics or geophysics. Not offered 1980–81.

2 lec., possible field trips. D. E. Karig.

Study of geophysical and geological characteristics of the earth's crust beneath the oceans. Review of strengths and limitations of marine exploratory techniques. Emphasis on recent geologic data concerning plate margins in the ocean, especially the island arc systems.]

[485 Physics of the Earth I Fall. 3 credits. Limited

to upperclass engineers, majors in the physical sciences, and others by permission of instructor. Not offered 1980–81.

2 lec., 1 lab. D. L. Turcotte.

Rotation and figure of the earth, gravitational field, seismology, geomagnetism, creep and anelasticity, radioactivity, earth's internal heat, continental drift, and mantle convection.]

488 Introduction to Geophysical Prospecting

Fall. 3 credits. Prerequisites: Physics 112–213 and Mathematics 191–192, or equivalents, or permission of instructor.

2 lec., S. Kaufman.

Physical principles, instrumentation, operational procedures, and interpretation techniques in geophysical exploration for oil, gas, and minerals. Seismic reflection, seismic refraction, gravity, and magnetic and electrical methods of exploration.

490 Senior Thesis Fall or spring. 2 credits.

Staff.

Thesis proposal to be discussed with adviser during the junior year. Participation requires acceptance of a thesis proposal by the faculty committee.

610–623 Seminars and Special Work Fall and

spring. 2 or 3 credits each term. Prerequisite:

permission of instructor.

Advanced work on original investigations in geological sciences. Topics change from term to term.

610 Tectonic and Stratigraphic Evolution of Sedimentary Basins W. B. Travers.**611 Petrology and Geochemistry** R. W. Kay.**612 Coastal Geomorphology or Quaternary Geology** A. L. Bloom.**613 Marine Geology** D. E. Karig.**614 Sedimentary Petrology and Tectonics** S. B. Bachman.**615 Topics in Mineral Resource Studies and Precambrian Geology** A. K. Gibbs.**616 Plate Tectonics and Geology** J. M. Bird.**617 Paleobiology** J. L. Cisne.**618 Geophysics, Exploration Seismology** L. D. Brown.**619 Earthquakes and Tectonics** B. L. Isacks.**620 Exploration Seismology, Gravity, Magnetism** S. Kaufman.**621 Geophysics, Seismology and Geotectonics** J. Oliver.**622 Geomechanics, Gravity, Magnetism, Heat Flow** D. L. Turcotte.**623 Mineralogy and Crystallography, X-ray Diffraction, Microscopy, High-Pressure-Temperature Experiments** W. A. Bassett.**[642 Glacial and Quaternary Geology** Spring.

3 credits. Prerequisite: Geological Sciences 345 or permission of instructor. Not offered 1980–81.

2 lec., 1 lab; several Saturday field trips.

A. L. Bloom.

Glacial processes and deposits and the stratigraphy of the Quaternary.]

681 Geotectonics Fall. 4 credits. Prerequisite:

permission of instructor.

2 lec., J. M. Bird.

Theories of orogeny; ocean and continent evolution. Kinematics of lithosphere plates. Rock-time assemblages of modern oceans and continental margins, and analogs in ancient orogenic belts. Time-space reconstructions of specific regions. Problems of dynamic mechanisms — corollaries and evidence from crustal features.

685 Advanced Geophysics I Fall. 3 credits.

Prerequisite: Geological Sciences 388 or 485.

3 lec., D. L. Turcotte.

Mantle convection, heat flow, the driving mechanism for plate tectonics, the energy balance, definition of the lithosphere.

686 Advanced Geophysics II Spring. 3 credits.

Prerequisite: Geological Sciences 388 or 485.

3 lec., D. L. Turcotte.

Gravity, figure of the earth, earth tides, magnetism, mechanical behavior of the lithosphere, changes in sea level.

[687 Seismology I Fall. 3 credits. Prerequisite:

T&AM 611 or equivalent. Offered alternate years. Not offered 1980–81.

3 lec-recs. B. L. Isacks.

Generation and propagation of elastic waves in the earth. Derivation of the structure of the earth and the mechanism of earthquakes from seismological observations.]

688 Seismology II Spring. 3 credits. Prerequisite:

Geological Sciences 687.

B. L. Isacks.

A continuation of Geological Sciences 687.

Field Courses

[601 Intersession Field Trip January intersession, 1 credit. Prerequisites: Geological Sciences 101–102 or equivalent and permission of instructor. Travel and subsistence expenses to be announced. Not offered 1980–81.

A trip of one week to ten days in an area of interesting geology in the lower latitudes. Interested students should contact the instructor during the early part of the fall semester.]

604 Western Adirondack Field Course Spring. 1 credit.

One week at the end of the spring semester.

W. A. Bassett.

Field mapping methods, mineral and rock identification, examination of Precambrian metamorphic rocks and lower Paleozoic sediments, talc and zinc mines. Students should be prepared for overnight camping and will have to pay for their own meals.

704 Western Field Course Spring. 6 credits.

Prerequisites: four courses in Geological Sciences at the 300 level, and permission of instructor. Students should be prepared for overnight camping and will have to pay for their own meals.

Weekly rec and 35-day trip to California, Nevada, and Utah. Staff.

A comparative study of California Coast Range, Sierra Nevada, Basin and Range of Nevada, and Uinta Mountains, Utah. Pretrip seminars and extensive reading at Cornell. Study of Mesozoic ophiolites, and subduction near San Luis Obispo, California; recent earth movements along the San Andreas Fault near San Francisco; granitic pluton emplacement and volcanism in the northern Sierra Nevada; multiphase mountain building near Dixie Valley, Nevada, sedimentology and block faulting of the Uinta Mountains, Utah. Five-day raft trip on the Green River through the core of the Uinta mountains. Visit to an oil field in California and a mine in Nevada. Lectures and field trips with local experts.

German

See Department of German Literature, p. 96, and Modern Languages, Literatures, and Linguistics, p. 92.

Government**Introductory Courses****111 The Government of the United States**

Spring. 3 credits.

T. J. Lowi.

An introduction to government through the American experience. Concentration on analysis of the institutions of government and politics as mechanisms of social control.

131 Introduction to Comparative Government and Politics Spring. 3 credits.

M. J. Esman.

A survey of the institutions, processes, and major problems of politics and government in contemporary

states. The structures and ideologies of different regimes, the relationships of individuals and groups to the state, the shaping and implementation of public policy, the regulation of political conflict, and the adaptation of political systems to changing conditions.

161 Introduction to Political Theory Fall. 3 credits.

W. J. Dannhauser.
A survey of the development of Western political theory from Plato to the present. Readings from the work of the major theorists; an examination of the relevance of their ideas to contemporary politics.

181 Introduction to International Relations Fall. 3 credits.

G. H. Quester.
An introduction to the basic concepts and practice of international politics.

Freshman Seminars

100 Freshman Seminars Fall or spring. 3 credits.
Seminars will be offered in both the fall and spring terms. Consult the supplement issued by the department and the Freshman Seminar booklet for course descriptions and instructors.

Major Seminars

300 Major Seminars Fall or spring. 4 credits.
Consult the supplement issued by the department for course descriptions and instructors. Admission by application only. Forms are provided each term for students to indicate their seminar preferences and are available in 125 McGraw Hall. Nonmajors may be admitted upon application but government majors are given priority. Majors are encouraged to take at least one seminar course during the junior or senior year.

The following courses are open to sophomores, juniors, and seniors without prerequisites unless otherwise indicated.

American Government and Institutions

Government 111 is recommended.

302 The Impact and Control of Technological Change (also Economics 302 and CRP 440)

Spring. 4 credits.
S. Del Sesto.
The role of technology as a factor in social, economic, and political change is examined. Issues, institutions, and mechanisms in the control of technology, particularly environmental regulation, are discussed.

[303 American Democracy and the Limits to Growth] 4 credits. Not offered 1980-81.]

309 Interpretation of American Politics. Fall.

4 credits.
R. King.
The study of politics is always a theoretical enterprise. This course shall attempt to move beyond the description of specific institutions and policies to survey a broad literature bearing upon the general question: What sort of polity exists in America?

310 Power and Poverty in America Spring.

4 credits.
R. King.
The United States is a stratified society conspicuous for great disparities in the allocation of income and wealth. Given democratic political institutions, one might have expected substantial popular efforts at redistribution. After reviewing the surprisingly small net fiscal effect of the federal government, we shall turn to explicitly welfare programs, surveying their particular forms and results. The principal goal for the term is to examine poverty policies insofar as they shed light on the conventional social science question: Who rules America? Attention will be given

to competing interpretations of the partition of political power, to the modes of organization and participation of the poor, and to conditions necessary for significant readjustments in policy focus.

311 Urban Politics Fall. 4 credits.

M. Shefter.
The interaction between urban problems and the politics of city government has resulted in important public policy issues in the United States. This course provides an introduction to the politics of metropolitan areas; analysis of the central institutions and processes of urban government such as mayors, city councils, elections, and the criminal justice system; and specific public policy problem areas such as race relations, education, housing, law enforcement, and civil disorder.

312 Urban Affairs Laboratory Fall or spring (if 40

students register). 4 credits. Open to both undergraduate and graduate students but by application only (forms are available at G32 Uris Hall). Fee for course materials, \$20.
D. E. Van Houweling, P. Vaughan.

An interdisciplinary course in urban affairs that emphasizes learning by experience in an urban game rather than lectures or reading assignments. By playing roles in a simulated city, students test their solutions for environmental and other urban problems. The roles include city councilperson, city manager, environmental quality agency director, newspaper editor, industrialist, community organizer, land speculator, and planner.

313 The Nature, Functions, and Limits of Law

Spring. 4 credits.
K. L. Hanslowe.
A general education course for students at the sophomore and higher levels. Law is presented not as a body of rules, but as a set of varied techniques for resolving conflicts and dealing with social problems. The roles of courts, legislatures, and administrative agencies in the legal process is analyzed, considering also the constitutional limits on their power and practical limits on their effectiveness. Readings consist mainly of judicial and administrative decisions, statutes and rules, and commentaries on the legal process.

[314 Common Law and Lawyers in America]

4 credits. Not offered 1980-81.]

316 The American Presidency Fall. 4 credits.

A. T. Dotson.
Analysis of the politics of the presidency and the executive branch with emphasis on executive-legislative relations, executive branch policymaking, and the problems of the modern presidency.

317 Political Parties and Elections Spring.

4 credits.
B. Ginsberg.
The relationship between citizen participation and public policy is one of the central questions of democratic politics. This course will focus on American voting behavior, the role of political parties, and the links between citizens' choices at the polls and the behavior of public officials.

318 The American Congress Spring. 4 credits.

M. Shefter.
The role of Congress in the American political system. Topics to be discussed: the political setting within which Congress operates, the structure of Congress, the salient features of the legislative process, and recent congressional behavior in a number of policy areas.

319 American Political Behavior Spring.

4 credits.
P. G. Leeds.
Examines those factors (political, social, economic, and psychological) that affect the formation, development, and organization of political opinions

and attitudes and the impact of these political attitudes on an individual's political behavior. The main focus of the course concerns the interplay between normative requirements for participation in a democratic society and the actual empirical investigation of the existing quality and level of participation in the United States.

[321 Public Policy and Public Revenues]

4 credits. Not offered 1980-81.]

323 The "Fourth" Branch Spring. 4 credits.

A. T. Dotson.
The national administrative branch is examined. Particular attention is given to the constitutional and political problems that result from the rise of administrative power.

327 Civil Liberties in the United States Spring.

4 credits.
J. Rabkin.
An analysis of contemporary issues in civil liberties and civil rights, with emphasis on Supreme Court decisions. Cases are analyzed in terms of democratic theory and the social and political context in which they arose.

328 Constitutional Politics: The United States

Supreme Court Fall. 4 credits.
J. Rabkin.
The course investigates the role of the Supreme Court in American politics and government. It traces the historical development of constitutional doctrine and the institutional role the court has played in American politics.

406 Politics of Education Fall. 4 credits.

E. W. Kelley.
Education is simultaneously America's biggest business and the set of formal and informal processes through which skills and values are passed on to the next generation. A topic involving both basic values and so much money must be the subject matter of politics. This course will deal with conflicts about and the politics of education as they occur at both national and state levels. What (including values) will be taught, to whom; who will benefit from formal education as a vehicle for entry into economic opportunity? What are the powers and restrictions on both state and national government in this area? How does the American system, in particular, its politics, differ from other systems? These and other questions, like the effects of constitutional, electoral, and legislative rules and structures on educational policies, will be considered.

[411 Political and Economic Power in Cities]

4 credits. Not offered 1980-81.]

412 Size of the State Spring. 4 credits.

R. King.
The size and scope of government has become a particularly important political issue in recent years. We tend, however, to suffer from considerable ignorance regarding the patterns and biases of policy in America. This course is intended as a research workshop to trace the expansion of the federal government and its programs and to develop relevant explanations.

426 Science, Technology, and Public Policy (also

B&PA NPA 504) Spring. 4 credits.
R. Brickman.
The major trends, issues, and implications of the public policies supporting research and technological innovation are reviewed. General problems such as the organization of science policymaking in government and the impact of policies on university and industrial research and development are covered. Specific sectors of research and development policy to be discussed include military research, energy research, and science and technology in international affairs.

428-429 Government and Public Policy: An Introduction to Analysis and Criticism 428, fall; 429, spring. 4 credits each term. Open to undergraduates with permission of instructor.
T. J. Lowi.

The analysis and criticism of public policies and the governments and politics responsible for them is stressed in Government 428. 429 is a weekly workshop for a smaller group, concentrating on problems for research, writing, and publication.

Comparative Government

Government 131 is recommended.

330 Soviet Union: Politics, Economics, and Culture Fall. 4 credits.

M. Rush, G. Gibian, and G. Staller.
Interdisciplinary survey of the USSR since the Revolution, with emphasis on contemporary developments.

[332 Politics and Society in France and Italy 4 credits. Not offered 1980-81.]

333 Government and Politics of the Soviet Union Spring. 4 credits.

M. Rush
A focus on the politics of the top leaders, the institutions through which they operate, and the impact of their policies on the Soviet people. Emphasis is also on phases in the development of the Soviet system on the ways in which the Soviet Union served as the prototype for all subsequent Communist states, as well as on the variant forms that have appeared in other states.

[334 Business and Labor in Politics Fall. 4 credits. Not offered 1980-81.]

[335 Cuba: Culture and Revolution 4 credits. Not offered 1980-81.]

340 Latin American Politics Spring. 4 credits

E. G. Kenworthy.
An introduction to the national politics of the larger Latin American nations, focusing on the post-1964 era. Explanations for the dominant pattern of authoritarian rule will be sought, and alternatives to this pattern explored.

[341 Society and Politics in Central Europe 4 credits. Not offered 1980-81.]

342 Government and Politics of Canada Fall. 4 credits.

M. J. Esman.
This course is an introduction to the government and politics of Canada. It will emphasize the following subjects: (1) the operations of a Federal system in a large and heterogeneous country within the framework of a cabinet-parliamentary system of government at both the Federal and Provincial levels; (2) tensions between English and French speaking Canadians and their effects on the political and economic unity of the country; (3) Canada's experience with economic management and comprehensive welfare state programs; and (4) the changing pattern of relations between Canada and the United States.

[344 Government and Politics of Southeast Asia 4 credits. Not offered 1980-81.]

[346 Politics in Contemporary Japan 4 credits. Not offered 1980-81.]

347 Chinese Government and Politics Spring. 4 credits.

D. P. Mozingo.
An examination of the politics of modern China including the breakdown of the traditional order and the revolutionary struggle of the Chinese Communist party. Primary emphasis on the institutions, methods, policies, and problems of the Communist regime since 1949.

[348 Politics of Industrial Societies 4 credits. Not offered 1980-81.]

349 Political Role of the Military Fall. 4 credits.

B. R. O'G. Anderson.
Comparative study of selected modern states and types of political systems in which the military have played a major role in domestic politics. Attention is given to the social and ideological character of the politicized military and various forms of military government.

350 Comparative Revolutions Spring. 4 credits.

D. P. Mozingo.
An analysis of major revolutionary movements since World War II; their sociopolitical origins, ideology, and organization, with special emphasis on contrasting strategies and roads to power.

351 Local Democracy in Britain and France Spring. 4 credits.

D. Ashford.
Comparison of municipal and local government policies with particular interest in central controls, municipal reform and local politics in unitary systems of government. The impact of the welfare state on local democracy and participation will be studied as it relates to regional politics and planning, spending controls, party organization and voluntary organizations. The central question will be how, if at all, local democratic influence is exercised over policymaking at higher levels of government.

352 The Roots of Greek Civilization (also Near Eastern Studies and College Scholar 346) Fall. 4 credits. Prerequisite: permission of instructor.

M. Bernal.
The course will investigate the present paradigm or general framework used to explain the origins of Mycenaean and Classical Greece. It will focus on the use of history, linguistics, and archeology to sustain it. The course will then examine the rise and social context of each of these disciplines and the political function of ancient Greece in the nineteenth and twentieth centuries. There will be a close reading of fifth century Greek writers on their past. An alternative paradigm will then be suggested and the problems of competing paradigms will be discussed.

Some knowledge of Greek and/or Hebrew would be helpful but it is not necessary. The Greek writers will be read in English and although ability to read the originals would be an advantage, the questions being studied can be approached through the translated texts.

353 Women and Politics (also Women's Studies 353) Spring. 4 credits.

M. Katzenstein.
This course considers alternative ideologies about the relationship between men and women in the family and in the marketplace; the strategies that women have used to assert claims to equality; and the results of government policies for the status of women in both liberal and revolutionary societies.

[355 From Politics to Policy: The Political Economy of Choice 4 credits. Not offered 1980-81.]

356 Elites and Society: The Political Economy of Power Spring. 4 credits.

N. T. Uphoff.
For students who have an interest in the nature and uses of power in politics. Consideration of how power has been treated by earlier political thinkers and by contemporary social scientists. Propositions will be formulated and critiqued about the distribution and consequences of power in America, other industrialized societies, and in the Third World, and their implications for the making of public policy. A game-simulation, "Third World Power Play," is undertaken at the end of the course.

[357 Political Development in Western Europe 4 credits. Not offered 1980-81.]

[358 Politics of the Middle East 4 credits. Not offered 1980-81.]

430 The Politics of Productivity: Germany and Japan Fall. 4 credits.

P. Katzenstein, T. J. Pempel.
Defeated in World War II, West Germany and Japan today are among the most prosperous, stable democracies in the industrial world. In the postwar era West Germany and Japanese policies reflect an osmosis of American political precepts, imposed by the occupation forces, overlaid onto historical traditions marked by delayed industrialization, authoritarianism, and fascism. This course analyzes key aspects of West German and Japanese political strategies at home and abroad in the light of their domestic power structures and international constraints.

[435 Politics of Decentralization and Local Reform 4 credits. Not offered 1980-81.]

446 Comparative Communism Spring. 4 credits.

M. Rush.
This seminar deals with regimes that claim to be committed to the Marxist-Leninist program for the realization of socialism and communism. Similarities and differences among countries of the Soviet bloc, China, and Yugoslavia are investigated.

456 Policymaking in Britain and France 4 credits. Fall.

D. Ashford.
Historical and contemporary efforts to shape the social, economic, and institutional forces within unitary governments. The major problems to be considered are control of the bureaucracy, economic planning, industrial relations and trade unions, devolution and regional movements, race and migrant labor policies. The central issue will be who makes policy in the European welfare state.

[459 Politics in Contemporary Europe: The Politics of the Left 4 credits. Not offered 1980-81.]

Political Theory

Government 161 is recommended.

361 Modern Ideologies: Liberalism and Its Critics Spring. 4 credits.

I. Kramnick.
Since the rise of capitalism, one political ideology has been dominant in the Western world — liberalism. However, its hegemony has been questioned by a series of critics: democracy, socialism, anarchism, conservatism, Freudianism, and feminism. This course will study the tensions between liberalism and these critics and speculate on the possible survival or extinction of this venerable and very American ideology.

[363 Classics in Political Thought 4 credits. Not offered 1980-81.]

364 Liberty, Equality, and the Social Order Fall. 4 credits.

D. Meyers.
We consider the accounts of liberty and equality provided by several major political philosophers, including Hobbes, Locke, Rousseau, and Mill; and we examine their proposals for embodying these concepts in political institutions. We will also read recent discussions of these issues.

[367 The Logic of Liberalism 4 credits. Not offered 1980-81.]

368 Economic Models of Politics Fall. 4 credits.

E. W. Kelley.
Economic factors influencing the structure of political systems and economic models of such systems are

considered. The rationalistic presumptions underlying some such models are introduced and modified. Applications to enduring policy arenas may be made.

[373 Feminist Political Thought 4 credits. Not offered 1980–81.]

375 American Political Thought Spring. 4 credits. W. J. Dannhauser.

Survey of American political thought with discussion of puritan thought, constitutional theory, selected nineteenth-century literature, and contemporary political science.

376 Marx Fall. 4 credits. S. Buck-Morss.

Readings in Marx's philosophical, economic, and political writings. Analysis of Marxism as a way of thinking: basic concepts and epistemological structures of his theory, within the context of nineteenth-century historical events. Lectures draw on twentieth-century interpretations as an introduction to the historiography of Marxism and its controversies, to the politics of scholarship, and to the creative process involved in the historical reproduction of an idea.

379 Freud Spring. 4 credits. S. Buck-Morss.

Analysis of Freud's own writings on psychological and social theory, clinical practice, and analytic method. Consideration of the political implications of these texts and their philosophical contribution. Critical discussion of post-Freudian revisions of the theory, including Left Freudianism, ego-psychology, and radical feminism.

International Relations

Government 181 is recommended.

382 Integration in the World System Spring. 4 credits. S. Jackson.

This seminar explores theories of interdependence, regional integration, and dependency as particular applications of the generalized concept of integration in the world system. Readings include works by Deutsch, Haas, Keohane, Nye, Lenin, Cardoso.

383 Theories of International Relations Spring. 4 credits. R. Rosecrance.

A survey of relevant theories of international relations, emphasizing war prevention and conflict resolution. Theories will be tested against the international experience of the past two centuries.

384 Defense Policy and Arms Control Spring. 4 credits. G. H. Quester.

The requirements for military defense and the problems caused by it are analyzed. Subjects covered include nuclear deterrence reasoning, military strategy, approaches to disarmament, the working of military-industrial complexes, and defense budgeting and policy procedures.

385 Contemporary American Foreign Policy Fall. 4 credits. R. Rosecrance.

An analysis of the dilemmas that have confronted American foreign policy since 1945, both specific problems and more general questions of capabilities, priorities, and morality.

386 Structure and Process in the Global Political Economy Fall. 4 credits. S. Jackson.

We will examine the global structures and transnational processes which constrain and condition economic development. We will look at global structures through the operations of multinational corporations, international trade, and world debt. We will look at transnational decision

making at the nongovernmental, official bilateral, and official multilateral level, including such actors as governments, the United Nations Conference on Trade and Development, and the Roman Catholic Church, with an emphasis on North-South relations.

387 The United States and Asia Spring. 4 credits. G. McT. Kahin.

The relations of the United States with the major states of Asia and with those smaller countries (especially Vietnam) with which it has been particularly concerned are analyzed. Attention is also given to the relationship of American policy to the Asian policies of France, Great Britain, and Soviet Russia.

389 International Law Fall. 4 credits. L. Scheinman.

Characteristics of international law: its theoretical foundations, principles, processes, and relationship to international politics. Emphasis on law-in-action. Attention to both traditional problems (intervention, coercion, the scope and limits of adjudication) and contemporary trends and processes (arms control, outer space, exploitation of seabed resources, the individual in international law, and cooperative patterns of socioeconomic relations at global and regional level). Content may vary according to international events.

[390 The Foreign Policy of China 4 credits. Not offered 1980–81.]

478 Accumulation on a World Scale Spring. 4 credits. S. Jackson.

In *Accumulation on a World Scale*, Samir Amin has developed the nearest thing to a comprehensive explanation for underdevelopment in the periphery of the world system to emerge from recent critical theorists of global political economy. In this course, we will examine Amin chapter by chapter, looking at the growing body of systematic evidence relevant to an evaluation of Amin's theory.

479 Dependencia and the State Fall. 4 credits. S. Jackson.

In the first half of this course, we will examine closely a sampling of the principal theoretical and empirical works that seek to explain the constraints on and possibilities for state action in dependent societies. We will focus particularly on those factors arising directly from the location of countries in the global system, including the role of multinational corporations, the World Bank, and military aid. In the second half of the course, each student will select and complete a research project on a question related to dependencia and the state. We will operate as a research workshop to define, guide, present, and critique the research being done by each member of the workshop.

[480 Foreign Economic Policies of Advanced Industrial Societies 4 credits. Not offered 1980–81.]

[481 Foreign Policy of the USSR 4 credits. Not offered 1980–81.]

[482 Imperialism and Dependency 4 credits. Not offered 1980–81.]

[483 Political and Economic Interdependence 4 credits. Not offered 1980–81.]

[485 Logic and Methods of Research in International Relations 4 credits. Not offered 1980–81.]

490 International Politics of Energy Spring. 4 credits. L. Scheinman.

The political, economic, and technical dimensions of international energy problems with principal emphasis on alternatives to an oil-based economy,

and in particular nuclear energy. Dynamics of supplier cooperation, national energy policymaking, and corporate behavior are evaluated as are the potential ability of technological changes to transform the nature of the problem. Attention is given to the impact of the energy situation on the course of world order and the structure of international politics.

Political Methodology

[391 Human and Social Statistics 4 credits. Not offered 1980–81.]

Honors Courses

400 Honors Seminar: Political Analysis Fall. 4 credits. Limited to honors students. M. Shefter.

494 Honors Thesis Fall or spring. 8 credits.

In their senior year, honors students will be required to take Government 494, in which they will prepare and write an honors thesis — an extended piece of original independent research. Before the end of the semester that precedes the semester in which the thesis is to be written, each participant must submit an approved proposal to the department office. Proposal forms may be obtained from the undergraduate secretary in 125 McGraw Hall. Honors theses are given to a second reader for evaluation and students are examined orally on their work by the two faculty members involved. In cases where students feel the need for a period of preparatory work before undertaking an honors thesis, they may make use of the option available under Government 499.

Supervised Study

Except under very unusual circumstances supervised study, Government 499, is open only to government majors doing superior work in the major. The application form may be obtained in 125 McGraw Hall and must be approved by the Director of Undergraduate Studies for credit to be granted. There is no limit established for the total number of credits in 499 a government major may take while at Cornell, but he or she may count no more than 4 credits toward fulfillment of the major. Students who wish to continue taking Government 499 for more than one semester must select a new theme or subject each semester, and applicants must present a well-defined program of study that cannot be satisfied by taking regular courses. Credit can be given only for work that results in a satisfactory amount of writing. Emphasis is on the capacity to subject a body of related readings to analysis and criticism. The permission of the instructor is required.

499 Readings Fall or spring. 1–4 credits. Staff.

Graduate Seminars

Qualified undergraduates are encouraged to apply for seminars listed with 600 course numbers. Consult the supplement which lists graduate courses, available in the department office.

Field Seminars

601 Scope and Method of Political Analysis Spring. 4 credits.

P. G. Leeds, R. Rosecrance. This seminar offers an overview of the main problem areas and theoretical orientations in the four subfields of contemporary political analysis: political theory, American politics, comparative politics, and international relations. Selected topics, including questions of research design, are treated through a reading of the best contemporary literature. The broad issues of the philosophy of social science or specific techniques of analysis may also be addressed.

602 Field Seminar in Methodology Fall. 4 credits.

E. W. Kelley.
Some attention is given to general problems of research design and hypothesis formulation. Emphasis is on measurements and hypothesis testing. Topics to be covered include statistics, both parametric and nonparametric; unidimensional and multidimensional scaling; data theory; and causal modeling.

603 Field Seminar in American Politics Fall. 4 credits.

P. Leeds, B. Ginsberg.
The basic issues and institutions of American government and the various subfields of American politics are introduced. The focus is on substantive information and theoretical analysis and problems of teaching and research.

604 Field Seminar in Public Policy Spring. 4 credits.

D. Ashford.
An introduction to the study of public policy. Various analytical approaches will be presented: models of public choice and political economy; analysis of bureaucratic politics, executive and political leadership, and interest groups and public opinion; economic analysis of public finance and welfare economics; and organization theory, game theory, and decision theory as these relate to the analysis of public policy formation and applications.

605 Field Seminar in Comparative Politics Spring. 4 credits.

T. J. Pempel, B. Anderson.
An introduction to selected theoretical problems in the study of comparative politics and to their application in empirical analysis. Basic problems are social class and politics; authority and legitimacy; participation and mobilization; economic development and democracy; authoritarian and totalitarian politics; corporatism and pluralism; nation building and political integration.

606 Field Seminar in International Relations Fall. 4 credits.

P. Katzenstein.
A general survey of the literature and propositions of the international relations field. Criteria are developed for judging theoretical propositions and are applied to the major findings. Participants will be expected to do extensive reading in the literature as well as research.

607 Field Seminar in Political Thought Spring. 4 credits.

I. Kramnick.
An introduction to political theory through a reading of selected classics in political thought from Plato to Marx.

American Government and Institutions**614 Supreme Court, Politics, and the Constitution** Spring. 4 credits.

J. Rabkin.
A study of American public and constitutional law.

[618 American Political Behavior 4 credits. Not offered 1980-81.]**621 Elections and Public Policy** Spring. 4 credits.

B. Ginsberg.
The relationship between citizen voting and public policy is one of the central questions of democratic politics. This course will focus on American voting behavior, the role of political parties, and the linkages between citizen choices and the behavior of public officials.

[623 Capitalism, the State, and the Economy 4 credits. Not offered 1980-81.]**624 American Political Development** Spring. 4 credits.

M. Shefter.

An analysis of the sources of change in American politics, focusing upon periodic realignments in American politics and the consequences of such changes for the nation's political institutions. The applicability of cross-national theories of political development to the United States will be considered. Implications for recent changes in the party system and legislative-executive relations will be discussed.

Public Policy**628 Politics of Technical Decisions I (also B&PA NPA 515 and CRP 541)** Fall. 4 credits.

S. Del Sesto.

629 Politics of Technical Decisions II (also B&PA NPA 516 and CRP 542) Spring. 4 credits.

The political aspects of public policy decisions are traditionally regarded as technical problems. Exploration of the concept of technical decisions and the characteristics of a technological society, with discussion of how decisions are determined or limited by the technologies involved, the institutions of technical decision making, the sources and implications of depoliticization, and the rise of citizen opposition to technological development.

Comparative Government**637 Theories of Decentralization** Spring. 4 credits.

D. Ashford.
The problem of decentralizing power in the modern state will be analyzed from the perspective of political, spatial, ecological, and functional theories of the modern state. The major efforts to strengthen lower-level governments both regionally and locally will be considered particularly in respect to the exercise of financial, budgetary, and regulatory control by the center. The relative advantages of federal and unitary governments will be assessed in relation to localized control and its effectiveness in formulating and implementing policy in the welfare state.

639 Politics of the Soviet Union Fall. 4 credits.

M. Rush.
A reading seminar on major works dealing with the Soviet political system, with special emphasis on higher politics, recent foreign policy, the nationality question, and the Brezhnev succession.

642 The Politics of Communalism Fall. 4 credits.

M. J. Esman.
Investigation of the politics of racial, ethnic, religious, linguistic, and cultural pluralism. Emphasis is on subnational pluralism, the implications of communal cleavages for political and economic development, and strategies for the managements of various expressions of communal conflict. Relationships between modernization and communal pluralism are focused on, and the manifestation of these phenomena in contemporary United States experience is considered.

[645 Politics of China 4 credits. Not offered 1980-81.]**[647 Political Anthropology: Culture and Revolution in Indonesia (also Anthropology 628)** 4 credits. Not offered 1980-81.]**648 Political Economy of Change: Rural Development in the Third World** Fall. 4 credits.

N. T. Uphoff.
The substantive focus is on economic, social, and political change in Third World countries, particularly with reference to rural development. The analytical approach integrates economic, social, and political factors into a common framework for dealing with policy choices and political action. Special attention is given to different instruments for promoting rural development in Third World countries.

651 Readings from Mao Zedong Fall. 4 credits

Prerequisite: two years of Chinese or permission of instructor.

M. G. Bernal.
The seminar will study the official and unofficial writings of Mao Zedong in the light of Chinese revolutionary history and Mao's own intellectual development. Special attention will be paid to the Anarchist strands in Mao's thought and to their relative importance vis-a-vis his Marxism-Leninism.

[652 Political Problems of Southeast Asia 4 credits. Not offered 1980-81.]**[655 Latin American Society and Politics** 4 credits. Not offered 1980-81.]**656 Comparative Institutions and the Welfare State** Fall. 4 credits.

D. Ashford.
An analysis of the prevailing theories about the institutional inadequacies of unitary governments, especially Britain and France. Attention will be given to the difficulties of clearly formulating policy alternatives, the weaknesses of present participatory and electoral arrangements as well as the problems of modern legislatures, party leaders, and party organizations in influencing policy. The tendencies of the welfare state to enhance the power of bureaucracy will be studied using case studies and institutional reform proposals evaluated in the light of the welfare state.

[659 Political Transitions in Western Europe 4 credits. Not offered 1980-81.]**Political Theory****[666 The Political Philosophy of Nietzsche** 4 credits. Not offered 1980-81.]**[667 Philosophical Foundations of Contemporary Politics: Rawls and Nozick** 4 credits. Not offered 1980-81.]**[668 Foundations of English Liberalism** 4 credits. Not offered 1980-81.]**669 Modern Social Theory** Fall. 4 credits.

S. Buck-Morss.
Theories that map out as structures the points where personal and social history intersect (in language, cognition, institutions), and developmental theories that deal with temporal transformations of such structures. Readings from the works of Durkheim, Mauss, Saussure, Lévi-Strauss, Althusser and Godelier, Foucault, Aires, Habermas.

670 Toward a Feminist Social Theory Spring. 4 credits.

S. Buck-Morss.
Readings in the nineteenth-century origins of social theory to discover what is *not* there: i.e., a conception of "society" as a space from which women are not excluded, and in which domestic economy is not treated separately from political economy, nor private life from public life, nor personal oppression from political oppression. The course is exploratory. We will criticize old concepts and try to formulate new ones.

673 Economic Models of Politics Fall. 4 credits.

E. W. Kelley.
Both economic factors influencing the structures of political systems and economic models of such systems are considered. The rationalistic presumptions underlying such models are introduced and modified. Applications to enduring policy arenas may be made.

678 Greek Political Philosophy Fall. 4 credits.

W. J. Dannhauser.
Studies in the political thought of Plato and Aristotle. Readings will consist of Plato's *Republic* and *Laws*, Aristotle's *Ethics* and *Politics*.

International Relations

686 International Strategy Fall. 4 credits.
R. Rosecrance.

Doctrines of deterrence and defense, particularly upon their interaction in American policy since 1945, are focused on. The relationship between doctrine and the type of international system (bipolar or multipolar) is considered and other means of equilibration in the international system are investigated.

687 The United States and Southeast Asia

Spring. 4 credits.

G. McT. Kahin.

American Southeast Asian policies: their genesis, character, impact, and long-term consequences. Elements involved in the formation of American policies toward Southeast Asia by the several postwar administrations (Truman through Carter) including international factors and American domestic politics. The ways in which these policies have been applied and their influence on political forces within the countries of Southeast Asia and upon American policies towards other countries.

692 The Administration of Agricultural and Rural Development Spring. 4 credits.

M. Esman, N. Uphoff.

The political, bureaucratic, economic, and technical environments of administration for agricultural and rural development; the various functions involved in administration (personnel management, planning, budgeting, economic analysis, information systems); several major tasks (research, extension, services, and infrastructure development); and specific problems of integrating activities, interfacing with rural populations, and utilizing external assistance. Intended primarily for persons who expect to have some future responsibilities in agricultural or rural development administration in Third World countries.

Greek

See Department of Classics, p. 62.

Hebrew

See Department of Near Eastern Studies, p. 108.

Hindi-Urdu

See Modern Languages, Literatures, and Linguistics, p. 92.

History

Freshman Seminars

[105 The Growth of Political Democracy in the United States] Fall. J. H. Silbey. Not offered 1980-81; next offered 1981-82.]

[107 The Family in American History] Spring. M. B. Norton. Not offered 1980-81.]

108 Civil Liberties in the United States Spring. 3 credits. Prerequisite: permission of the instructor.
T R 2:30. R. Polenber.

Freedom of speech and dissent from Jefferson's time to the present, with emphasis on the twentieth century. Topics include Jefferson and Burr; Lincoln and martial law; war and the Supreme Court; the ACLU and the New Deal; the relocation of Japanese-Americans; the cold war and

anticommunism; religious cults and censorship; John Milton, John Stuart Mill, and the critique of libertarianism.

110 Science and Society in Mid-Victorian Britain Fall. 3 credits. Prerequisite: permission of instructor.
T R 3:35-4:50. J. Richards.

The course will focus on intellectual and cultural issues raised by specific scientific advances in Britain in the late nineteenth century. Questions raised by Darwin's evolutionary theory of biology, by attempts to develop sciences for the study of the human mind and human society, and by the development of non-Euclidean geometry are representative of those to be considered. Readings will be taken primarily from the extensive periodical literature of the period, supplemented by occasional secondary treatments of mid-Victorian culture and science.

[112 The North Atlantic Community and the Wider World] Fall. T. H. Holloway. Not offered 1980-81.]

114 Seminar on American Foreign Policy Fall. 3 credits. Open to freshmen and sophomores. Limited to 12 students; preference will be given to non-history majors. Prerequisite: permission of instructor.
T 1:25-3:20. W. LaFeber.

Fall 1980 topic: The presidency and foreign policy in the cold war.

119 Race Relations in American History Fall. 3 credits.
M W 2:30. D. Usner.

A comparative approach to the interaction among Native Americans, Euro-Americans, and Afro-Americans. Major themes and changing contexts of race relations from the colonial period to the present will be explored.

146 America in the Camera's Eye Spring. 3 credits. Open to freshmen and sophomores. Prerequisite: permission of instructor.
M W 1:25. R. L. Moore.

The seminar will attempt to assess the value of visual material (especially photography) in understanding twentieth-century American history. Students will read and view the work of some leading American photographers in an effort to understand how the camera has both reflected and helped create America's perception of itself. Frequent papers aim at helping students develop a vocabulary to articulate their reactions to visual material.

151-152 Introduction to Western Civilization 151, fall; 152, spring. 4 credits each term. History 151 is not a prerequisite to 152. Either term or both may be used to fulfill the Freshman Seminar requirement.

Fall: T R 9:05, plus disc to be arranged; spring: T R 9:05, plus disc to be arranged. L. P. Williams.
A survey of European history, History 151 covers antiquity to the Reformation; 152 spans the sixteenth century to the present day. The major political and social developments and the intellectual heritage of the West are both studied. A considerable portion of the reading is drawn from contemporary sources.

[171 Revolution and Russian Society] W. M. Pintner. Not offered 1980-81.]

[174 Foodways: A Social History of Food and Eating] Fall. S. L. Kaplan. Not offered 1980-81.]

176 Britain and the Second World War Fall. 3 credits. Prerequisite: permission of instructor. Sophomores may enroll.
W 2:30-4:30. Freshman Seminar students must have M 3:35 available for writing class.
D. A. Baugh.

The aim is to uncover the true facts of Britain's conduct and situation from 1936 to 1946. Emphasis is on the fighting on land, sea, and in the air, but preparedness, economic warfare, diplomacy, and

imperial power are considered. Topics include the Battle of Britain, the Battle of the Atlantic, and strategic bombing.

192 Asia in the Western Mind Spring. 3 credits.
W 1:25-3:20. J. V. Koschmann.

Explores the functions of images of Asia and the Orient as they are employed in selected texts of Western literature and philosophy. In conjunction with a critique of such texts, the seminar will take up such problems as exoticism, stereotyping, projection, and the production of knowledge through classification and contrast.

[193 China and the West Before Imperialism] Spring. C. A. Peterson. Not offered 1980-81; next offered 1981-82.]

[194 Chinese Views of Themselves] Spring. S. Cochran. Not offered 1980-81; next offered 1982-83.]

Underclass Seminars

220 English Constitutional History to 1600 Fall. 4 credits. Prerequisite: permission of instructor.
M W 9:05. F. G. Marcham.

A study of Anglo-Saxon law and government; Norman administrative and legal ideas as they relate to monarchy and feudalism; evolution of central government under Henry II; Magna Carta; the evolution of Parliament and the central court system. Examination of laws, charters, royal decrees, financial records, and parliamentary documents, all in translation. Reading and discussion focuses on original documents; occasional lectures supply political narrative.

221 English Constitutional History, 1600 to the Present Spring. 4 credits. Prerequisite: permission of instructor.
M W 9:05. F. G. Marcham.

A study of the Tudor monarchy; constitutional conflicts of the seventeenth century; the Glorious Revolution; evolution of cabinet government; general governmental reform of the nineteenth century; twentieth-century democracy, the welfare state, and a nationalized economy. Statutes, parliamentary debates, court decisions, and the reports of commissions are examined. Reading is in original documents; occasional lectures supply political narrative.

225 Public Life and Literature in Nineteenth-Century Great Britain Fall. 4 credits. Prerequisite: permission of instructor.
T R 9:05. F. G. Marcham.

British political, constitutional, economic, and imperial history are studied in the light of Victorian prose, poetry, and drama. History and literature are both considered; history through lectures and discussions of constitutional documents; literature through comment upon readings. Authors assigned include Macaulay, Carlyle, Tennyson, Mill, Darwin, Huxley, Gilbert and Sullivan, and Shaw.

226 Public Life and Literature in Twentieth-Century Great Britain Spring. 4 credits. Prerequisite: permission of instructor.
T R 9:05. F. G. Marcham.

A study of British political, social, and constitutional history is paralleled by the reading of plays. Both history and literature are considered. The development of parliamentary democracy in Great Britain, the consequences for her of the two world wars, the emergence of the welfare state, the application to the economy of nationalization, and Great Britain's withdrawal from imperialism are presented. Among the writers read and discussed are Shaw, Barrie, Maugham, O'Casey, Sherif, and Eliot.

232 Urban Problems and Policy in Historical Perspective Spring. 4 credits.

R 10:10–12:05. S. Blumin.

This seminar seeks to better understand contemporary urban problems and the policies aimed at solving them by tracing their development over long periods of time in the context of the more general history of the American city. Common readings in American urban history will be followed by individual research projects in particular problem and policy areas.

Comparative History**360 Early Warfare, East and West** Fall. 4 credits.

M W 1:25; disc to be arranged. C. A. Peterson.

A study of the principal modes of warfare found both in the East and the West from ancient times up to the eighteenth century. Tactical evolution and the impact of innovations are stressed, but attention is also paid to the general social background and the role of nonmilitary factors.

[407 Death in Past Time Spring. S. L. Kaplan. Not offered 1980–81.]**[449 Comparative Slave Systems in the Americas** Fall. T. H. Holloway, M. B. Norton. Not offered 1980–81.]**History of Science****281–282 Science in Western Civilization** 281, fall; 282, spring. 4 credits each term. History 281 is not a prerequisite to 282.

M W 10:10, plus disc to be arranged. J. Richards. The development of scientific thought from antiquity to the present. Readings and discussions of original sources.

[284 Undergraduate Seminar in the History of Biology (also Biological Sciences 204 and College Scholar 284) Not offered 1980–81.]**[287–288 History of Biology (also Biological Sciences 201–202)** W. Provine. Not offered 1980–81.]**380 Social History of Western Technology**

Spring. 4 credits.

M W F 1:25. J. H. Weiss.

The interaction between technological changes and social changes in Western Europe and America since the eighteenth century is studied. Both instances of social transformation that accompanied technological changes and the role of technology in social thought and cultural expression receive attention. Special emphasis upon three periods: Britain during the Industrial Revolution, America in the nineteenth century, and America during the Vietnam War.

[385–386 Problems in the History of Biology W. Provine. Not offered 1980–81.]**[481–482 Science in Classical Antiquity**

L. P. Williams. Not offered 1980–81.]

680 Seminar in the History of Nineteenth-Century Physical Science Spring. 4 credits.

Hours to be arranged. L. P. Williams.

American History**201 Introduction to American History: From the Beginning to 1865** Fall. 3 credits. No prerequisites.

M W F 11:15. F. Somkin.

A basic chronological survey of events and problems. Topics include founding of the colonies and development of a colonial economy; the American Revolution and Constitution; Jeffersonian democracy; age of Jackson, westward expansion; North-South crisis and the Civil War.

202 Introduction to American History: From the Civil War to Recent Times Spring. 3 credits. No prerequisites.

Hours to be arranged. D. Usner.

275 Crime and Punishment: The American Vision from the Puritans to Mickey Spillane Fall.

4 credits. Limited to 25 students. No prerequisites.

R 1:25–3:20. F. Somkin.

A reading-discussion course. The changing relation between social sanctions and the transgressor will be examined in selected novels and other materials. Texts include fiction by Cooper, Stowe, Melville, Van Tilburg Clark, Richard Wright, James M. Cain, Dashiell Hammett, and Raymond Chandler.

[311–312 Structure of American Political History

J. H. Silbey. Not offered 1980–81; next offered 1982–83.]

[313–314 History of American Foreign Policy

W. LaFeber. Not offered 1980–81.]

316 Puritanism, the Enlightenment, and the Republic: American Cultural and Intellectual History to 1820 Fall. 4 credits. But

some background knowledge of the period is recommended.

T 1:25–3:20. F. Somkin.

Calvinism (the Puritans, the Protestant ethic, the Great Awakening and Jonathan Edwards); the Enlightenment (science and government); the early Republic (culture and ideology).

317 American Intellectual and Cultural History: The Nineteenth Century Spring. 4 credits. No prerequisites, but some background knowledge is recommended.

M W F 1:25. F. Somkin.

Ideas, movements, and thinkers. Topics include the conflict between ideals and reality, the individual and society; Mormonism; reform movements such as temperance, women's rights, communitarianism, and antislavery; Darwinism; the Gospel of Wealth; the rise of the originality and radicalism in technology, art, literature, and social thought.

318 American Constitutional Development

Spring. 4 credits.

M W F 11:15. M. B. Norton.

A study of the major themes of the constitutional history of the United States. Among the topics to be considered are the drafting of the Constitution, the Marshall and Taney courts, civil rights decisions of the nineteenth century, the rise of substantive due process, and the Warren court.

321 The Development of Early American Society

Spring. 4 credits.

M W F 10:10. D. Narrett.

This course will offer a survey of American history from the Age of Discovery to the outbreak of the American Revolution. Some of the major historical issues to be examined include the European origins of American civilization, the development of viable public institutions in a new society, and changes in the nature of political and social authority over time. Both the readings and lectures will emphasize the ways in which public events intersected with the private experiences of individuals — how American society was shaped by the activities of ordinary people as well as by the actions of famous individuals.

323–324 Native American History 323, fall; 324, spring. 4 credits each term.

M W F 12:20. D. Usner.

A two-semester survey of North American Indians from the beginnings of European contact to the present. Cultural, political, and economic changes experienced by particular societies will be covered. Emphasis given to general themes of Indian-White relations, comparative tribal histories, and the role of Native Americans in the overall history of the United States.

[325 Age of the American Revolution, 1763–1815 Fall. M. B. Norton. Not offered 1980–81; next offered 1981–82.]**326 Women in the American Society, Past and Present** Spring. 4 credits.

M W F 9:05. M. B. Norton.

A survey of women's experiences in America, from the seventeenth century to the present. Among the topics to be discussed are women's familial roles, the changing nature of household work, the women's rights movement, employment of women outside the home, and contemporary feminism.

[330 The United States in the Middle Period Fall.

J. H. Silbey. Offered alternate years. Not offered 1980–81; next offered 1981–82.]

[331 The American Civil War and Reconstruction Spring. J. H. Silbey. Offered

alternate years. Not offered 1980–81; next offered 1981–82.]

[332–333 The Urbanization of American Society S. Blumin. Not offered 1980–81.]**336–337 American Social History** 336, fall; 337, spring. 4 credits each term. History 336 is not a prerequisite to 337.

M W F 11:15. S. Blumin.

A history of American society, with emphasis on the transforming effects of such phenomena as industrialization, urbanization, immigration, national expansion, and institutionalization on the social life of anonymous Americans. The first semester will cover the colonial and Jacksonian eras, with emphasis on the latter; the second semester will focus upon the industrial-urban transformation of the period 1850–1920.

340–341 Recent American History, 1920 to the Present 340, fall; 341, spring. 4 credits each term. History 340 is not a prerequisite to 341.

T R 12:20; disc to be arranged. R. Polenberg.

History 340 topics include individualism and conformity in the 1920s; class, race, and ethnicity in the 1930s; Franklin Roosevelt and the New Deal; World War II, the atomic bomb, and the Nuremberg trials. 341 considers the Supreme Court and civil rights; McCarthyism and civil liberties; Kennedy, Johnson, and social reform; the Vietnam War and the protest movement; Watergate and the Carter presidency.

345 The Modernization of the American Mind

Fall. 4 credits.

M W F 11:15; disc to be arranged. R. L. Moore.

American thought and culture from 1890 to the present. Course emphasizes the intellectual impact of major political and economic events and the adaptation of social ideas and values to new conditions.

[346 Major Themes in American Religious History Not offered 1980–81.]**[411 Undergraduate Seminar in American Political History** J. H. Silbey. Not offered 1980–81.]**414 Motivations of American Foreign Policy** Fall. 4 credits. Prerequisites: History 314 and permission of instructor.

R 1:25–3:15. W. LaFeber.

Topic for 1980: American foreign policy and the Korean War, 1949–52.

[416 Undergraduate Seminar in American Cultural History F. Somkin. Not offered 1980–81.]**[418 Undergraduate Seminar in the History of the American South** J. H. Silbey. Not offered 1980–81; next offered 1981–82.]

419 Undergraduate Seminar in American Social History Fall. 4 credits. Prerequisite: permission of the instructor.

R 10:10–12:05. S. Blumin.
Topic for 1980–81: The evolving class structure of urban America.

[426 Undergraduate Seminar in Early American History] M. B. Norton. Not offered 1980–81.]

430 Law and Authority in America: Freedom, Restraint, and Judgment Spring. 4 credits.

Prerequisite: permission of instructor.

T 1:25–3:20. F. Somkin.
A reading-discussion course. Selected themes in the history of American law and authority will be studied. Topics may include the law of business and industry; criminal law; violence; the gun; sex and liquor regulation; anarchism; peculiar anomalies of our justice system.

440 Undergraduate Seminar in Recent American History Fall. 4 credits. Prerequisite: permission of instructor.

T R 2:30. R. Polenber.
Topic for 1980–81: Communism in America, 1917–57.

445 Undergraduate Seminar: Deviance and Conformity in a Liberal Society Spring. 4 credits. Prerequisite: permission of instructor.

T 1:25–3:20. R. L. Moore.
Reading and research to focus on constraints placed on religious practice in democratic America.

516 The Popular Mind in the United States Spring. 4 credits. Open to graduate students, majors in history or American studies, or other qualified students. Prerequisite: permission of instructor.

R 1:25–3:20. F. Somkin.
American popular culture: from the image of the hero and the myth of success to the world of the poolroom, the circus, the minstrel show, the dramatic and vaudeville stage, the cowboy epic, the gangster movie, and the tough-guy novel.

[521 Culture and Tradition in America] M. Kammen. Not offered 1980–81.]

[613–614 Graduate Seminar in American Foreign Relations] W. LaFeber. Not offered 1980–81.]

[615–616 Seminar in American Cultural and Intellectual History] F. Somkin. Not offered 1980–81.]

[617–618 Seminar in Recent American Cultural History] R. L. Moore. Not offered 1980–81.]

[619 Seminar in American Social History] S. Blumin. Not offered 1980–81.]

[626–627 Seminar in the History of American Women] M. B. Norton. Not offered 1980–81.]

[633–634 Seminar in Nineteenth-Century American History] J. H. Silbey. Not offered 1980–81.]

[710 Colloquium in American History] Fall. 4 credits. Required of all first-year American history graduate students. M 3:35–5:25. Staff. Not offered 1980–81.]

Asian History

190 Introduction to Asian Civilizations Spring. 4 credits.

T R 11:15; disc to be arranged. J. V. Koschmann, C. A. Peterson, and D. K. Wyatt.
An introduction to the distinctive cultures of China, India, Japan, and Southeast Asia, which proceeds by way of a broad examination of a period of particular significance in the history of each.

191 Introduction to Asian Civilizations in the Modern Period Fall. 4 credits.

T R 11:15; plus an additional hour, M 12:20, 1:25, or 3:35. J. V. Koschmann, D. K. Wyatt, and staff.
The history of Asian civilizations in modern times is introduced, focusing on the relationship between key figures and societies. English translations of autobiographies, novels, short stories, diaries, and other documents written by Asians are used to assess the perspectives, social priorities, and historical significance of intellectual and political leaders.

393 History of China Up To Modern Times Fall. 4 credits.

T R 10:10; disc to be arranged. C. A. Peterson.
A broad examination of the major aspects of Chinese culture and civilization from earliest times to the late imperial period. Seeks to expose both those features maintaining continuity and the significant (but frequently overlooked) instances of change.

394 History of China in Modern Times Spring. 4 credits.

T R 10:10; plus an additional hour to be arranged. S. G. Cochran.
A survey that concentrates on the rise of the last imperial dynasty in the seventeenth and eighteenth centuries, the upheavals resulting from domestic rebellions and foreign imperialism in the nineteenth century, and the twentieth-century efforts to achieve social mobilization and political unity.

395 Indochina and the Archipelago to the Fourteenth Century Fall. 4 credits.

T R 11:15; plus one hour to be arranged. O. W. Wolters.
A survey of the early history of Indochina and the Archipelago, with particular attention to questions raised in the source material concerning religious beliefs and political and social assumptions.

396 Southeast Asian History from the Fifteenth Century Spring. 4 credits.

W F 12:30; plus one hour to be arranged. D. K. Wyatt.
A survey focusing on cultural, social, and economic change in Southeast Asia.

398 History of Modern Japan Fall. 4 credits.

M W F 10:10. J. V. Koschmann.
A survey of Japan from the mid-eighteenth to the mid-twentieth centuries with special attention to changing configurations of institutional structure, knowledge, action, and conceptions of history. Major emphasis will be placed on the discussion of Japanese political, literary, and philosophical texts in translation, supplemented by lectures and secondary source materials.

492 Undergraduate Seminar in Medieval Chinese History Spring. 4 credits. Prerequisite: History 393, or permission of the instructor.

Hours to be arranged. C. A. Peterson.
Topic spring, 1980: The external relations of China from early times up to the Ch'ing dynasty. Emphasis will be placed on the interrelationship of Chinese history with Asian and Eurasian history as a whole, culturally as well as politically.

[493 Self and Society in Late Imperial and Twentieth-Century China] Fall. S. Cochran. Not offered 1980–81; next offered 1981–82.]

691 Chinese Historiography and Source Materials Spring. 4 credits. Prerequisite: permission of the instructor.

C. A. Peterson.
694 Problems in Modern Chinese History Spring. 4 credits. Prerequisite: permission of instructor.
Hours to be arranged. S. Cochran.

695–696 The Historiography of Southeast Asia 695, fall; 696, spring. 4 credits each term.

Prerequisite: permission of instructor.
Hours to be arranged. O. W. Wolters and D. K. Wyatt.

791–792 Seminar in Medieval Chinese History 791, fall; 792, spring. 4 credits each term.

Prerequisite: permission of instructor.
Hours to be arranged. C. A. Peterson.

[793–794 Seminar in Modern Chinese History] S. Cochran. Not offered 1980–81; next offered 1981–82.]

795 Seminar in Southeast Asian History Fall. 4 credits.

Hours to be arranged. D. K. Wyatt.
Topic for fall 1980: eighteenth-century southeast Asia.

Ancient European History

267 The Roman Republic Fall. 4 credits. Open to freshmen.

W F 10:10; disc to be arranged. A. H. Bernstein.
A survey of Roman Republic history from the origin of the city to the assassination of Julius Caesar. Special attention is paid to the development and nature of republican forms of government; to Rome's unification of the Italian peninsula and conquest and governance of the Mediterranean; to the course of the revolution that replaced the Republic with the imperial autocracy of the Caesars. Readings are drawn from the works of Polybius, Sallust, Cicero, Caesar, Livy, and Plutarch.

[268 Rome of the Caesars] A. H. Bernstein. Not offered 1980–81; next offered 1981–82.]

[460 Roman Imperialism] A. H. Bernstein. Not offered 1980–81; next offered 1981–82.]

461 The Roman Revolution Spring. 4 credits. Limited to 20 students. Prerequisite: History 267 or permission of instructor. An undergraduate seminar.

Hours to be arranged. A. H. Bernstein.
An inquiry into the causes and course of the Roman revolution from 146 to 44 B.C. Students will read from Sallust, Cicero, Caesar, Livy, Plutarch, and Appian, and will study modern analyses of the revolution. Where relevant, comparative materials will be used, especially on revolutions in twentieth-century agrarian societies.

[462 The High Roman Empire] A. H. Bernstein. Not offered 1980–81.]

[463 Decline and Fall of the Roman Empire] A. H. Bernstein. Not offered 1980–81.]

[561 Social and Economic History of Rome, 60 B.C. to A.D. 117] A. H. Bernstein. Not offered 1980–81; next offered 1981–82.]

[562 Roman Africa] A. H. Bernstein. Not offered 1980–81.]

[661 Graduate Seminar in Ancient Classical History] A. H. Bernstein. Not offered 1980–81.]

Medieval, Renaissance, and Early Modern European History

257 English History From Anglo-Saxon Times to the Revolution of 1688 Spring. 3 or 4 credits.

M W F 12:20. C. A. Holmes.
A survey of the government, social organization, and cultural and religious experience of the English, laying particular stress on the unification of the realm, the rise of Parliament, changes in agrarian organization, and the development of urban and commercial classes.

263 The Earlier Middle Ages Spring. 4 credits.
M W F 12:20. J. J. John.

A survey of medieval civilization from c. 300 to c. 1100, dealing with religious, intellectual, political, and economic developments in Western Europe.

264 The High Middle Ages Fall 4 credits.
T R 2:30–3:45. B. Tierney.

A survey of medieval civilization from c. 1100 to c. 1450, dealing with religious, intellectual, political, and economic developments in Western Europe. Lectures and class discussions.

350 Early Renaissance Europe Fall 4 credits.
T R 1:25; disc to be arranged. J. Najemy.

An exploration of the intellectual, cultural, religious, and political development of Western Europe from the age of Dante, Ockham, and Marsilius, through the several stages of Italian humanism from Petrarch to Pico, down to the generation of Machiavelli and Erasmus, with some attention to the economic, social, and demographic crises of the fourteenth and fifteenth centuries. Readings and topics about evenly divided between Italy and the North.

[351 Reformation and Counter-Reformation Europe] J. Najemy. Not offered 1980–81.]

[359 The Early Development of Anglo-American Common Law] C. A. Holmes. Not offered 1980–81.]

[361 Introduction to Renaissance Culture (also Comparative Literature 361)] E. Morris, J. Najemy. Not offered 1980–81; next offered 1981–82.]

[365 Medieval Culture, 400–1150] Spring. J. J. John. Not offered 1980–81; next offered 1981–82.]

366 Medieval Culture, 1100–1300 Spring. 4 credits. Prerequisite: History 264 or permission of instructor.

T R 2:30–3:45. J. J. John.
The origin and development of universities will be studied as background for a consideration of the scholastic mentality and its influence on the art, literature, philosophy, science, script, and theology of the period. Readings from Abelard, Hugh of St. Victor, Bonaventure, Thomas Aquinas, Dante, etc.

[367 Church and State during the Middle Ages] B. Tierney. Not offered 1980–81.]

368 Francis of Assisi and the Franciscans Fall. 4 credits. Prerequisite: any introductory course in a medieval subject.

W 2:30–4:30. B. Tierney.
A seminar with lectures, class papers, and class discussions. The course will begin with a detailed study of the early lives of Francis in translation, then consider the impact of the Franciscans on the medieval church and vice-versa.

369 The History of Florence in the Time of the Republic 1250–1530 Spring. 4 credits.
T R 11:15; disc to be arranged. J. Najemy.

Florentine politics and society from the communal period through the age of Dante, the rise and decline of the guild republic, the age of civic humanism, and the rise of the Medici, to the time of Machiavelli. Economic structures and social classes, corporate politics, family history, and political and historical ideas are considered in the context of the emergence and transformation of republican government.

371 History of England Under the Tudors and Stuarts Spring. 4 credits. Prerequisite: permission of instructor.

M W 2:30–4:30. C. A. Holmes.
An examination of the relation between the intellectual developments of the period and political, social, and religious change. Topics for discussion will include political thought, religious toleration, witchcraft, and the role of women and the family.

374 War, Trade, and Empire, 1500–1815 Spring. 4 credits.

M W 2:30–4. D. A. Baugh.
Maritime enterprise, imperial policy, and naval power in the age of expansion. The rise and decline of the Portuguese and Spanish empires are considered, but the emphasis is on English, French, and Dutch rivalry in the Atlantic and Caribbean.

381–382 Self, Family, and Polity in Renaissance Times (The Frederick G. Marcham Seminar; also Society for the Humanities 381–382, and Romance Studies 381–382) 381, fall; 382, spring. 4 credits each term. Limited to 15 students.

Fall: disc, M W 2:30–3:45. Spring: no class meetings; students will pursue independent work in consultation with the instructors. E. Morris, J. Najemy.

An exploration of the relationships between the problematic notions of selfhood, family and community, on the one hand, and historical experience, on the other. The course will use and confront the methods of social history and literary analysis, drawing occasionally on anthropology and psychoanalysis. The three principal texts will be Alberti, *Books on the Family*; Rabelais, *Gargantua and Pantagruel*; Montaigne, *Essays* (all in English translation); additional readings in historical and theoretical works.

[468 Undergraduate Seminar in Renaissance History] J. Najemy. Not offered 1980–81.]

[469 Undergraduate Seminar in Reformation History] J. Najemy. Not offered 1980–81.]

[475 The English Civil War, 1640–60] C. A. Holmes. Not offered 1980–81.]

485 The Transformation of Feudal Society Fall. 4 credits.

Hours to be arranged. C. A. Holmes.
The seminar will examine the ideas of a number of scholars who have suggested that England experienced a major shift in the nature of social organization and relations in the sixteenth century. Theories about feudal society, and its collapse, will be tested against contemporary legal and literary sources concerning the political, social, and religious experience of the English people in the middle ages.

[663 Graduate Seminar in Renaissance History] J. Najemy. Not offered 1980–81.]

664–665 Seminar in Latin Paleography 664, fall; 665, spring. 4 credits each term.
Hours to be arranged. J. J. John.

666 Seminar in Medieval History Fall 4 credits.
Hours to be arranged. J. J. John.

669 Seminar in Medieval History Spring. 4 credits.

Hours to be arranged. B. Tierney.

[670 Seminar in Tudor and Stuart History] C. A. Holmes. Not offered 1980–81.]

Modern European History

[258 English History from the Revolution of 1688 to the Present] D. A. Baugh. Not offered 1980–81.]

[352 The End of the Austro-Hungarian Monarchy, 1848–1918] I. V. Hull. Not offered 1980–81.]

353–354 European Intellectual History in the Nineteenth and Twentieth Centuries 353, fall; 354, spring. 4 credits. each term. History 353 is not prerequisite to 354.

T R 12:20–1:35. D. C. LaCapra.
The focus is on social and cultural thought in France,

Germany, and England. Topics include reactions to the French Revolution and industrialization; the definition of conservative, liberal, and radical perspectives; literature and social thought; varieties of existentialism; the birth and development of the social sciences; psychoanalysis and post-Freudian psychology; linguistic philosophy; and structuralism. Readings for the first term include Tocqueville, Mill, Hegel, Marx, Stendhal, Flaubert, Dostoevsky, Nietzsche, and Durkheim. Readings for the second term include Weber, Freud, Wittgenstein, Sartre, Camus, Mann, and Lévi-Strauss.

[355 The Old Regime: France in the Sixteenth, Seventeenth, and Eighteenth Centuries] S. L. Kaplan. Not offered 1980–81.]

[356 The Era of the French Revolution and Napoleon] S. L. Kaplan. Not offered 1980–81.]

[357 Survey of German History, 1648–1890] I. V. Hull. Not offered 1980–81; next offered fall 1981.]

[358 Survey of German History, 1890 to the Present] I. V. Hull. Not offered 1980–81; next offered spring 1982.]

362 Russian History to 1800 Fall. 4 credits. Open to freshmen.
T R 10:10–11:25. W. M. Pintner.

The origin and development of the fundamental social, political, economic, and cultural institutions that determined the nature of contemporary Soviet society.

[363 Russian History Since 1800] W. M. Pintner. Not offered 1980–81; next offered spring 1982.]

[372 Social and Cultural History of Contemporary Europe] Spring. J. H. Weiss. Not offered 1980–81; next offered 1981–82.]

383 Europe in the Twentieth Century: 1900–45 Fall. 4 credits.

M W F 1:25. J. H. Weiss.
An investigation of the major developments in European history from 1900 to the end of the Second World War. Emphasis upon the development of democratic political systems and their alternatives. Topics include the transforming effects of war and depression, the dynamics of fascism, the European response to the economic and ideological influence of America and the Soviet Union, and the relationship between politics and social structure.

[384 Europe in the Twentieth Century: 1945 to the Present] Spring. J. H. Weiss. Not offered 1980–81; next offered 1981–82.]

[451 Lord and Peasant in Europe: A Seminar in Social History] S. L. Kaplan. Not offered 1980–81.]

[456 Seminar in Germany, 1890–1918] I. V. Hull. Not offered 1980–81.]

[457 Seminar in European Fascism] I. V. Hull. Not offered 1980–81; next offered fall 1981.]

[458 Seminar in Weimar and Nazi Germany, 1918–45] I. V. Hull. Not offered 1980–81.]

[459 The Making of the English Ruling Class, 1660–1780] D. A. Baugh. Not offered 1980–81.]

467 Seminar in Modern European Political History Spring. 4 credits. Prerequisite: History 383 or permission of the instructor.

Hours to be arranged. J. H. Weiss.
Topic for 1981: Resistance, collaboration, and retribution in World War II. A study of the response of individuals, social groups, and political bodies to the extreme pressures of occupation, imprisonment, civil war, and Nazi extermination actions. The concluding section focusses primarily on the war-crimes trials at Nuremberg.

471 Russian Social and Economic History Fall. 4 credits.

M 2:30-4:30. W. M. Pintner.

A seminar devoted to an examination of the transformation of Russia from a backward agrarian nation to the second of the world's superpowers.

[474 Topics in Modern European Intellectual History D. C. LaCapra. Not offered 1980-81.]**[476 Documenting the Depression: Film, Literature, and Memory** J. H. Weiss. Not offered 1980-81; next offered 1981-82.]**[477 The Politics of the Enlightenment** S. L. Kaplan. Not offered 1980-81.]**[478 Seminar in Eighteenth-Century French Social History** S. L. Kaplan. Not offered 1980-81.]**480 Twentieth-Century Britain** Spring. 4 credits. Primarily a discussion seminar.

T 2:30-4:30, R 2:30-3:20. D. A. Baugh.

Lectures focus on key personalities. Seminar topics include Ireland, the 1930s, the world wars and their impact, the decline of Liberalism and rise of Labour, the roots of Britain's economic problems, and the character of English society.

483 Seminar in Modern European Social History Fall. 4 credits.

Hours to be arranged. J. H. Weiss.

Topic for 1980: Getting ahead: Historical perspectives on social mobility and professional advance. Case studies from Modern European and American history investigate why societies are stratified as they are, how some individuals and groups rise to the top and some fall, how those at the top remain there, and the role of education, professionalism, and ideology in shaping these processes.

[655 Seminar in Eighteenth-Century British History D. A. Baugh. Not offered 1980-81.]**[656 Seminar in Nineteenth-Century British History** D. A. Baugh. Not offered 1980-81.]**[671 Seminar in the French Revolution** S. L. Kaplan. Not offered 1980-81.]**672 Seminar in European Intellectual History** Fall. 4 credits.

Hours to be arranged. D. C. LaCapra.

677 Seminar in Russian History Fall. 4 credits. M 2:30-4:30. W. M. Pintner.**678 Seminar in Modern European Social History** Spring. 4 credits.

Hours to be arranged. J. H. Weiss.

Research seminar. Topic for 1980-81: Education, professional structures, and social stratification since 1800.

[679 Seminar in European History S. L. Kaplan. Not offered 1980-81.]**Latin American History****[295 Colonial Latin America** T. H. Holloway. Not offered 1980-81.]**[296 Latin America in the Modern Age** T. H. Holloway. Not offered 1980-81.]**[347 Agrarian Societies in Latin American History** T. H. Holloway. Not offered 1980-81.]**[348 Contemporary Brazil (also Sociology 368)** T. H. Holloway, J. Kahl. Not offered 1980-81.]**[649 Seminar in Latin American History** T. H. Holloway. Not offered 1980-81.]**Honors and Research Courses****301 Supervised Reading** Fall or spring. 2 credits. Prerequisite: permission of instructor. Open only to upperclass students.**302 Supervised Research** Fall or spring. 3 or 4 credits. Prerequisite: permission of instructor. Open only to upperclass students.**400 Honors Proseminar** Fall or spring. 4 credits. For prospective honors candidates who have permission of instructor.

Fall: W 2:30-4:30, D. K. Wyatt; or R 2:30-4:30.

D. A. Baugh. Spring: W 2:30-4:30, J. Najemy.

An introduction to historical writing and modes of research, emphasizing the possibilities and limitations of historical inquiry.

401 Honors Guidance Fall or spring. 4 credits. Prerequisites: History 400 and permission of instructor.**703-704 Supervised Reading** 703, fall; 704, spring. 4 credits each term. Prerequisite: permission of instructor. Open only to graduate students.**Society for the Humanities Seminars of Interest to History Students****Architecture, Man, and Nature in the Early Modern Period (Society for the Humanities 423)****Leonardo da Vinci as a Philosopher of Nature (Society for the Humanities 424)****The Phenomenon of Iconoclasm (Society for the Humanities 425-426)****History of Art****Freshman Seminars**

The history of art courses listed below are offered in the Freshman Seminar Program and as freshman electives, but may not be used to satisfy the distribution requirement.

103 Freshman Seminar in Visual Analysis Fall or spring. 3 credits.

Fall: M W F 9:05, 12:20, or 1:25; or T R 12:20-1:35.

Spring: M W F 9:05, 10:10, 11:15, 12:20, or 1:25; or T R 10:10-11:25. Staff.

The nature of man-made objects, from tools to cities and including such conventional categories as painting, sculpture, and architecture is examined. An introduction to the problems of perceiving such objects and articulating the visual experience. Organized by media and themes rather than chronologically. A supplement, not a prerequisite, to art history.

104 How to Look at Works of Art Fall or spring. 3 credits.

Fall: T R 2:30-3:45, staff. Spring: T R 12:20-1:35.

J. V. Falkenheim; T R 2:30-3:45, H. P. Kahn.

Several major works of art, primarily paintings, are examined in detail. The cultural and historical contexts in which the works were created and their unique qualities as works of art are considered.

105 Myth and Image in Modern Society (also Sociology 103) Fall. 3 credits.

T R 9:05, and one hour to be arranged. H. P. Kahn and R. Golden.

The course views myth as a universal human language. Its components are widely recognizable images and symbols, arranged in structures that validate the legitimacy of a society's moral order. The course, taught jointly by an artist and a sociologist, invites students to analyze certain mythic forms in American society, from mass-produced myths of the media to modern art.

106 Art in a Landscape: Traditional Arts in Southeast Asia Fall. 3 credits.

M W F 10:10. S. J. O'Connor.

The traditional arts in Southeast Asia such as textiles, ceramics, architecture, sculpture, and puppet theatre will be examined in varying social and physical contexts. The aim of the course will be to introduce the works themselves and to explore the way they are, or were, implicated in daily life. We will encounter works created in the palaces and monasteries of the centralized kingdoms, as well as those that are part of the village world. Among the topics to be discussed: Wayang theatre, a world of shadows; batik and ikat, the dyer's art; the life of Buddha in Art; stoneware and porcelain ceramics from Thailand, Cambodia, and Vietnam; temple and art in Bali; and the cosmic mountain in architecture. Emphasis will be on writing short papers.

107 Principles of Architecture Fall. 3 credits. M W F 12:20. T. M. Brown.

Through readings, lectures, and discussions, examination of some theoretical and practical aspects of architecture as it affects our lives.

Related Course in Another Department**Revolution and the Russian Arts (Russian Literature 106)****Introductory Courses**

The following courses are designed to introduce students to the processes and methods of art history by means of a systematic examination of a closely related body of visual material. The courses need not be taken in any particular sequence. One 200-level course is normally the prerequisite to courses at the 300 level.

[200 Introduction to Art History: Mediterranean Archaeology (also Classics 200) 3 credits. Not offered 1980-81.]**[206 Introduction to Art History: Rise of Classical Greece (also Classics 206)** 3 credits. Not offered 1980-81.]**[210 Introduction to Art History: Beginnings of Civilization (also Classics 210)** 3 credits. Not offered 1980-81.]**215 Introduction to Art History: African Art** Spring. 3 credits.

M W F 12:20. N. C. Neaher.

The cultural foundations of art in sub-Saharan Africa, including an examination of masking traditions; royal arts; body aesthetics and figurative sculpture; and domestic and sacred architecture.

220 Introduction to Art History: Classical Archaeology (also Classics 220) Fall. 3 credits.

M W F 10:10. J. E. Coleman.

Classical archaeology is the study of the material culture of the ancient Greeks and Romans. This course, while providing a general framework for an understanding of the complexities of this culture, concentrates for the most part on specific subject matter. Subjects are chosen for their value in illustrating specific questions about the past and the process by which scholars seek to answer these questions. They vary somewhat from year to year but may include among others: architecture, painting, sculpture, the development of writing, burial customs, and coins.

[221 Introduction to Art History: Minoan-Mycenaean Art and Archaeology (also Classics 221) 3 credits. Not offered 1980-81.]**230 Introduction to Art History: Monuments of Medieval Art** Spring. 3 credits.

M W F 11:15. R. G. Calkins.

An introduction to the approaches to art history

through a study of selected works of art from the Middle Ages: architecture, sculpture, painting, manuscript illumination, metal work, and ivory.

240 Introduction to Art History: The Renaissance Spring. 3 credits.

M W F 10:10. C. Lazzaro.

A study of selected works of architecture, sculpture, and painting in Italy and northern Europe from about 1300 to about 1575. Major artists considered include Donatello, Jan van Eyck, Michelangelo, and Bruegel. Various approaches to the understanding of works of art and various interpretations of the Renaissance are explored.

250 Introduction to Art History: The Baroque Era Fall. 3 credits.

M W F 10:10. C. Lazzaro.

A survey of the major artistic trends in western Europe during the seventeenth century. The course will consider architecture, sculpture, and painting in Italy during the first half of the century, and the schools of painting of Spain, Flanders, Holland, and France. Emphasis will be on major masters of the period: Annibale Carracci, Caravaggio, Bernini, El Greco, Velazquez, Rubens, Hals, Vermeer, Rembrandt, Poussin.

261 Introduction to Art History: Modern Art Fall. 3 credits.

T R 10:10–11:25; plus one disc, R 8–9:15, 10:10–11:25, or 12:20–1:35. Discussion sections will sometimes be held in place of the R lec.
R. C. Hobbs.

A topical discussion of some of the major artists, movements, and ideas that make up modern art. Emphasis is on European and American painting in relationship to cultural and intellectual concerns of the period spanning approximately 1850 to present.

[270 Introduction to Art History: American Art 3 credits. Not offered 1980–81.]

280 Introduction to Art History: Asian Traditions Spring. 3 credits.

M W F 10:10. S. J. O'Connor.

Designed to introduce students to the varied responses of the Asian artist in different social and geographical contexts. By selective focus and emphasis, rather than broad survey, the student will gain some familiarity with high-fired ceramics, Chinese landscape painting, Buddhist sculpture and painting of Thailand, Indian miniature paintings, and Japanese prints. A number of class sessions will meet in the Herbert F. Johnson Museum of Art.

290 Introduction to Art History: Architecture and Environment Fall. 3 credits. Limited to 50 students.

M W F 1:25. T. M. Brown.

Emphasis is placed on the social and humanistic aspects of nineteenth- and twentieth-century design. After a lengthy introduction to the architectural categories of space, form, function, and structure, the ideas and forms that have influenced the physical shape of the contemporary world are considered.

Intermediate Courses

The following courses are intended primarily for upperclass students, qualified sophomores, and first-year graduate students. Except as noted, all require as a general prerequisite one course at the 200 level. Some of the courses have discussion sections.

311 Techniques and Materials: Painting Spring. 4 credits. Limited to 50 students.

T R 10:10–12:05. H. P. Kahn.

The techniques of painting in their historical and formal contexts, analytical research of materials and conservation.

313 Books, Prints, and the Graphic Image Fall. 4 credits. Limited to 50 students.

T R 10:10–12:05. H. P. Kahn.

The history and formal evolution of letters, types, illustrations, books, and publications; theories of design and message.

320 The Archaeology of Classical Greece (also Classics 320) Spring. 4 credits.

M W F 2:30. A. Ramage.

Detailed study of the monuments and crafts of Athens, from the Geometric to the Roman Period; the Acropolis and the Agora. Literature and art considered in their cultural context.

[321 Archaeology of Cyprus (also Classics 321) 4 credits. Not offered 1980–81.]

322 Arts of the Roman Empire (also Classics 350) Fall. 4 credits.

M W F 9:05. A. Ramage.

The visual arts in the service of the first world state. The course starts with the Etruscan and Republican period but concentrates on monuments of the Imperial era in Italy and the provinces until the time of Constantine.

323 Painting in the Greek and Roman World (also Classics 323) Spring. 4 credits.

M W F 9:05. A. Ramage.

Vase painting, wall painting, and mosaics from the ancient Mediterranean world will be studied in conjunction with the testimony of Greek and Roman sources. An attempt will be made to grasp the concerns and achievements of the Classical painters.

[324 Architecture in the Greek and Roman World (also Classics 324) 4 credits. A. Ramage. Not offered 1980–81.]

[325 Greek Vase Painting (also Classics 325) 4 credits. A. Ramage. Not offered 1980–81.]

[326 Art and Archaeology of Archaic Greece (also Classics 326) 4 credits. Not offered 1980–81.]

[327 Greek and Roman Coins (also Classics 327) 4 credits. Not offered 1980–81.]

[329 Greek Sculpture (also Classics 329) 4 credits. J. E. Coleman. Not offered 1980–81.]

[330 Art in Pompeii: Origins and Echoes (also Classics 330) 4 credits. Not offered 1980–81.]

[332 Architecture of the Middle Ages 4 credits. R. G. Calkins. Not offered 1980–81.]

[333 Early Medieval Art and Architecture 4 credits. R. G. Calkins. Not offered 1980–81.]

[334 Romanesque Art and Architecture 4 credits. R. G. Calkins. Not offered 1980–81.]

[335 Gothic Art and Architecture 4 credits. R. G. Calkins. Not offered 1980–81.]

[336 Late Medieval Italian Art and Architecture 4 credits. Not offered 1980–81.]

[337 The Medieval Illuminated Book 4 credits. R. G. Calkins. Not offered 1980–81.]

341 Flemish Painting Fall. 4 credits.

M W F 9:05. R. G. Calkins.

Painting in the transitional period from the late Gothic to the Renaissance in the Lowlands. The works of the Master of Flemalle, Jan van Eyck, and Jerome Bosch will be considered.

[342 Medieval and German Renaissance Art 4 credits. R. G. Calkins. Not offered 1980–81.]

[343 Italian Renaissance Art of the Fifteenth Century 4 credits. Not offered 1980–81.]

[344 Italian Renaissance Art of the Sixteenth Century 4 credits. Not offered 1980–81.]

[345 Sculpture of the Italian Renaissance 4 credits. Not offered 1980–81.]

352 Dutch Painting in the Seventeenth Century Fall. 4 credits.

M W F 12:20. C. Lazzaro.

A study of the flourishing of painting in the seventeenth-century Holland with emphasis on the major artists—Rembrandt, Hals, Vermeer—and on the traditions of still-life, genre, and landscape painting. Context and content as well as stylistic development will be considered.

[355 French Art of the Sixteenth and Seventeenth Centuries 4 credits. E. G. Dotson. Not offered 1980–81.]

[357 European Art of the Eighteenth Century 4 credits. E. G. Dotson. Not offered 1980–81.]

[359 Major Masters of the Graphic Arts 4 credits. H. P. Kahn, A. S. Roe. Not offered 1980–81.]

361 Modern Artists and Their Critics Spring. 4 credits. Limited to 30 students. Prerequisites: History of Art 261 or permission of instructor.

T R 10:10–11:25. J. V. Falkenheim.

A consideration of several major nineteenth- and twentieth-century artists and the way their work is discussed by important contemporary critics. The modern period studied through such artist-critic relationships as those of Delacroix and Baudelaire, Turner and Ruskin, Cezanne and Fry, abstract expressionism and Greenberg and Rosenberg. Lectures, discussions, extensive reading from these critics.

[362 Topics in Modern Art 4 credits. J. V. Falkenheim. Not offered 1980–81.]

[364 Modern Sculpture: From Rodin to Rickey 4 credits. R. C. Hobbs. Not offered 1980–81.]

[365 Art from 1940 to the Present: From Hoffmann to Haacke 4 credits. Prerequisite: History of Art 261. R. C. Hobbs. Not offered 1980–81.]

[374 American and European Decorative Arts of the Renaissance and Early Nineteenth Century 4 credits. A. S. Roe. Not offered 1980–81.]

[376 Painting and Sculpture in America: 1850–1950 4 credits. T. W. Leavitt. Not offered 1980–81.]

[378 American Architecture, the City, and American Thought: 1850–1950 4 credits. T. M. Brown. Not offered 1980–81.]

379 Art and Technology: 1850–1950 Spring. 4 credits.

T R 12:20–1:35. T. M. Brown.

Approached topically, an examination of the issues of two- and three-dimensional visual art and design within the context of a mass-technological world. Discussion will revolve around topics presented, as well as required weekly reading.

[381 Buddhist Art in Asia 4 credits. S. J. O'Connor. Not offered 1980–81.]

383 The Arts of Early China Fall. 4 credits.

M W 12:20; plus one disc, T 9:05, 11:15, 1:25, or 3:35. M. W. Young.

An introduction to the arts of China intended for students without previous experience of China or art history. The course will begin with the late Neolithic pottery cultures and then examine in detail the arts of the Bronze Age and the Buddhist period, ending with the beginning of painting in the ninth century. The

collection of the Herbert F. Johnson Museum of Art will be used in conjunction with the discussion sections. Term paper option for the final exam.

[384 The Arts of Japan] 4 credits. M. W. Young. Not offered 1980–81.]

385 Chinese Painting Spring. 4 credits.
M W 12:20; plus one disc, T 9:05, 11:15, 1:25, or 3:35. M. W. Young.

An introduction to the arts of China from the medieval period to the modern age. The course focuses on developments in the art of painting, especially landscapes, but related arts such as ceramics, architecture, and sculpture are discussed. Discussion sections use the collection of the Herbert F. Johnson Museum of Art. Term paper option for the final exam.

[386 Studies in Indian and Southeast Asian Art] 4 credits. S. J. O'Connor. Not offered 1980–81.]

Seminars

Courses at the 400 level are open to upperclass students, majors, and graduate students. Seminars at the 500 level are primarily for graduate students, but qualified upperclass students may be admitted. All seminars involve the writing and presentation of research papers. Enrollment is limited, and permission of the department or instructor is normally required. Students may repeat 500-level courses that cover a different topic each semester.

401 Independent Study Fall or spring. 2 credits; may be repeated for credit. Prerequisite: permission of a department faculty member.

Hours to be arranged. Staff.
Individual investigation and discussion of special topics not covered in the regular course offerings, by arrangement with a member of the department.

402 Independent Study Fall or spring. 4 credits; may be repeated for credit. Prerequisite: permission of a department faculty member.

Hours to be arranged. Staff.
Individual investigation and discussion of special topics not covered in the regular course offerings, by arrangement with a member of the department.

[405 Original Works of Art] 4 credits. Not offered 1980–81.]

[406 Introduction to Museums] 2 credits.
T. W. Leavitt. Not offered 1980–81.]

[421 History of Art Criticism] 4 credits.
J. V. Falkenheim. Not offered 1980–81.]

423 Ceramics Fall. 4 credits. Prerequisite: permission of instructor.

M 2:30–4:30. A. Ramage.
Greek and Roman pottery specimens from several Near Eastern and Mediterranean sites will be studied to provide direct experience in one of the basic prerequisites of archaeological excavation—the identification and dating of pottery types. A report, delivered in class, will concern ancient ceramic materials of particular types and periods.

[431 Greek Sculpture (also Classics 431)] 4 credits. A. Ramage. Not offered 1980–81.]

[448 Mannerism and the Early Baroque Era in Italy] 4 credits. E. G. Dotson. Not offered 1980–81.]

[449 Studies in Italian Renaissance Art] 4 credits. Not offered 1980–81.]

[452 Studies in English Art] 4 credits. A. S. Roe. Not offered 1980–81.]

[456 Literature and the Arts in Sixteenth-Century France (also French 456)] 4 credits. E. G. Dotson, E. P. Morris. Not offered 1980–81.]

[458 Classic and Romantic Art] 4 credits.
E. G. Dotson. Not offered 1980–81.]

[464 Studies in Modern Art] 4 credits.
J. V. Falkenheim. Not offered 1980–81.]

465 Problems in Modern Art and Architecture Spring. 4 credits. Limited to 15 students. Prerequisite: permission of instructor.

M 12:20–2:15. T. M. Brown.
Topic to be announced.

474 American and European Decorative Arts from the Renaissance Period to the Early Nineteenth Century Spring. 4 credits. Prerequisite: permission of instructor.

T R 12:20–1:35. A. S. Roe.
The evolution of the successive major styles of European interior design and furnishing are studied in relation to their impact upon the arts of the colonies and of the United States from the earliest period until the advent of mechanized production. The rise and dissemination of forms and design motifs will be traced back to their origins in European prototypes, especially English and Dutch. The evolution of furniture forms, as well as of silver and ceramics, will be studied systematically. In particular, the role of the major European engraved books of design for architecture and interior furnishings will be studied in relation to their influence in early America.

476 Seminar on American Art: 1840–1940 Spring. 4 credits.

M 2:30–4:30. T. W. Leavitt.
An exploration of aspects of American painting represented in the collection of the Herbert F. Johnson Museum of Art. Works will be examined in many different contexts.

[482 Ceramic Art of Asia] 4 credits. S. J. O'Connor. Not offered 1980–81.]

483 Chinese Art of the T'ang Dynasty Spring. 4 credits. Prerequisites: History of Art 383, or a course in Chinese history or Chinese literature, or permission of instructor.

M 2:30–4:30. M. W. Young.
A detailed examination of the arts in medieval China, with particular attention to arts of the T'ang court, the international style of the seventh and eighth centuries, and the Buddhist tradition in painting and sculpture. Some meetings will be held in the Herbert F. Johnson Museum of Art. Lectures, readings, discussion. Final paper expected.

[486 Studies in Chinese Painting] 4 credits.
M. W. Young. Not offered 1980–81.]

[488 Traditional Arts in Southeast Asia] 4 credits.
S. J. O'Connor. Not offered 1980–81.]

493 Honors Work Fall or spring. 4 credits. Intended for senior art history majors who have been admitted to the honors program. S-U grades only.

Hours to be arranged. Staff.
Basic methods of art historical research will be discussed and individual readings assigned, leading to the selection of an appropriate thesis topic.

494 Honors Work Fall or spring. 4 credits. Prerequisite: History of Art 493.

Hours to be arranged. Staff.
The student, under faculty direction, will prepare a senior thesis.

531 Problems in Medieval Art and Architecture Fall. 4 credits.

W 2:30–4:30. R. G. Calkins.
Topic for 1980: Romanesque portals.

[540 Seminar in Renaissance Art] 4 credits. Not offered 1980–81.]

550 Seminar in Baroque Art Spring. 4 credits.
T 2:30–4:30. C. Lazzaro.

The artist's self-image in the seventeenth century. The course will examine artist's images of themselves in both portraiture and allegorical statements about the nature of the artist's activity, genius, and social status. Among those to be discussed are Poussin, Rubens, Velazquez, Castiglione, and Artemisia Gentileschi.

[564 Problems in Modern Art] 4 credits.
R. C. Hobbs. Not offered 1980–81.]

[580 Problems in Asian Art] 4 credits.
S. J. O'Connor. Not offered 1980–81.]

591–592 Supervised Reading 591, fall; 592, spring. 4 credits; may be repeated for credit. Limited to graduate students.

[594 Methodology Seminar I] 4 credits. Not offered 1980–81.]

595 Methodology Seminar II Fall. 4 credits. Required of all graduate students. Prerequisite: permission of instructor. S-U grades only.
T 2:30–4:30. R. C. Hobbs.

[596 Problems of Art Criticism] 4 credits.
S. J. O'Connor. Not offered 1980–81.]

Related Courses in Other Departments

Architecture, Man, and Nature in the Early Modern Period (Society for the Humanities 423)

Leonardo da Vinci as a Philosopher of Nature (Society for the Humanities 424)

The Phenomenon of Iconoclasm (Society for the Humanities 425–426)

Primitivism of Nineteenth and Early Twentieth-Century Art and Thought (Society for the Humanities 428)

Meanings of the Garden in Europe after the Renaissance (Society for the Humanities 431–432)

Scandinavia and Europe 400–1100 (English 601, Archaeology 601, Medieval Studies 609)

Courses given in Archaeology, Classics, and Near Eastern Studies often complement History of Art courses.

Indonesian

See Modern Languages, Literatures, and Linguistics, p. 92.

Italian

See Modern Languages, Literatures, and Linguistics, p. 92, and Department of Romance Studies, p. 101.

Japanese

See Department of Asian Studies, p. 55, and Modern Languages, Literatures, and Linguistics, p. 92.

Javanese

See Modern Languages, Literatures, and Linguistics, p. 92.

Latin

See Department of Classics, p. 62.

Mathematics

Basic Sequences

103 Mathematics for Architects (also Architecture 221) Fall. 3 credits.

Lec, T 10:10; 2 recs to be arranged.
Rudiments of calculus and introduction to vectors and matrices.

105 Finite Mathematics for Biologists (also Engineering T&AM 105) Fall. 3 credits

Prerequisite: three years of high school mathematics including trigonometry.

Prelims: 6:30 p.m. Sept. 25, Oct. 23, Nov. 20.
Sets, functions, and graphing (including use of log and semi-log paper). Probability (with some applications to genetics). Vectors and matrices. Examples from biology are used.

106 Calculus for Biologists (also Engineering T&AM 106) Spring. 3 credits. Prerequisite:

Mathematics 105 or three years of high school mathematics, including trigonometry and analytic geometry.

Prelims: 6:30 p.m. Feb. 26, Mar. 26, Apr. 30.
Introduction to differential and integral calculus, partial derivatives, elementary differential equations. Examples from biology are used.

107 Finite Mathematics Fall. 3 credits.

Prerequisite: three years of high school mathematics, including at least two years of high school algebra. This course cannot be used toward fulfillment of the mathematics requirement for biology majors.

Lecs, T R 12:20 plus 2 hours to be arranged.
Prelims: 6:30 p.m. Sept. 25, Oct. 23, Nov. 20.

Functions, enumeration, permutations and combinations, probability, vectors and matrices, Markov chains.

108 Introduction to Calculus Spring. 3 credits.

Intended primarily for students in the more descriptive areas of the social sciences. Prerequisite: three years of high school mathematics including trigonometry and analytic geometry of the line and circle. Recommended: Mathematics 107. This course does not normally provide adequate preparation for any higher course in mathematics; nor can it be used toward fulfillment of the mathematics requirement for biology majors.

Lecs, T R 12:20 plus 2 hours to be arranged.

Prelims: 6:30 p.m. Feb. 26, Mar. 26, Apr. 30.
Behavior of functions, introduction to differential and integral calculus, elementary differential equations.

109 Precalculus Mathematics Fall. 3 transcript credits only; cannot be used toward graduation.

M W F 11:15.
This course is designed to prepare students for Mathematics 111 or 108. Algebra, trigonometry, logarithms, and exponentials are reviewed.

111 Calculus Fall or spring. 4 credits. Intended for students who have a good background in high school mathematics but who have not studied calculus (see Mathematics 113). Prerequisite: Mathematics 109 or three years of high school mathematics including trigonometry.

Fall: lecs, T R F 11:15, plus 2 hours to be arranged.

Spring: lecs, T R F 11:15 plus 2 hours to be arranged. Prelims: fall, 6:30 p.m. Sept. 23, Oct. 21, Dec. 2; spring, 6:30 p.m. Feb. 24, Mar. 24, Apr. 28.

Plane analytic geometry, differentiation and integration of algebraic and trigonometric functions, applications of differentiation, logarithmic and exponential functions.

112 Calculus Fall or spring. 4 credits.

Prerequisites: Mathematics 106 or 111 or 113 with a grade of C or better, or exceptional performance in Mathematics 108. Those who do extremely well in Mathematics 111 or 13 should take 122 instead of 112, unless they plan to continue with Mathematics 214–217.

Fall: lecs, T R F 11:15, plus 2 hours to be arranged.

Spring: lecs, T R F 10:10, 11:15, or 12:20, plus 2 hours to be arranged. Prelims: fall, 6:30 p.m.

Sept. 23, Oct. 21, Dec. 2; spring, 6:30 p.m.

Feb. 24, Mar. 24, Apr. 28.

Applications of integration, techniques of integration, partial derivatives and extremal problems, multiple integrals.

113 Calculus Fall. 4 credits. Prerequisite:

Mathematics 109 or three years of high school mathematics, including trigonometry. This course covers the same material as Mathematics 111, but it is intended for students who have had enough calculus to be able to differentiate polynomial functions.

Lecs, T R F 11:15 or 12:20, plus 2 hours to be arranged. Prelims: 6:30 p.m. Sept. 23, Oct. 21, Dec. 2.

122 Calculus Fall or spring. 4 credits. Prerequisite:

performance at a high level in Mathematics 111 or 113 or permission of the department. Students planning to continue with Mathematics 214–217 are advised to take 112 instead of this course.

Fall: lecs, M W F 10:10, 11:15, or 12:20. Spring: lecs, M W F 9:05 or 10:10.

Differentiation and integration of elementary transcendental functions, the techniques of integration, applications, polar coordinates, infinite series, and complex numbers. The approach is more theoretical than in Mathematics 112.

191–193 Calculus for Engineers Fall. 4 credits.

Prerequisite: three years of high school mathematics, including trigonometry. Mathematics 193 is a course parallel to 191 for students who have had a substantial amount of calculus in high school, but who did not place out of 191. Although the same topics will be covered in 193 as in 191, some may be treated in greater depth in 193.

191: lecs, M W F 11:15, plus 2 hours to be arranged. 193: lecs, M W F 9:05 or 11:15, plus 2 hours to be arranged. Prelims: 6:30 p.m. Sept. 23, Oct. 21, Dec. 2.

Plane analytic geometry, differential and integral calculus, and applications.

192 Calculus for Engineers Fall or spring.

4 credits. Prerequisite: Mathematics 191 or 193.

Fall: lecs, M W F 9:05 or 11:15 plus 2 hours to be arranged. Spring: lecs, M W F 9:05 or 11:15, plus 2 hours to be arranged. Prelims: 7:30 p.m. Sept. 23, Oct. 21, Dec. 2; spring, 6:30 p.m. Feb. 24, Mar. 24, Apr. 28.

Transcendental functions, technique of integration and multiple integrals, vector calculus, analytic geometry in space, partial differentiation, applications.

214–215–216–217 Fall or spring. 1 credit each.

Prerequisite: Mathematics 112 or 122. These courses are taught as a unified third-semester calculus package, but students may register for any subset of these courses in accordance with their interests and needs *subject to the following credit regulations*: no credit can be received for Mathematics 216 if 192 or 194 is taken, nor can credit be received for Mathematics 214 or 216 if 221 is taken, nor can credit be received for Mathematics 217 if either 122 or 293 is taken. Students in doubt about their choices should consult their advisers and the course instructors. The courses are offered in sequence (though not necessarily in numerical order) through the semester, and each lasts three to four weeks. The expected order is Mathematics 217, 214, 215, 216, but some

variation is possible. (Note: 217 is prerequisite to 214 and 215.)

Fall: lecs, M W F 11:15, plus 2 hours to be arranged. Spring: lecs, T R 11:15 and F 8, plus 2 hours to be arranged. *All students are urged to attend the first lecture of the semester to learn the order in which the course will be taught, the dates for each course, the examination dates, and the structure of the whole.* Prelims will be given some evenings at 6:30 p.m.

214 Introduction to Differential Equations

Prerequisite: Mathematics 217 or equivalent material from Mathematics 122 or 293.

Simple first- and second-order equations with applications. See also the entire 214–215–216–217 description above.

215 Differential Equations Prerequisites:

Mathematics 214 and 217 or equivalent material from Mathematics 122 or 293.

Introduction to numerical methods of solution, systems of differential equations, elementary partial differential equations, and boundary value problems. Applications. See also the entire 214–215–216–217 description above.

216 Vector Analysis

Vectors, matrices, vector valued functions. Line integrals. See also the entire 214–215–216–217 description above.

217 Infinite Series and Complex Numbers

See the entire 214–215–216–217 description above.

221 Linear Algebra and Calculus Fall or spring. 4 credits. Prerequisite: Mathematics 122 with a grade of B or better, or permission of instructor.

Fall: M W F 9:05, 10:10, or 11:15. Spring: M W F 10:10 or 11:15.

Linear algebra and differential equations. Topics include vector algebra, linear transformations, matrices, linear differential equations, as well as an introduction to proving theorems.

222 Calculus Fall or spring. 4 credits. Prerequisite: Mathematics 221.

Fall, M W F 11:15 or 12:20; spring, M W F 9:05 or 10:10 or 11:15.

Vector differential calculus, calculus of functions of several variables, multiple integrals.

293 Engineering Mathematics Fall or spring.

3 credits. Prerequisites: Mathematics 192 or 194 plus a knowledge of computer programming equivalent to that taught in Engineering DBS 105. In exceptional circumstances, Mathematics 192 and 293 may be taken concurrently.

Fall: lecs, M W 10:10, 11:15, or 12:20, plus an hour to be arranged. Spring: lecs, M W 10:10 or 12:20, plus an hour to be arranged. Prelims: fall, 6:30 p.m. Sept. 30, Oct. 30, Dec. 2; spring, 6:30 p.m. Mar. 3, Apr. 7, May 5.

Infinite series, complex numbers, first and second order ordinary differential equations with applications in the physical and engineering sciences.

294 Engineering Mathematics Fall or spring.

4 credits. Prerequisite: Mathematics 293.

Fall: lecs, M W F 10:10 or 12:20, plus an hour to be arranged. Spring: lecs, M W F 10:10, 11:15, or 12:20, plus an hour to be arranged. Prelims: fall, 6:30 p.m. Sept. 30, Oct. 30, Dec. 2; spring, 6:30 p.m. Mar. 5, Apr. 7, May 5.

Vector spaces and linear algebra, matrices, eigenvalue problems and applications to systems of linear differential equations. Vector calculus. Boundary value problems and introduction to Fourier series.

General Courses

Students who want a general introductory mathematics course are advised to take Mathematics 107–108, described above.

100 History of Mathematics Spring, 3 credits. Intended for freshmen and sophomores. Limited to 50 students. Prerequisite: high school geometry. If this course is taken to satisfy part of the distribution requirement, it is to be treated in the same way as Mathematics 403 (consult the College of Arts and Sciences section on the *Announcement of Academic Information*).

In 1981 the topic will be the history of geometry from ancient times. Prehistoric geometry from Vedic, Mesopotamian, and Egyptian sources. The Greek tradition of Thales, Pythagoras, and Plato. Detailed study of the first six books of Euclid. Modern developments, including non-Euclidean geometry.

401 Honors Seminar Fall or spring, 4 credits. Prerequisite: permission of instructor. Students will discuss selected topics under the guidance of one or more members of the staff.

[403 History of Mathematics Spring, 4 credits. Not offered 1980–81.]

408 Development of Modern Mathematical Thought Spring, 4 credits. Limited to students who are completing a major in mathematics or in a related subject with a strong concentration in mathematics. Prerequisites: Mathematics 411 or 421, and 431 or 331.

Selected topics tracing the development of mathematics from antiquity to the present (including harmonic analysis and music, calculus, foundations, and modern physics), chosen to shed light on general questions such as: What is mathematics? How does it develop? How does it relate to other areas of knowledge? Students will be expected to write expository papers.

690 Supervised Reading and Research Variable credit (up to 6 credits each term).

Applied Mathematics and Differential Equations

[305 Mathematics in the Real World Not offered 1980–81. See Engineering OR&IE 431.]

421 Applicable Mathematics Fall or spring, 4 credits. Prerequisites: high level of performance in Mathematics 294, or 217 and 222, or 214–217 and 331. Graduate students who need mathematics extensively in their work and who have had a solid advanced calculus course and complex variables course as undergraduates should take Mathematics 515–516. With less preparation, they should take Mathematics 421–422–423. Students who have not had infinite series, some linear algebra, and some ordinary differential equations should take Mathematics 214–217, 331, and then Mathematics 421–422–423.

T W R F 12:20. Evening Prelims may be scheduled. Theorems of Stokes, Green, Gauss, etc. Sequences and infinite series. Fourier series and orthogonal functions. Ordinary differential equations. Solution of partial differential equations by separation of variables.

422 Applicable Mathematics Spring, 4 credits. Prerequisite: Mathematics 421.

T W R F 12:20. Evening prelims may be scheduled. Complex variables. Generalized functions. Fourier transforms, Laplace transforms. Partial differential equations.

423 Applicable Mathematics Fall, 4 credits. Prerequisite: Mathematics 421; however, students who have not taken 422 should talk to the instructor before taking this course.

T W R F 12:20. Normed vector spaces. Elementary Hilbert space theory. Projections. Fredholm's alternative. Eigenfunction expansions. Applications to elliptic partial differential equations, and to integral equations.

427 Introduction to Ordinary Differential Equations Fall, 4 credits. Prerequisite: Mathematics 222 or 294, or permission of instructor. Offered alternate years.

T R 10:10–11:25.

Covers the basic existence, uniqueness, and stability theory together with methods of solution and methods of approximation. Topics include singular points, series solutions, Sturm-Liouville theory, transform methods, approximation methods, and application to physical problems.

428 Introduction to Partial Differential Equations Spring, 4 credits. Prerequisite: Mathematics 222 or 294 or permission of instructor.

T R 10:10–11:25.

Topics selected from: first-order quasilinear equations, classification of second-order equations, characteristics. Laplace, heat, and wave equations with emphasis on maximum principles, existence, uniqueness, stability. Fourier series methods, approximation methods.

Analysis

311 Elementary Analysis Fall, 4 credits. Prerequisites: Mathematics 214–217. Mathematics 311 is similar to that of 411 below, but is taught at a more elementary level and at a slower pace. A student may not receive credit for both Mathematics 311 and 411 or 413. May be offered alternate years; may not be offered 1981–82.

M W F 9:05.

A careful study of topology of the real line. Continuous functions of one real variable. Differentiation and integration of such functions.

411–412 Introduction to Analysis 411, fall; 412, spring, 4 credits each term. Prerequisite: Mathematics 222. Students who need measure theory and Lebesgue integration for advanced probability courses should take Mathematics 413–414, or arrange to audit the first few weeks of Mathematics 521.

T R 8:40–9:55.

An introduction to the theory of functions of real variables, stressing rigorous logical development of the subject rather than technique of applications. Topics include metric spaces, the real number system, continuous and differentiable functions, integration, convergence and approximation theorems, Fourier series, calculus in several variables, and differential forms.

413–414 Introduction to Analysis 413, fall; 414, spring, 4 credits each. Prerequisite: Mathematics 222.

T R 8:40–9:55.

Honors version of Mathematics 411–412. Parts of measure theory and Lebesgue integration are also covered.

418 Introduction to the Theory of Functions of One Complex Variable Spring, 4 credits. Intended mainly for undergraduates and for graduate students outside mathematics. Prerequisite: Mathematics 222 or 294 or 214–217. May be offered only in alternate years. May not be offered 1980–81.

A rigorous introduction to complex variable theory. Complex numbers. Differential and integral calculus for functions of a complex variable including Cauchy's theorem and the calculus of residues. Elements of conformal mapping.

Algebra

331 Linear Algebra Fall, 4 credits. Prerequisite: one year of calculus. A student may not receive credit for both Mathematics 331 and any one of Mathematics 221, 293.

M W F 10:10.

Vectors, matrices, and linear transformations, affine and Euclidean spaces, transformation of matrices, and eigenvalues.

332 Algebra and Number Theory Spring, 4 credits. Prerequisite: one year of calculus. Mathematics 332 does not satisfy prerequisites for courses numbered 500 and above.

M W F 10:10.

Various topics from modern algebra and number theory, usually including rings, fields, and finite groups. Motivation and examples are derived mostly from geometry, arithmetic, and congruence problems on the integers.

431–433 Introduction to Algebra Fall, 4 credits. Prerequisite: Mathematics 221 or 331. Mathematics 433 is an honors section that will be more theoretical and rigorous than Mathematics 431 and will include additional material such as multilinear and exterior algebra.

M W F 10:10.

An introduction to linear algebra, including the study of vector spaces, linear transformation, matrices, and systems of linear equations; quadratic forms and inner product spaces; canonical forms for various classes of matrices and linear transformations; determinants.

432–434 Introduction to Algebra Spring, 4 credits. Prerequisite: Mathematics 431 or 433. Mathematics 434 is an honors section that will be more theoretical and rigorous than Mathematics 432.

M W F 10:10.

An introduction to various topics in abstract algebra, including groups, rings, fields, factorization of polynomials and integers, congruences, and the structure of finitely generated modules over Euclidean domains with application to canonical forms of matrices.

Geometry and Topology

451 Classical Geometries Fall, 4 credits. Prerequisite: 221 or 331 or permission of instructor.

M W F 11:15.

Foundations of geometry. Various geometric topics, including Euclidean, non-Euclidean, and projective geometry and rigidity theory.

[452 Classical Geometries May be offered only alternate years. Not offered 1980–81.]

453–454 Introduction to Topology and Geometry 453, fall; 454, spring, 4 credits each term. Prerequisites: Mathematics 411 and 221, or permission of instructor.

M W F 12:20.

Mathematics 453: basic point set topology, connectedness, compactness, metric spaces, fundamental group. Application of these concepts to surfaces such as the torus, the Klein bottle, the Moebius band. 454: intrinsic definition of tangent vectors and differential forms in R^3 . Metric properties of surfaces in R^3 . Smooth manifolds and introduction to Riemannian geometry.

Probability and Statistics

370 Elementary Statistics Spring, 4 credits. Prerequisites: Mathematics 112, 122 or 192; or Mathematics 106 or 108 with permission of instructor. A terminal course for students who will take no further work in this area. Mathematics 370 is not preparation for 472.

M W F 9:05. Prelims: 6:30 p.m. Feb. 26, Mar. 26, Apr. 30.

Topics in probability that are essential to an understanding of statistics; introduction to the principles underlying modern statistical inference, and the rationale underlying choice of statistical methods in various situations.

471 Basic Probability Fall, 4 credits. Prerequisite: Mathematics 221. May be used as a terminal course in basic probability. Intended primarily for those who will continue with Mathematics 472.

M W F 11:15. Prelims: 6:30 p.m. Sept. 25, Oct. 23, Nov. 20.

Topics covered include combinatorics, important probability laws, expectations, moments, moment-generating functions, limit theorems. Emphasis is on diverse applications and on development of use in statistical applications. See also the description of Mathematics 571.

472 Statistics Spring. 4 credits. Prerequisite: Mathematics 471 and knowledge of linear algebra such as taught in Mathematics 221.

M W F 11:15. Prelims: 6:30 p.m. Feb. 26, Mar. 26, Apr. 30.

Classical and recently developed statistical procedures are discussed in a framework that emphasizes the basic principles of statistical inference and the rationale underlying the choice of these procedures in various settings. These settings include problems of estimation, hypothesis testing, large sample theory.

473 Further Topics in Statistics Fall. 4 credits. Prerequisite: Mathematics 472 or 574. (For corresponding subject matter taught in more detail, see description of Mathematics 573 and 675.)

T R 8:40–9:55.

More detailed discussion of some of the topics not covered at length in Mathematics 472. Design and analysis of experiments. Multivariate analysis. Nonparametric inference; robustness. Sequential analysis.

Mathematical Logic

381 Elementary Mathematical Logic Spring. 4 credits. Prerequisite: Mathematics 122.

M W F 11:15.

Propositional and predicate logic. Completeness and incompleteness theorems. Set theory.

Graduate Courses

Students interested in taking graduate courses in mathematics should consult the department for further course details, times, and possible changes in courses as described below.

511–512 Real and Complex Analysis First term: measure and integration, functional analysis. Second term: complex analysis, Fourier analysis, and distribution theory.

515–516 Mathematical Methods in Physics 515, fall; 516, spring. 4 credits each. Intended for graduate students in physics or related fields who have had a strong advanced calculus course and at least two years of general physics. A knowledge of the elements of finite dimensional vector space theory, complex variables, separation of variables in partial differential equations, and Fourier series will be assumed. The course overlaps with parts of Mathematics 421–422–423. Undergraduates will be admitted only with permission of instructor. Mathematics 515 is a prerequisite for 516.

T W R F 12:20.

Topics designed to give a working knowledge of the principal mathematical methods used in advanced physics. A brief discussion of some basic notions: metric space, vector space, linearity, continuity, integration. Generalized functions (Schwartz distributions). Fourier series and Fourier integrals. Saddle point method. Linear operators. Differential operators and integral operators, the equations and eigenvalue problems connected with them and the special functions arising from them. Elements of group theory. The rotation group and its representations.

[517–518 Ordinary Differential Equations Not offered 1980–81. Basic theory of ordinary differential equations.]

519–520 Partial Differential Equations

[521 Elementary Functional Analysis Not offered 1980–81.

Elementary set theory and topology, Banach and Hilbert spaces, measure and integration. Graduate students in mathematics should take Mathematics 613 for functional analysis.]

[522 Applied Functional Analysis Not offered 1980–81.

Spectral theorem for bounded operators, spectral theory for unbounded operators in Hilbert space compact operators, distributions. Applications.]

[527 Analysis of Numerical Methods for Partial Differential Equations Not offered 1980–81.

Tools for analyzing practical numerical methods, especially with regard to asymptotic convergence. Finite difference and finite element method.]

531–532 Algebra

531: finite groups, field extensions, Galois theory, rings and algebras, tensor and exterior algebra. 532: Wedderburn structure theorem, Brauer group, group cohomology, Ext, Dedekind domains, primary decomposition, Hilbert basis theorem, local rings. Additional topics selected by instructor.

[537 Elementary Number Theory Prerequisites: Mathematics 432 and 412. Not offered 1980–81.

Introduction to number theory suitable for first-year graduate students and advanced undergraduates. Choice of topics discussed depends on the instructor. In previous years the text has been *A Course in Arithmetic* by J. P. Serre; the topics covered have included quadratic forms, quadratic reciprocity, and modular forms.

549–550 Lie Groups and Differential Geometry.

551 Introductory Algebraic Topology

Fundamental group and covering spaces. Homology and cohomology theories for complexes and spaces.

552 Differentiable Manifolds

Manifolds and differentiable structures. Tangent, cotangent, and tensor bundles. Exterior calculus. Riemannian structures. Local and global theory of differential equations. Integration on manifolds.

[561 Geometric Topology Not offered 1980–81.

Topics from general topology. Introduction to geometric properties of manifolds.]

571–572 Probability Theory Prerequisites: a knowledge of Lebesgue integration theory, at least on the real line. Students can learn this material by taking parts of Mathematics 413–414 or 521.

Properties and examples of probability spaces. Sample space, random variables, and distribution functions. Expectation and moments. Independence, Borel-Cantelli lemma, zero-one law. Convergence of random variables, probability measures, and characteristic functions. Law of large numbers. Selected limit theorems for sums of independent random variables. Markov chains, recurrent events. Ergodic and renewal theorems. Martingale theory. Brownian motion and processes with independent increments.

571–574 Probability and Statistics This course is a prerequisite to all advanced courses in statistics. First term: same as Mathematics 571. Second term (574): topics include an introduction to the theory of point estimation, consistency, efficiency, sufficiency, and the method of maximum likelihood; the classical tests of hypotheses and their power; the theory of confidence intervals; the basic concepts of statistical decision theory; the fundamentals of sequential analysis. Intended to furnish a rigorous introduction to mathematical statistics.

[573 Experimental Design, Multivariate Analysis Not offered 1980–81.

Rationale for selection of experimental designs and algorithms for constructing optimum designs. Optimum properties and distribution theory for classical analysis of variance procedures and their simplest multivariate analogues.]

[575 Sequential Analysis, Multiple Decision Problems Not offered 1980–81.]

577 Nonparametric Statistics Prerequisite: a course in mathematical statistics such as Mathematics 574.

A study of nonparametric techniques, especially order statistics, rank order statistics, scores, local optimality properties, and perhaps some asymptotic theory.

581 Logic

Basic topics in mathematical logic including propositional and predicate calculus; formal number theory and recursive functions; completeness and incompleteness theorems.

611–612 Seminar in Analysis

613 Functional Analysis

Topological vector spaces. Banach and Hilbert spaces, Banach algebras. Additional topics to be selected by instructor.

615 Fourier Analysis

[622 Riemann Surfaces Not offered 1980–81.]

623 Several Complex Variables

627 Seminar in Partial Differential Equations

631–632 Seminar in Algebra

[635 Topics in Algebra I Not offered 1980–81.

Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.]

637 Algebraic Number Theory

[639 Topics in Algebra II Not offered 1980–81.

Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.]

[640 Homological Algebra Not offered 1980–81.]

651–652 Seminar in Topology

653–654 Algebraic Topology

Duality theory in manifolds, applications, cohomology operations, spectral sequences, homotopy theory, general cohomology theories, categories and functors.

657–658 Advanced Topology

Selection of advanced topics from modern algebraic, differential, and geometric topology. Course content varies.

[661–662 Seminar in Geometry Not offered 1980–81.]

667 Algebraic Geometry

670 Topics in Statistics

A course taught occasionally to cover special topics in theoretical statistics not treated in other listed courses. Typical of the subjects that will be treated are time series analysis, and classification and cluster analysis.

671 Seminar in Probability and Statistics

[674 Multivariate Analysis Not offered 1980–81.]

[675–676 Statistical Decision Theory Not offered 1980–81.]

677–678 Stochastic Processes

681–682 Seminar in Logic

683 Model Theory

684 Recursion Theory

Theory of effectively computable functions. Classification of recursively enumerable sets. Degrees of recursive unsolvability. Applications to logic. Hierarchies. Recursive functions of ordinals and higher type objects. Generalized recursion theory.

685 Metamathematics

Topics in metamathematics. Course content varies.

[687 Set Theory Not offered 1980–81.

Models of set theory. Theorems of Gödel and Cohen, recent independence results.]

690 Supervised Reading and Research

Modern Languages, Literatures, and Linguistics

Courses in modern languages, literatures, and linguistics are offered by various departments of the college.

	<i>Department</i>
Akkadian, Arabic, Aramaic	Near Eastern Studies
Chinese literature	Asian Studies
French literature	Romance Studies
Germanic literature	German Literature
Greek	Classics
Hebrew	Near Eastern Studies
Italian literature	Romance Studies
Japanese literature	Asian Studies
Latin	Classics
Russian literature	Russian Literature
Spanish literature	Romance Studies
Swahili	Africana Studies and Research Center

Language, literature, and linguistics courses that are not offered by the departments listed above are offered by the Department of Modern Languages and Linguistics.

Arabic

See listings under Near Eastern Studies.

Burmese

101–102 Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for Burmese 102: 101 or equivalent.

Hours to be arranged. R. B. Jones.
A semi-intensive course for beginners or for those who have been placed in the course by examination. The purpose of the course is to give a thorough grounding in all the language skills: listening, speaking, reading, and writing.

201–202 Burmese Reading 201, fall; 202, spring. 3 credits each term. Prerequisites: for Burmese 201: qualification in Burmese; for 202, Burmese 201. Hours to be arranged. R. B. Jones.

203–204 Composition and Conversation 203, fall; 204, spring. 3 credits each term. Prerequisites: for Burmese 203, qualification in Burmese; for 204, Burmese 203. Hours to be arranged. R. B. Jones.

301–302 Advanced Burmese Reading 301, fall; 302, spring. 4 credits each term. Prerequisites: for Burmese 301, Burmese 202 or permission of instructor; for 302, Burmese 301 or permission of instructor.

Hours to be arranged. R. B. Jones.
Selected Burmese readings in various fields.

Cambodian

101–102 Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for 102: 101 or equivalent.

Hours to be arranged. F. E. Huffman.

201–202 Cambodian Reading 201, fall; 202, spring. 3 credits each term. Prerequisites: for Cambodian 201, qualification in Cambodian; for 202, Cambodian 201.

Hours to be arranged. F. E. Huffman.

203–204 Composition and Conversation 203, fall; 204, spring. 3 credits each term. Prerequisites: for Cambodian 203, qualification in Cambodian; for 204, Cambodian 203.

Hours to be arranged. F. E. Huffman.

301–302 Advanced Cambodian 301, fall; 302, spring. 4 credits each term. Prerequisites: for Cambodian 301, Cambodian 201–202 or the equivalent; for 302, Cambodian 301.

Hours to be arranged. F. E. Huffman.

401–402 Directed Individual Study 401, fall; 402, spring. For advanced students. 4 credits each term. Prerequisite: permission of instructor.

Hours to be arranged. F. E. Huffman.

404 Structure of Cambodian Spring only. 4 credits. Prerequisite: Linguistics 101–102 or equivalent.

Hours to be arranged. F. E. Huffman.

Cebuano (Bisayan)

[101–102 Basic Course 101, fall; 102, spring. Offered according to demand. 6 credits each term. Prerequisite for Cebuano 102: 101 or equivalent. A semi-intensive course for beginners. Not offered 1980–81; next offered 1981–82.]

Chinese**Languages and Linguistics**

101–102 Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for Chinese 102: 101 or equivalent.

Lecs, M W F 9:05; drill, M–F 8 or 2:30. C. Ross, P. Wang.
A semi-intensive course for beginners or for those who have been placed in the course by examination. The course gives a thorough grounding in all the language skills: listening, speaking, reading, and writing.

111–112 Cantonese Basic Course 111, fall; 112, spring. 6 credits each term. Prerequisite: permission of instructor.

Lecs, T R 11:15; drill, M–F 10:10. J. McCoy, S. Fessler.
Conversation in standard Cantonese and readings in modern expository Chinese with Cantonese pronunciation.

201–202 Intermediate Chinese I 201, fall; 202, spring. 4 credits each term. Prerequisite: qualification in Chinese.

M–F 9:05 or 11:15. P. Ni.

203–204 Chinese Conversation 203, fall; 204, spring. 1 credit each term; may be repeated for credit. Prerequisite: Chinese 101–102. S-U grades only.

Two class hours: M W 1:25. Staff.

211–212 Intermediate Cantonese I 211, fall; 212, spring. 4 credits each term. Prerequisite: Cantonese 112 or permission of instructor.

Hours to be arranged. S. Fessler.

213–214 Introduction to Classical Chinese 213, fall; 214, spring. 3 credits each term. Prerequisite: qualification in Chinese or permission of instructor. This course may be taken concurrently with Chinese 101–102, 201–202, or 301–302.

213: M W 11:15, plus 1 hour to be arranged. 214: hours to be arranged.

301–302 Intermediate Chinese II 301, fall; 302, spring. 4 credits each term. Prerequisite for Chinese 301: 202 or equivalent. Prerequisite for Chinese 302: 301.

M W F 11:15. P. Wang.
Readings and drill in modern expository Chinese.

303–304 Chinese Conversation — Intermediate 303, fall; 304, spring. 1 credit each term. S-U grades only. Prerequisites: Chinese 201–202. May be repeated for credit.

T R 1:25. Staff.
Guided conversation and oral composition and translation. Corrective pronunciation drill.

311–312 Intermediate Cantonese II 311, fall; 312, spring. 4 credits each term. Prerequisite: Cantonese 212 or permission of instructor.

Hours to be arranged. S. Fessler.

315–316 Chinese Composition 315, fall; 316, spring. 4 credits each term. Prerequisite: Chinese 202 or 212.

M W F 10:00. P. Ni.
Special emphasis on developing the style and vocabulary of modern written Chinese through practice and example.

401 History of the Chinese Language Fall or spring, according to demand. 4 credits. Prerequisite: permission of instructor.

Hours to be arranged. J. McCoy, C. Ross.
Survey of phonological and syntactic developments in Chinese.

[403 Linguistic Structure of Chinese: Phonology and Morphology Fall or spring according to demand. 4 credits. Prerequisite: permission of instructor. Not offered 1980–81.

C. Ross.
Introductory course in the structure of modern Mandarin Chinese.]

[404 Linguistic Structure of Chinese: Syntax Fall or spring, according to demand. 4 credits. Prerequisite: permission of instructor. Not offered 1980–81.

C. Ross.
Syntax of modern Mandarin Chinese.]

[405 Chinese Dialects Fall, according to demand. 4 credits. Prerequisite: permission of instructor. Not offered 1980–81.

J. McCoy.
Introductory survey of modern dialects and their distinguishing characteristics.]

411–412 Readings in Modern Chinese Literature 411, fall; 412, spring. 4 credits each term. Prerequisite: Chinese 302.

M W F 1:25. P. Ni.

[607 Chinese Dialect Seminar Fall or spring on student demand. 4 credits. Prerequisite: Chinese 405 and permission of instructor. Not offered 1980–81.

J. McCoy.
Analysis and/or field techniques in a selected dialect area.]

FALCON

161–162 Intensive Mandarin Course 161, fall (parallels first 16 credits of instruction in regular program); 162, spring (parallels second 16 credits of instruction in regular program). Prerequisite: permission of instructor.

J. McCoy and staff.

Literature in Chinese

313 Chinese Philosophical Texts Fall. 4 credits. Prerequisite: Chinese 214. T. L. Mei.

314 Classical Narrative Texts Spring. 4 credits. Prerequisite: Chinese 214. E. M. Gunn.

420 Tang and Sung Poetry Fall. 4 credits. Prerequisite: permission of instructor. T. L. Mei.

421-422 Directed Study 421, fall; 422, spring. 2-4 credits each term. Prerequisite: permission of instructor. Staff.

424 Readings in Literary Criticism Spring. 4 credits. Prerequisite: permission of instructor.

430 Readings in Folk Literature Fall or spring on student demand. 4 credits. Prerequisite: permission of instructor. J. McCoy.

For complete descriptions of courses numbered 600 or above consult the appropriate instructor.

603 Seminar in Chinese Poetry and Poetics Fall. 4 credits. Prerequisite: permission of instructor. T. L. Mei.

605 Seminar in Chinese Fiction Fall. 4 credits. Prerequisite: permission of instructor. E. M. Gunn.

609 Seminar in Chinese Folk Literature Fall or spring, according to demand. 4 credits. Prerequisite: permission of instructor. J. McCoy.

621-622 Advanced Directed Reading 621, fall; 622, spring. Credit to be arranged. Prerequisite: permission of instructor. E. M. Gunn, J. McCoy, T. L. Mei.

Dutch

131-132 Reading Course 131, fall; 132, spring. 3 credits each term. Prerequisite: permission of instructor. Hours to be arranged. F. C. van Coetsem.

Seminar in Dutch Linguistics (German 740)

English

102 English as a Second Language Fall. 6 credits. Prerequisite: placement by the instructor. M-F 9:05. M. Martin. Intermediate spoken and written English with emphasis on speaking, understanding, and reading.

103 English as a Second Language Spring. 3 credits. Prerequisite: English 102 or placement by the instructor. M W F 2:30. M. Martin.

Designed for those who have completed English 102 and who require or desire further practice. Emphasis is on developing control of written as well as spoken language.

211-212 English as a Second Language 211, fall; 212, spring. 3 credits each term. Prerequisite: placement by the instructor. M W F 10:10, 11:15, 2:30; T R 2:30-4. M. Martin. Advanced reading and writing with emphasis on improving vocabulary and control of college-level written English.

213 English for Non-Native Speakers Spring. 3 credits. Prerequisite: placement by the instructor. T R 10:10; plus a weekly interview. M. Martin.

Designed for those whose writing fluency is sufficient for them to carry on regular academic work, but who feel the desire for refining and developing their ability to express themselves clearly and effectively. As much as possible, students receive individual attention.

Freshman Seminar

215-216 English for Bilinguals 215, fall; 216, spring. 3 credits each term. Not designed for students whose schooling has been entirely in English. M W F 2:30. M. Martin.

A course designed to strengthen the English language skills of students from American high schools whose language in the home is not English. Intensive work in written English is offered, with emphasis on sentence structure, cohesion, vocabulary expansion, maturity of style, and grammatical structure and pronunciation.

French

Languages and Linguistics

121-122 Elementary Course 121, fall; 122, spring. 4 credits each term. Intended for beginners or students placed by examination. Prerequisite for French 122: 121 or equivalent. Students who obtain a CEEB score of 560 after French 121-122 attain qualification and may enter the 200-level sequence; otherwise French 123 is required for qualification. Lec, R 9:05, 10:10, 11:15 or 1:25; drills, M T W F 8, 9:05, 10:10, 11:15, 12:20, 1:25, 2:30, or 3:35. J. Noblitt, N. Gaenslen.

A thorough grounding in all the language skills is given: listening, speaking, reading, and writing. Language practice is in small groups. Lectures cover grammar, reading, and cultural information.

123 Continuing French Fall or spring. 4 credits. Limited to students who have previously studied French and have a CEEB achievement score between 450 and 559. Satisfactory completion of French 123 fulfills the qualification portion of the language requirement. Lec, T 10:10 or 12:20; drills, M W R F 8, 9:05, 10:10, 11:15, 1:25, 2:30, or 3:35. J. Herschensohn.

An all-skills course designed as the final course in the sequence. A review of grammar is included in addition to reading, writing, and conversation.

200 Intermediate Course: Language and Literature Fall or spring. 3 credits. Prerequisite: qualification in French with a CEEB score no higher than 629. Offered by the Department of Romance Studies. Fall: M W F 9:05 or 12:20 or T R 8:40. Spring: M W F 9:05 or 12:20. D. Brewer and staff.

Designed to provide an introductory examination of contemporary French culture and literature. Texts read and discussed are selected for their cultural and humanistic value. Grammar is reviewed, and emphasis is on linguistic and analytic skills.

203 Intermediate Composition and Conversation Fall or spring. 3 credits. Prerequisite: qualification in French. Lec, T 11:15 or 1:25, W 2:30, or R 11:15; drills, M W F 8, 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30. S. A. Littauer.

Weekly grammar review in addition to composition and conversation.

204 Intermediate Composition and Conversation Fall or spring. 3 credits. Enrollment limited. Prerequisite: French 203 or equivalent. Fall: lec, T 2:30 or W 1:25; drills, M W F 10:10, 2:30, or 3:35. Spring: lec, T 10:10 or W 1:25; drills, M W F 9:05, 10:10, 11:15, 12:20, or 1:25. S. A. Littauer.

Conversation, compositions, vocabulary expansion, and some grammar review (all based on contemporary texts).

211-212 Intermediate French 211, fall; 212, spring. 3 credits each term. Prerequisite for French 211: qualification. Prerequisite for French 212: French 211, 203, or placement by advanced standing examination. Offered by the Department of Romance Studies.

Fall: M W F 10:10 or 12:20. Spring: M W F 11:15 or 12:20. N. Furman and staff.

Designed to improve reading, writing, and speaking skills. Grammar is reviewed. Special emphasis is on vocabulary expansion, composition, and the development of reading competence. Students write short essays in French; readings focus on modern literature and culture.

310 Advanced Conversation Spring. 2 credits. Enrollment limited. T R 10:10. J. Béreaud and staff.

This course is specifically designed to increase the student's oral fluency in French. There will be no written work in class; slides and recordings will be used along with extensive discussions.

311-312 Advanced Composition and Conversation 311, fall; 312, spring. 4 credits each term. Prerequisite: French 212 or 204 or placement by special examination. Offered by the Department of Romance Studies. Fall: M W F 10:10 or 1:25; E. Morris. Spring: M W F 10:10 or 1:25; J. Béreaud.

All skills course. Reading and analysis of contemporary texts. Detailed study of present-day syntax in French 311. Weekly translations or essays in French.

401 History of the French Language Fall. 4 credits. Prerequisites: qualification in French and Linguistics 101. M W F 2:30. Staff.

Diachronic development of French from Latin with emphasis on phonological and morphological change. Course work includes problems in reconstruction, textual analyses, discussions of theoretical topics, and external history.

407 Applied Linguistics: French Fall. 4 credits. Prerequisite: qualification in French. M W F 3:35. J. S. Noblitt.

Designed to equip the student with the ability to apply linguistic descriptions in teaching French, with special emphasis on phonetics and morphology.

408 Linguistic Structure of French Spring. 4 credits. Prerequisites: qualification in French and Linguistics 101, or permission of instructor. M W F 2:30. Staff.

A descriptive analysis of modern French with emphasis on its phonology, morphology, and syntax.

410 Semantic Structure of French Fall or spring. 4 credits. Prerequisite: permission of instructor. Offered alternate years.

Hours to be arranged. L. R. Waugh. Introduction to French semantic elements — morphological, lexical and syntactic — from a Jakobsonian perspective.

[424 Composition and Style Spring. 4 credits. Prerequisite: French 312 or placement by special examination. Offered by the Department of Romance Studies. M W F 12:20. J. Béreaud.

Written work will include review of some areas of advanced grammar, the theory and practice of translation, and pastiches of certain French authors. The oral work will aim at enabling students to deliver a short and correct communication in the foreign language. Weekly papers, *explications de texte*, and exposes on cultural problems.]

[602 Linguistic Structure of Old and Middle French Spring. 4 credits. Prerequisite: French 408 or permission of instructor. Not offered 1980-81; next offered spring 1982.

Hours to be arranged. J. S. Noblitt.
Through the study of Old and Middle French texts, students analyze synchronically aspects of the grammar of the language at different periods.]

[604 Contemporary Theories of French Grammar] Fall. 4 credits. Prerequisite: permission of instructor.

Hours to be arranged. Staff.
Selected readings of twentieth-century French linguistics.]

700 Seminar in French Linguistics Spring, according to demand. 4 credits.

Hours to be arranged. Staff.
Seminars are offered according to faculty interest and student demand. Topics in recent years have included: current theories in French phonology; current theories in French syntax; semantics of French.

Literature

107 Freshman Seminar: Readings in Modern Literature Fall or spring. 3 credits.

Fall: M W F 9:05. Spring: M W F 9:05. Staff.
What sense of modernity is conveyed by literary works of our time that ask what it means to live in a century of world wars and triumphant technology? Representative texts of twentieth-century French literature are discussed in the context of current intellectual and social issues. Works by such writers as Gide, Malraux, Sartre, Ionesco, Genet, and Bataille (readings in English translation).

201 Introduction to French Literature Fall or spring. 3 credits. Prerequisite: qualification. French 201 serves as a prerequisite for all 300-level courses in French literature and is required of all majors. The course is divided into small sections of three types: those conducted in French; those that use more French as the term progresses; those conducted in English. The reading in each section is in French and is the same; students may write their principal papers in English. Relative freedom to change from one section of the course to another is given during the first two weeks.

Fall: M W F 9:05, 10:10, 11:15, or 12:20 or T R 10:10–11:25 or 8:40–9:50. (Tentatively, the sections primarily conducted in English will be M W F 9:05 and 12:20; the sections primarily conducted in French will be M W F 11:15 and T R 10:10–11:25. The section using both French and English will be M W F 10:10 and T R 8:40–9:50.) Spring: M W F 11:15 or T R 10:10–11:25. R. Klein and staff.

The work of five or six major French authors from the nineteenth and twentieth centuries is introduced. Stress is on literary analysis and the development of reading skills. The larger historical framework in which French literature is considered as a whole, and more general questions of cultural anthropology, linguistics, sociology, and aesthetics are raised. Readings are chosen from the works of such authors as Baudelaire, Flaubert, Mallarmé, Rimbaud, Proust, Sartre, Malraux, Beckett, and Ionesco.

202 Studies in French Literature Fall or spring. 3 credits. Prerequisite: French 201 or a CEEB achievement score of 650 or more (students with scores in the 560–649 range should see French 200). Required of all majors, but not limited to them. A fee is charged for a number of short texts distributed by the instructor.

Fall: T R 10:10–11:25; P. Lewis. Spring: M W F 10:10, 11:15, or T R 10:10–11:25; D. Brewer and staff.
Study of the classic literature of seventeenth-century France (Corneille, Racine, Molière, Madame de Lafayette) and its immediate forebears (Montaigne) and successors in the Enlightenment (Voltaire, Rousseau, Diderot, Beaumarchais).

[323 French Civilization] Fall. J. Béreaud. Not offered 1980–81; next offered 1981–82.]

[331 Masterpieces of French Drama I: The Classical Era] Fall. P. Lewis. Not offered 1980–81; next offered 1982–83.]

[332 Masterpieces of French Drama II: The Modern Era] Spring. D. Grossvogel. Not offered 1980–81; next offered 1982–1983.]

334 The Novel as Masterwork: French Novels from Pre-Romanticism to Symbolism Spring. 4 credits.

M W F 1:25. N. Furman.
The second in a series of three courses that survey the French novel, this course traces the evolution of the genre in the nineteenth century. Major works of Stendhal, Balzac, Flaubert, and Zola will be emphasized.

335 The Novel in France: From the Origins to the French Revolution Fall. 4 credits. Conducted in French.

T R 12:20–1:35. D. Brewer.
An examination of the transformations of the novel in France from Chrétien de Troyes to the Marquis de Sade, including works by such writers as Madame de Lafayette, Cyrano de Bergerac, Prévost, Voltaire, Laclos, Diderot, and Rousseau. Based on discussions of the novels themselves, questions raised will concern narration, realism, and genre; desire and the feminine subject; ideology, language, and power.

[336 Experimental and Contemporary French Novels: Subversion of the Novelistic Genre from Diderot to the Present] Fall. D. Grossvogel. Not offered 1980–81; next offered 1981–82.]

[337 French Poetry from the Middle Ages to Romanticism] Fall. E. Morris. Not offered 1980–81; next offered 1981–82.]

[347 Masterpieces of Medieval Literature. Not offered 1980–81.]

[368 The Baroque in France] A. Seznec. Not offered 1980–81.]

[369 French Classicism] P. Lewis. Not offered 1980–81; next offered 1981–82.]

[379 Victor Hugo and the Romantic Movement] Fall. N. Furman. Not offered 1980–81.]

381–382 Self, Family, and Polity in Renaissance Times (The Frederick G. Marcham Seminar; also Society for the Humanities 381–382 and History 381–382) 381, fall; 382, spring. 4 credits each term. Limited to 15 students.

Fall: discs. M W 2:30–3:45; Spring: no class meetings; students will pursue independent work in consultation with the instructors. E. Morris, J. Najemy.

An exploration of the relationships between the problematic notions of selfhood, family, and community, on the one hand, and historical experience, on the other. The course will use and confront the methods of social history and literary analysis, drawing occasionally on anthropology and psychoanalysis. The three principal texts will be Alberti, *Books on the Family*, Rabelais, *Gargantua and Pantagruel*; Montaigne, *Essays* (all in English translation); additional readings in historical and theoretical works.

387 From Parnassus to Surrealism Fall. 4 credits.

T R 2:30–3:45. R. Klein.
This course is conceived as a panoramic survey of roughly 100 years of French poetry, from 1830 to 1930. Beginning with the late Romantic work of the Parnassus poets (Gautier, Banville), it will touch on such major figures as Baudelaire, Vigny, Rimbaud, Mallarmé, Valéry, and Apollinaire. It will conclude with a brief examination of some exemplary Surrealist

poems. Close textual analysis of individual poems will serve to mark the principle stages in the transformation of French prosody and will provide a basis for constructing a theory of French literary history.

[394 Marx in France] R. Klein. Not offered 1980–81.]

419–420 Special Topics in French Literature 419, fall, 420, spring. 2–4 credits each term.

Prerequisite: permission of instructor.
Staff.
Guided independent study of special topics.

429–430 Honors Work in French May be taken without credit or for 4 credits with permission of the adviser. Open to juniors and seniors. Consult the director of the honors program.
E. Morris.

[447 Medieval Literature] Fall. A. Colby-Hall. Not offered 1980–81; next offered 1981–82.]

448 Medieval Literature Spring. 4 credits. Prerequisite: French 201 or permission of the instructor.

M W F 9:05. A. Colby-Hall.
This course will deal with the romance and the lyric. Facility in reading Old French and appreciation of these two major genres are the primary goals of this course.

[452 Theatre in Sixteenth-Century France] Spring. Not offered 1980–81.]

[456 Literature and the Arts in Sixteenth-Century France] Spring. Not offered 1980–81.]

[458 Montaigne] Spring. Not offered 1980–81.]

[461 The Theatre of Molière] Fall. Not offered 1980–81.]

[473 Diderot and the Enlightenment] Fall. Not offered 1980–81.]

483 Feminism and French Literature (also Women's Studies 483) Fall. 4 credits. Taught in French.

M W F 1:25. N. Furman.
The interaction between feminist concerns and literary expression brings to the fore an array of questions at the juncture of history and literature. Some of the topics discussed will be the representation of women in literature, the literary echoes of women's social *revendications*, the inscription of women writers in the literary canon, and feminist challenges to criticism. Authors to be studied include Mme. de Lafayette, Mme. De Staël, George Sand, Colette, Simone de Beauvoir, Marguerite Duras, and Hélène Cixous.

[486 Mallarmé] Spring. R. Klein. Not offered 1980–81.]

[490 French Film and Literature in the Twentieth Century] Spring. D. Grossvogel. Not offered 1980–81.]

496 The Aesthetics of Coincidence (also Comparative Literature 496) Spring.

R 2–4. R. Klein.
Superstitious coincidence — the conjunction of events that have no causal relation but that seem unmistakably to signify one another — has been taken, at least since Baudelaire, as an exemplary poetic experience. It finds its theoretical grounds in the Romantic doctrine of *correspondances* between man and nature. It has acquired for some writers the status of an unimpeachable scientific fact — a compelling instance of fiction becoming reality. In the twentieth century, Jungian psychology and Surrealist aesthetics have made the most systematic attempts to explore the nature of uncanny coincidence.

Readings in this course will include works of Jung, Freud, Breton, Poe, and other more contemporary writers.

[637 Old French Dialectology] Fall. A. Colby-Hall. Not offered 1980–81.]

639–640 Special Topics in French Literature 639, fall, 640, spring. 4 credits each term. Staff.
Guided independent study for graduate students.

[644 Medieval Seminar: The Old French Epic] Not offered 1980–81.]

646 Medieval Seminar: Villon Spring. 4 credits. W 2:30–4:30. A. Colby-Hall.
Topic: The structure and meaning of Villon's two fictional testaments.

[648 Medieval Seminar: La Roman de la Rose] Spring. A. Colby-Hall. Not offered 1980–81.]

658 Poetry and the Powers Spring. 4 credits. T 2–4. E. Morris.

When authority is jeopardized by the free playing of imagination, wit, and art, repression ensues: poets are banished, or become clients, or culture is made official. Maybe it's all in the mind. The course will examine the varying connections of poets with church, crown, and academies from the reign of Henry II through the ministry of Richelieu. Poems of Ronsard, Du Bellay, D'Aubigné, Régnier, and Saint Amant will serve as major contrasting examples; themes will include flattery, subversion, and poetic distance.

661 Racine and His Critics Fall. 4 credits. Conducted in French. F 1:25–3:25. P. Lewis.

This course will combine work on three levels: (1) analytic reading of a half-dozen plays by Racine; (2) reading and discussion of interpretations of these plays by major critics (Barthes, Goldmann, Girard, Jauss, Mauron, Pavel, Picard, Starobinski, etc.); (3) theoretical discussion of the field of possible readings opened by the diverse examples of practical criticism considered and of the issues encountered in an attempt to choose among the possible approaches to the theatrical text.

[669 Seventeenth-Century Seminar: Illusion and Representation] P. Lewis. Not offered 1980–81.]

[689 Bohemians and Dandies] Fall. N. Furman. Not offered 1980–81.]

[693 The Poetics of Derrida] Fall. R. Klein. Not offered 1980–81.]

[696 Memory, Creation, and the Novel (also Comparative Literature 596)] Spring. D. Grossvogel. Not offered 1980–81.]

Related Courses in Other Departments

The Applications of Reason: For and Against Civilization (Society for the Humanities 413–414)

Hume and Rousseau (Comparative Literature 416)

Hegel's Phenomenology in Context (Comparative Literature 474)

Critical Perspectives: Roland Barthes (Comparative Literature 606)

Germanic Studies

Languages and Linguistics

121–122 Elementary Course 121, fall; 122, spring. 4 credits each term. Prerequisite for German 122: 121 or equivalent. Intended for beginners or

students placed by examination. Students who obtain a CEEB score of 560 after German 121–122 attain qualification and may enter the 200-level sequence; otherwise German 123 is required for qualification.

Lec, T 9:05, 11:15, or 2:30; drills, M W R F 8, 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30. W. Harbert.

A thorough grounding in all the language skills is given: listening, speaking, reading, and writing. Language practice is in small groups. Lectures cover grammar, reading, and cultural information.

123 Continuing German Fall or spring. 4 credits. Limited to students who have previously studied German and have a CEEB achievement score between 450 and 559. Satisfactory completion of German 123 fulfills the qualification portion of the language requirement.

Fall: lec, M 2:30; drills, T–F 9:05, 10:10, 11:15, or 12:20. Spring: lec, M 2:30; drill, T–F 10:10 or 12:20. W. E. Harbert.

An all-skills course designed to prepare students for study at the 200 level.

203 Intermediate Composition and Conversation Fall or spring. 3 credits. Prerequisite: qualification in German.

Fall: M W F 9:05, 10:10, 11:15, or 1:25. Spring: M W F 9:05 or 1:25. G. Valk.

204 Intermediate Composition and Conversation Fall or spring. 3 credits. Prerequisite: German 203 or permission of instructor.

Fall: M W F 11:15. Spring: M W F 10:10 or 11:15. G. Valk.

303–304 Advanced Composition and Conversation 303, fall; 304, spring. 4 credits each term. Prerequisite for German 303: German 204 or equivalent. Prerequisite for German 304: 303 or equivalent.

M W F 1:25. G. Valk.

Emphasis is on increasing the student's oral and written command of German. Detailed study of present-day syntax and different levels of style.

401 Introduction to Germanic Linguistics Fall. 4 credits. Prerequisite: Linguistics 101 or permission of instructor.

Hours to be arranged. F. van Coetsem. Survey of major issues in Germanic linguistics, with emphasis on historical and dialectal problems.

[402 History of the German Language] Spring. 4 credits. Prerequisite: German 204 and Linguistics 101 or permission of instructor. Offered alternate years. Not offered 1980–81; next offered spring 1982.

Hours to be arranged. J. Jasanoff, F. van Coetsem. Phonological, syntactic, and semantic developments from pre-Old High German times to the present.]

[403 Modern German Phonology] Fall. 4 credits. Prerequisites: German 304 or equivalent, and Linguistics 101, 111, or 601. Not offered 1980–81.

Hours to be arranged. F. van Coetsem. The phonological system of German is viewed from various theoretical approaches.]

[404 Modern German Syntax] Spring. 4 credits. Prerequisites: German 304 or equivalent, and Linguistics 101 or 601. Not offered 1980–81.

Hours to be arranged. W. Harbert. An application of selected theoretical syntactic models to problems in the syntax of modern German.]

[405 German Dialectology] Fall. 4 credits. Prerequisite: German 304 or equivalent, and Linguistics 101 or equivalent. Not offered 1980–81; next offered 1981–82.

M W F 11:15. H. L. Kufner. Survey of German dialects, the work done at the Sorachatlas, and a discussion of modern approaches to dialectology.]

[406 Runology] Fall. 4 credits. Prerequisite: German 401. Not offered 1980–81; next offered 1982–83.

Hours to be arranged. F. van Coetsem. A study of the inscriptions in the older *futhark* and their relevance to historical Germanic linguistics.]

[407 Applied Linguistics: German] Fall. 4 credits. Not offered 1980–81.

M W F 11:15. H. L. Kufner. Designed to equip the teacher of German with the ability to apply current linguistic theory to the second-language learning situation.]

[408 Linguistic Structure of German] Spring. 4 credits. Prerequisites: German 204 and Linguistics 101–102, or permission of instructor. Not offered 1980–81; next offered 1981–82.

Hours to be arranged. H. L. Kufner. A descriptive analysis of present day German with emphasis on phonology and syntax.]

[602 Gothic] Spring. 4 credits. Prerequisite: Linguistics 101. Not offered 1980–81.

Hours to be arranged. F. van Coetsem. Linguistic structure of Gothic with extensive readings of Gothic texts.]

[603–604 Old Saxon, Old High German, Old Low Franconian, Old Frisian] Fall, 603; spring, 604. 4 credits each term. Prerequisite: Linguistics 102. F. van Coetsem. Offered alternate years. Not offered 1980–81.]

605 Structure of Old English Fall. 4 credits. Prerequisite: German 401.

Hours to be arranged. W. Harbert. Linguistic overview of Old English with emphasis on phonology and syntax.

606 Topics in Historical Germanic Fall. 4 credits. Prerequisite: German 401.

Hours to be arranged. F. van Coetsem. The development of the sound system from Proto-Germanic to its daughter languages.

607 Topics in Historical Germanic Morphology Spring. 4 credits. Prerequisite: German 401.

Hours to be arranged. J. Jasanoff. The Germanic verbal system and its Indo-European origins.

608 Topics in Historical Germanic Syntax Spring. 4 credits. Prerequisite: German 401.

Hours to be arranged. W. Harbert. A diachronic and comparative investigation of syntactic processes in the older Germanic languages.

609–610 Old Norse Fall, 609; spring 610. 4 credits each term.

Hours to be arranged. V. Bjamar. Study of the linguistic structure of Old Norse with extensive reading of Old Norse texts.

611 Readings in Old High German and Old Saxon Fall. 4 credits.

Hours to be arranged. J. Jasanoff. Texts are chosen to suit the interests of the students taking the course, but normally include selections from the more extensive Old High German and Old Saxon sources (*Otfrid*, *Tatian*, *Heliant*) as well as representative shorter works, such as *Hildebrandslied*, *Muspilli*, and *Genesis*.

612 Germanic Tribal History Spring. 4 credits. Prerequisite: German 401.

Hours to be arranged. F. van Coetsem. The history of the Germanic tribes from about 500 B.C. to A.D. 500; introduces the study of Proto-Germanic, and the separation of the Germanic languages.

631–632 Elementary Reading I 631, fall; 632, spring. 3 credits each term. Limited to graduate

students. Prerequisite for German 632: 631 or equivalent.

M W F 4:30 or T R 11:15–12:30. I. Kovary. Emphasis is on developing skill in reading, although some attention will be devoted to the spoken language, especially to listening comprehension.

710 Seminar in Germanic Linguistics Fall or spring, subject to the needs of students and to the limitations of staff time. 4 credits.

Hours to be arranged. W. Harbert.

720 Seminar in Comparative Germanic Linguistics Fall or spring, subject to the needs of students and to the limitations of staff time. 4 credits.

Hours to be arranged. Staff.

Topics include phonology, morphology, syntax, and dialectology of the older Germanic languages.

730 Seminar in German Linguistics Fall or spring, subject to the needs of students and the limitations of staff time. 4 credits.

Hours to be arranged. Staff.

Selected topics including the history, structure, and dialects of German.

740 Seminar in Dutch Linguistics Fall or spring, subject to the needs of students and to the limitations of staff time. 4 credits.

Hours to be arranged. F. van Coetssem.

Selected topics including the history, structure, and dialects of modern Dutch.

German Literature

Freshman Seminars

109 Folk Literature and Folk Poetry Fall and spring. 3 credits each term.

M W F 8, or 10:10, or 12:20 or T R 8:30–10.

I. Ezergailis and staff.

A study of folk literature, ballads, myths, and other forms of primitive literature. Readings in the Grimm brothers, H. C. Andersen, Old Icelandic mythological texts, saints' lives, Child ballads, and selected secondary literature, including Freud. All readings in English.

151 Kafka, Hesse, Brecht, and Mann Fall and spring. 3 credits each term.

T R 9:25–11:05. H. Deinert and staff.

The course will be based on complete works (in English translation) by four representative German authors of the first half of this century. Although dealing with works of great popular appeal (*Demian*, *Siddhartha*, *The Metamorphosis*, *Death in Venice*, *Mother Courage*, *Galileo*, and others) the emphasis of the course will be on improving writing skills. We will meet twice a week for lectures and discussion. In lieu of a third class meeting there will be regular conferences between students and their instructors to discuss the papers.

Courses Offered in German

201 Introduction to German Literature I Fall and spring. 3 or 4 credits each term. Prerequisite: qualification in German or permission of instructor. Taught in German.

Fall: M W F 12:20 or 1:25 or T R 12:20–1:35.

Spring: T R 12:20–1:35 or M W F 1:25. P. W. Nutting and staff.

An intermediate course designed to improve reading, listening, and speaking skills. Emphasis is placed on developing reading competency, tools of literary analysis and expansion of vocabulary. Grammar review included. Readings from major twentieth-century authors, including Brecht, Dürrenmatt, Böll, Thomas Mann, Freud, Kafka, Musil, and Bachmann.

202 Introduction to German Literature II Spring. 3 or 4 credits. Prerequisite: German 201 or permission of instructor. Taught in German.

M W F 12:20 or T R 12:20–1:35. P. W. Nutting and staff.

Emphasizes skills in reading and interpreting German literature, using representative texts of major nineteenth-century authors. Included will be discussions of the drama (Kleist, Büchner), lyric poetry (Goethe, Hölderlin, the Romantics, Heine), the essay (Kleist, Heine, Marx and Engels), and the novella (Kleist, Keller, Meyer, Hauptmann).

211 Intensive Workshop in Germanic Studies for Freshmen I Fall. 6 credits. Intended for entering freshmen with extensive training in the German language (CEEB achievement score of 680 or comparable evidence; please consult instructor).

Taught in German. Satisfies the language and distribution requirements or the Freshman Seminar requirement.

T R 2:30–4:30. H. Deinert.

Not intended as a survey, but rather as a rigorous seminar designed to familiarize students with literary forms and the tools of critical analysis. The course will provide an intensive introduction to the study of German literature through the discussion of exemplary prose works, dramas, and poems from the eighteenth century to the present.

312 Intensive Workshop in Germanic Studies for Freshmen II Spring. 4 credits. Taught in German.

May be used to satisfy the Freshman Seminar requirement.

T R 2:30–4. H. Deinert.

Designed primarily as a sequel to German 211. Emphasis is on German literature since 1900 (Thomas Mann, Hesse, Kafka, Brecht, Dürrenmatt, Peter Weiss, Plenzdorf, Rilke, Benn, Celan). Supplementary reading from contemporary philosophy, psychology, sociology, and political theory.

[305 Modern Germany Not offered 1980–81.]

324 Old Icelandic Literature: Eddic Poetry Fall. 4 credits. Prerequisite: German 610 or permission of instructor.

M W F 12:20. J. C. Harris.

Eddic poetry, read in the original language.

354 Schiller Fall. 4 credits. Prerequisite: German 201–202 or permission of instructor. Taught in German.

W 2:30–4:30. H. Deinert.

A discussion of Schiller's dramas, selected poetry, philosophical and aesthetic writing against the political and intellectual background of eighteenth-century Europe.

[355 The Age of Goethe Not offered 1980–81.]

[356 Goethe's Faust Not offered 1980–81.]

[357 Romanticism Not offered 1980–81.]

359 Nineteenth-Century Literature Spring.

4 credits. Prerequisite: German 201–202, or permission of instructor. Taught in German.

M W F 10:10. C. N. Creedy.

This course attempts to cover some of the most important tendencies in the beginning of the nineteenth century in German literature. Attention will be paid to historical (Marx) as well as literary (Heine) texts.

[361 Modern German Literature I: Contemporary German Prose Not offered 1980–81.]

362 Modern German Literature II: Twentieth-Century Prose Fall. 4 credits.

Prerequisite: German 201–202 or permission of instructor. Taught in German.

M W F 10:10. P. W. Nutting.

Examination of literary and extra-literary prose forms (novel, novella, essay, satire, *Feuilleton*, *Reportage*, short story) of the 1910s and 1920s in their social, political, and cultural context. Writers discussed will

include Schnitzler, Sternheim, Benn, Döblin, Kafka, Kisch, Musil, Tucholsky, Kästner, Freud. Students will be encouraged to practice their spoken and written German.

[363 Modern German Literature III: Contemporary Literature Not offered 1980–81.]

365 Lyrical Poetry Not offered 1980–81.]

Courses in English Translation

[311 Modern German Drama in English Not offered 1980–81.]

[314 Nietzsche, the Man and the Artist Not offered 1980–81.]

[315 Topics in German Literature I: The Modern German Novel in English Translation Not offered 1980–81.]

[350 Yiddish Literature in English Translation Not offered 1980–81.]

[375 The Shtetl in Modern Yiddish Fiction Not offered 1980–81.]

[377 Topics in Yiddish Literature Not offered 1980–81.]

Advanced Courses

405–406 Introduction to Medieval German Literature 405, fall; 406, spring. 4 credits each term. Intended for students with no previous knowledge of Middle High German.

M W F 10:10. Fall: B. C. Buettner; spring: A. Groos. The course will provide a survey of the court epic, the heroic epic, and *Minnesang*. Emphasis will be placed on a thorough understanding of the Middle High German language.

417–418 The Great Moments of German Literature 417, fall; 418, spring. 4 credits each term. Prerequisite: reading knowledge of German.

M W F 11:15. E. A. Blackall.

Recommended for graduate students and undergraduates, whether majoring in German or not, who wish to acquire an overall view of the whole range of German literature from the earliest texts to the beginning of the present century. The course will consist of lectures and discussion classes. The lectures will aim at a characterization of the temper of a period or of the essential nature of a certain writer. The discussion periods will concentrate on individual works illustrative of the topics of the lectures. All works will be read in German, except for medieval works which will be read in translation, though some short passages in the original medieval German will be explicated.

[427 Baroque Literature Not offered 1980–81.]

[438 Twentieth-Century German Literature Not offered 1980–81.]

451–452 Independent Study 451, fall; 452, spring. 1–4 credits each term. Prerequisite: permission of instructor.

Hours to be arranged. Staff. Extensive reading of texts in addition to regular course work, under the direction of a member of the department.

Seminars

For complete descriptions of courses numbered 600 or above consult the appropriate instructor.

611 Seminar in Old Icelandic Literature I Fall. 4 credits. Prerequisite: German 610 or permission of instructor.

Hours to be arranged. J. C. Harris. Old Icelandic mythological texts, with focus on the female figures and the role of women.

[612 Seminar in Old Icelandic Literature II Not offered 1980–81.]

[623 Seminar in Medieval German Literature I Not offered 1980–81.]

624 Seminar in Medieval German Literature II Spring. 4 credits.
W 1:25. A. Groos.
Topic to be announced.

625 The Northern Renaissance and Reformation Fall. 4 credits.
T 1:25. S. L. Gilman.

[629 The Enlightenment Not offered 1980–81.]

[631 From *Wilhelm Meister* to *Buddenbrooks* Not offered 1980–81.]

[632 Goethe's Poetry Not offered 1980–81.]

[633 Basic Texts of Romanticism Not offered 1980–81.]

[634 The Romantic Novel Not offered 1980–81.]

635 Jean Paul and the Eighteenth-Century Humorous Novel (also Comparative Literature 635) Spring. 4 credits. Prerequisite: permission of instructor.

R 2:30. P. W. Nutting.

Jean Paul's theory of humor will be used as the starting point for discussion of the English humorous novel and its influence on his later fiction. Other theories of the comic (Hegel, Vischer, Freud, Bergson) will also be discussed in order to consider their relevance in light of contemporary developments in narrative theory. Reading knowledge of German suggested, although English translations of Jean Paul will be available.

[636 Nineteenth-Century Drama Not offered 1980–81.]

637 Seminar in Realism: The *Novelle* Spring. 4 credits. Prerequisite: permission of instructor.
W 1:25. H. Deinert.

638 Twentieth-Century German Literature: Thomas Mann Fall. 4 credits.

R 1:25. J. P. Stern, I. Ezergalis.

Students should have some acquaintance with all the main novels: *Buddenbrooks*, *Magic Mountain*, *Lotte in Weimar*, the Joseph novels, *Dr. Faustus*, and *Felix Krull*. Knowledge of German helpful but texts can be read in translation.

[639 Modern Lyric Poetry Not offered 1980–81.]

[641 The Postwar German Novel Not offered 1980–81.]

[650 Graduate Seminar in Medieval Literature Not offered 1980–81.]

682 Seminar on Richard Wagner (also Music 682) Spring. 4 credits.

M 1:25. J. Webster, E. A. Blackall.

An analysis of Wagner's music-dramas, with special reference to *Tristan und Isolde* and *Die Meistersinger von Nürnberg*. Attention will be paid to the literary and musical context of Wagner's works, and to the relations between his theories and his practice.

753–754 Tutorial in German Literature 753 fall; 754, spring. 1–4 credits each term. Prerequisite: permission of instructor.
Hours to be arranged. Staff.

Related Courses Offered in Other Departments

Culture as Semiotic System (Comparative Literature 295)

Introduction to Psychopathological Texts (Comparative Literature 310)

Comedy (Comparative Literature 312)

Being, God, and Mind (Comparative Literature 359)

The European Novel (Comparative Literature 363–364)

Literature and Society (Comparative Literature 380)

Introduction to Twentieth-Century Criticism (Comparative Literature 395)

Hegel's Phenomenology in Context (Comparative Literature 474)

Fiction and the Irrational (Comparative Literature 479)

Hermeneutics (Comparative Literature 699)

Modern Greek

See listings under Classics.

Modern Hebrew

See listings under Near Eastern Studies.

Hindi-Urdu

101–102 Hindi-Urdu Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for Hindi 102: 101 or equivalent.

M–F 9:05. G. Kelley

A semi-intensive course for beginners. A thorough grounding in all the language skills is given: listening, speaking, reading, and writing.

201–202 Hindi Reading 201, fall; 202, spring. 3 credits each term. Prerequisite for Hindi 201: qualification in Hindi. Prerequisite for Hindi 202: 201 or permission of instructor.

M W F 10:10. G. Kelley.

203–204 Composition and Conversation 203, fall; 204, spring. 3 credits each term. Prerequisite for Hindi 203: qualification in Hindi. Prerequisite for Hindi 204: 203 or permission of instructor.

Hours to be arranged. G. Kelley.

301–302 Readings in Hindi Literature 301, fall; 302, spring. 4 credits each term. Prerequisite for Hindi 301: Hindi 202. Prerequisite for Hindi 302: 301 or equivalent.

Hours to be arranged. G. Kelley.

303–304 Advanced Composition and Conversation 303, fall; 304, spring. 4 credits each term. Prerequisite for 303: Hindi 204 or equivalent. Prerequisite for Hindi 304: 303 or equivalent.

Hours to be arranged. G. Kelley.

305–306 Advanced Hindi Readings 305, fall; 306, spring. 4 credits each term. Prerequisite for Hindi 305: 202 or equivalent. Prerequisite for 306: 305 or equivalent.

Hours to be arranged. G. Kelley.
Intended for those who wish to do readings in history, government, economics, etc., instead of literature.

[401 History of Hindi Fall or spring. 4 credits. Prerequisite: Hindi 101–102 or equivalent, or Linguistics 102. Not offered 1980–81.]

For complete descriptions of courses numbered 600 and above, consult the appropriate instructor.

700 Seminar in Hindi Linguistics Fall or spring. 3 credits. Prerequisite: permission of instructor.
Hours to be arranged. J. W. Gair, G. B. Kelley.

Indonesian

101–102 Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for Indonesian 102: 101.

M–F 8, plus 2 more hours to be arranged.
J. U. Wolff.

A semi-intensive course for beginners.

201–202 Indonesian Reading 201, fall; 202, spring. 3 credits each term. Prerequisite for Indonesian 201: qualification in Indonesian. Prerequisite for Indonesian 202: 201 or permission of instructor.

Hours to be arranged. J. U. Wolff.

203–204 Composition and Conversation 203, fall; 204, spring. 3 credits each term. Prerequisite for Indonesian 203, qualification in Indonesian. Prerequisite for Indonesian 204: 203 or permission of instructor.

Hours to be arranged. J. U. Wolff.

300 Linguistic Structure of Indonesian Fall or spring. 4 credits. Prerequisites: Indonesian 101–102 or equivalent, and Linguistics 101.

Hours to be arranged. J. U. Wolff.

301–302 Readings in Indonesian and Malay 301, fall; 302, spring. 4 credits each term. Prerequisite for 301: Indonesian 201–202 or equivalent. Prerequisite for Indonesian 302: 301.

Hours to be arranged. J. U. Wolff.

303–304 Advanced Indonesian Conversation and Composition 303, fall; 304, spring. 4 credits each term. Prerequisite for Indonesian 303: 204; Prerequisite for Indonesian 304: 303 or equivalent.

Hours to be arranged. J. U. Wolff.

305–306 Directed Individual Study 305, fall; 306, spring. 2–4 credits. Prerequisite: Indonesian 301–302 and 303–304 or equivalent knowledge of Indonesian or Malay.

Hours to be arranged. J. U. Wolff.

A practical language course on an advanced level in which the students will read materials in their own field of interest, write reports, and meet with the instructor for two hours a week for two credits and twice a week for four credits.

401–402 Advanced Readings in Indonesian and Malay Literature 401, fall; 402, spring. 4 credits each term. Prerequisite for Indonesian 401: 302 or equivalent. Prerequisite for Indonesian 402: 401 or equivalent.

Hours to be arranged. J. U. Wolff.

FALCON

161–162 Intensive Course 161, fall; 162, spring. 16 credits each term. Prerequisite: permission of instructor.

M–F, 6 hours each day. J. U. Wolff and staff.

Related Course

Malayo-Polynesian Linguistics (Linguistics 655–656)

Italian

Languages and Linguistics

121–122 Elementary Course 121, fall; 122, spring. 4 credits each term. Prerequisite for Italian 122: 121 or equivalent. Intended for beginners or students placed by examination. Students who obtain a CEEB score of 560 after Italian 121–122 attain qualification and may enter the 200-level sequence; otherwise Italian 123 is required for qualification.

Lec, T 10:10; drills M W R F 8, 9:05, 12:20, 1:25, or 2:30. C. Rosen and staff.

A thorough grounding is given in all the language skills: listening, speaking, reading, and writing. Language practice is in small groups. Lectures cover grammar and cultural information.

123 Continuing Italian Fall. 4 credits. Limited to students who have previously studied Italian and have a CEEB achievement score between 450 and 559. Satisfactory completion of Italian 123 fulfills the qualification portion of the language requirement.
M-F 11:15. C. Rosen and staff.

203-204 Composition and Conversation 203, fall; 204, spring. 3 credits each term. Prerequisite for Italian 203: qualification in Italian. Prerequisite for Italian 204: 203 or equivalent.

M W F 1:25 or 2:30. C. Rosen and staff.
Guided conversation, composition, reading, pronunciation, and grammar review emphasizing the development of accurate and idiomatic expression in the language.

Note: Students placed in 200-level courses also have the option of taking courses in introductory literature; see separate listings under Italian 200, 201, and 202 for descriptions of these courses, any of which may be taken concurrently with the 203-204 language courses described above. The introductory literature courses are offered by the respective literature departments and the 203-204 language courses by the Department of Modern Languages and Linguistics.

300 Advanced Composition and Conversation Spring. 2 credits. Prerequisite: Italian 204.

Hours to be arranged. C. Rosen and staff.
Further development of all skills. Diverse readings illustrating varieties of style. Material for conversation is prepared by students according to their individual interests.

402 History of the Italian Language Spring. 4 credits. Prerequisite: Linguistics 101 and qualification in Italian, or permission of instructor. Offered alternate years.
M W F 2:30. C. Rosen.

403 Structure of Italian Fall. 4 credits. Prerequisite: Linguistics 102 and qualification in any Romance language. Offered alternate years.
M W F 2:30. C. Rosen.

Fundamentals of Italian grammar in the light of recent research. Emphasis is on syntax. Some selected topics in phonology, derivational morphology, and semantics.

[432 Italian Dialectology Spring, according to demand. 4 credits. C. Rosen. Not offered 1980-81.]

[700 Seminar in Italian Linguistics Offered according to demand. 4 credits. C. Rosen. Not offered 1980-81.]

Literature

201 Introduction to Modern Italian Literature Fall. 3 credits. Required of all majors in Italian. May be used to fulfill the distribution requirement. Prerequisite: reading knowledge of Italian, or knowledge of another Romance language and permission of instructor. Graduate students may take the course on an S-U basis to fulfill area examination requirements.

M W F 10:10. A. Grossvogel.
Classes are devoted to literature from the Middle Ages through the seventeenth century. Some focus is on language instruction.

202 Introduction to Modern Italian Literature Spring. 3 credits. Conducted in Italian.
M W F 10:10. Staff.

Works in Italian literature from the eighteenth century to the present will be read and discussed, with emphasis on the major authors of the twentieth century.

322 Italian Civilization Fall. 4 credits.

T R 10:10-11:25. A. Grossvogel.
A historical and cultural exploration of Italy region by region. The course will include the showing of Folco Quilici's fourteen-part film series "Italy seen from the sky" together with taped interviews and texts by contemporary writers on literature, politics, and folklore.

[327-328 Dante: *La Divina Commedia* (also Italian 527-528) Not offered 1980-81.]

[334 Dante In Translation (also Comparative Literature 344) Not offered 1980-81.]

[336 Boccaccio Not offered 1980-81.]

[359-360 The Italian Renaissance Not offered 1980-81.]

[366 Seventeenth-Century Prose Not offered 1980-81.]

[370 Eighteenth-Century Thought Not offered 1980-81.]

[381 Verga, Svevo, and Pirandello Not offered 1980-81.]

[387 Nineteenth-Century Poetry: Leopardi Not offered 1980-81.]

[390 Contemporary Narrative in Italy Not offered 1980-81.]

[395 Twentieth-Century Prose: Contemporary Italian Short Fiction Not offered 1980-81.]

[399 Postwar Italy: The Film as a Cultural, Artistic, and Political Reflector Fall. 4 credits. Not offered 1980-81; next offered fall 1981.
T R 2:30-3:45. D. Grossvogel.

Postwar Italian films will be analyzed, as the explicit and implicit vehicles of social forces, through their artistic, semiotic, psychological, and economic functions. Films will be shown on Tuesdays and discussed on Thursdays. Discussions will be conducted in English; films will be subtitled. There will also be reading material assigned.]

419-420 Special Topics in Italian Literature 419, fall; 420, spring. 2-4 credits each term. Prerequisite: permission of instructor.
Staff.
Guided independent study of specific topics.

[437 Petrarch: *Canzoniere* Not offered 1980-81.]

[472 Eighteenth-Century Theatre Not offered 1980-81.]

[486 The Nineteenth Century Not offered 1980-81.]

490 Verga, D'Annunzio, and Pirandello (also Comparative Literature 490) Fall. 4 credits.
W 3:30-5:30. A. Grossvogel.

Three Italian writers at the crossroads of naturalism, symbolism, and the avant-garde. The course will focus on their narratives and dramas and will illustrate their poetics. Reading knowledge of Italian desirable; lectures in English. An hour of discussion in Italian will be arranged for students who know the language.

[496 Futurism in Italy Not offered 1980-81.]

[498 Contemporary Poetry Not offered 1980-81.]

[527-528 Special Topics in the *Divine Comedy* Not offered 1980-81.]

[559-560 The Italian Renaissance Not offered 1980-81.]

[590 Contemporary Narrative in Italy (also Italian 390) Not offered 1980-81.]

639-640 Special Topics in Italian Literature 639, fall; 640, spring. 4 credits each term.
Staff.

Related Course in Another Department

Love Books in the Middle Ages (Society for the Humanities 417-418)

Japanese

Languages and Linguistics

101-102 Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for Japanese 102: 101 or equivalent. Intended for beginners or for those who have been placed in the course by examination.

Lecs, M W F 10:10; drills, M-F 9:05 or 12:20.
E. H. Jordan and staff.
A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

123 Accelerated Introductory Japanese Fall. 6 credits. Prerequisite: permission of instructor.
Lecs, M W F 10:10 (with Japanese 101-102); drills, M W F 12:20. E. H. Jordan and staff.
Accelerated training in listening, speaking, reading, and writing for students who have already acquired a limited facility in Japanese through residence in Japan or brief formal study, but who require additional training to qualify for admission to Japanese 102.

141-142 Japanese for Business Purposes 141, fall; 142, spring. 4 credits each term. Prerequisite for Japanese 142: 141 or permission of instructor.
Hours to be arranged. E. H. Jordan and staff.
Introductory Japanese for specialists in international business and economics.

201-202 Intermediate Japanese I 201, fall; 202, spring. 3 credits each term. Prerequisite for Japanese 201: 102 or equivalent. Prerequisite for Japanese 202: 201 or equivalent.
Lec, M W R 1:25; drills, W 10:10 (with Japanese 205-206). E. H. Jordan and staff.
Reading of elementary texts with emphasis on expository style.

203-204 Japanese Conversation 203, fall; 204, spring. 4 credits each term. Prerequisite for Japanese 203: 102 or equivalent. Prerequisite for Japanese 204: 203 or 205 or equivalent.
Lecs, M W 1:25; drills, M T R F 10:10 (with Japanese 205-206). E. H. Jordan and staff.
Training in listening and speaking for students who have acquired a basic oral proficiency.

205-206 Intermediate Japanese I and Conversation 205, fall; 206, spring. 6 credits each term. Prerequisite for Japanese 205: 102 or equivalent. Prerequisite for Japanese 206: 205 or equivalent.
Lec, M W R 1:25; drill, M-F 10:10. E. H. Jordan and staff.
A combination of Japanese 201-202 and 203-204, for students interested in developing both written and oral skills.

301-302 Intermediate Japanese II 301, fall; 302, spring. 4 credits each term. Prerequisite for Japanese 301: 202 or 206 or equivalent. Prerequisite for Japanese 302: 301 or equivalent.
M W F 2:30. Staff.
Reading of selected modern texts with emphasis on expository style.

303-304 Communicative Competence - Intermediate 303, fall; 304, spring. 3 credits each term. Prerequisite for Japanese 303: 204 or 206 or equivalent. Prerequisite for Japanese 304: 303 or equivalent. May be repeated for credit.
Hours to be arranged. E. H. Jordan and staff.

Drill in the use of spoken Japanese within the constraints set by a sampling of Japanese social settings.

401-402 Advanced Japanese 401, fall; 402, spring. 4 credits each term. Prerequisite for Japanese 401: 302 or equivalent. Prerequisite for Japanese 402: 401 or equivalent.

M W F 2:30. Staff.
Reading of selected modern texts with emphasis on expository style.

404 Linguistic Structure of Japanese Spring. 4 credits. Prerequisites: Japanese 102 or permission of instructor, and Linguistics 101.

Hours to be arranged. E. H. Jordan.

407-408 Oral Narration and Public Speaking 407, fall; 408, spring. 2 credits each term.

Prerequisite: Japanese 304 or permission of instructor.

Hours to be arranged. Staff.
Instruction in storytelling, lecturing, and speechmaking, with emphasis on both the construction of discourse and Japanese patterns of oral delivery.

421-422 Directed Readings 421, fall; 422, spring. Credit to be arranged. Prerequisite: permission of instructor.

Hours to be arranged. Staff.
Topics are selected on the basis of student needs.

FALCON

161-162 Intensive Japanese 161, fall; 162, spring. 16 credits each term. Prerequisite: permission of instructor.

M-F, six hours each day. E. H. Jordan and staff.

Literature in Japanese

305-306 Introduction to Literary Japanese 305, fall; 306, spring. 4 credits each term. Prerequisite for Japanese 305: 302 or Japanese 162 or equivalent. Prerequisite for Japanese 306: 305 or equivalent.

305: M W F 10:10. 306: hours to be arranged.
B. deBary.

405-406 Intermediate Literary Japanese 405, fall; 406, spring. 4 credits each term. Prerequisite for Japanese 405: 306 or 402 or equivalent. Prerequisite for Japanese 406: 405 or equivalent.

Hours to be arranged. K. Brazell.

421-422 Directed Readings 421, fall; 422, spring. Credit to be arranged. Prerequisite for Japanese 421: 402 or equivalent. Prerequisite for Japanese 422: 421 or equivalent.

Hours to be arranged. Staff.
Topics are selected on the basis of student needs.

For complete descriptions of courses numbered 600 or above consult the appropriate instructor.

611 Seminar in Modern Literature Fall. 2 or 4 credits. Prerequisite: permission of instructor. Hours to be arranged. B. deBary.

612 Seminar in Classical Literature Spring. 2-4 credits. Prerequisite: permission of instructor. Hours to be arranged. K. Brazell.

621-622 Advanced Directed Readings 621, fall; 622, spring. Credit to be arranged. Prerequisite: permission of instructor.

Hours to be arranged. Staff.

See courses listed under Department of Asian Studies for Japanese literature courses in translation.

Javanese

131-132 Elementary Course 131, fall; 132, spring. 3 credits each term. Prerequisite for Javanese 131: qualification in Indonesian. Prerequisite for Javanese 132: Javanese 131 or equivalent.

Hours to be arranged. J. U. Wolff.
An elementary language course for those who have had no previous experience in the language.

133-134 Intermediate Course 133, fall; 134, spring. 3 credits each term. Prerequisite for Javanese 133: 132 or equivalent. Prerequisite for Javanese 134: 133 or equivalent.

Hours to be arranged. J. U. Wolff.

203-204 Directed Individual Study 203, fall; 204, spring. 3 credits. Prerequisite: Javanese 134 or equivalent.

Hours to be arranged. J. U. Wolff.
This is a practical language course on an intermediate level in which the students will work through readings and conversations under the guidance of a native speaker for three contact hours a week.

Old Javanese (see Linguistics 651-652)

Linguistics

101-102 Theory and Practice of Linguistics 101, fall; 102, spring. 4 credits each term.

M W F 9:05; disc, T or R 3:35. Staff.
An introductory course designed primarily for those who intend to major in a language or in general linguistics. (See Linguistics 111-112 for a course designed for nonmajors.) The course satisfies the social science distribution requirement.

111-112 Themes in Linguistics 111, fall; 112, spring. 4 credits each term. Linguistics 111 has no prerequisites. Prerequisites for Linguistics 112: Linguistics 111 (or 101 with permission of instructor). Intended primarily for nonmajors. (Prospective linguistics majors should see Linguistics 101-102.)

M W F 10:10. S. McConnell-Ginet.
Basic linguistic concepts are introduced; relationship of linguistics to other disciplines is explored; emphasis on biological, psychological, social, and cultural contexts; language acquisition and transmission; dialects and language change. This course satisfies the social science distribution requirement.

201 Phonetics Fall. 3 credits.

T R 12:20-1:35. J. E. Grimes.
Introductory level study of practical and theoretical aspects of phonetics; emphasis on identifying, producing, and transcribing speech sounds.

202 Instrumental Phonetics Spring. 3 credits.

T R 12:20-1:35. J. E. Grimes.
Prerequisite for 202 is 201. Intermediate level study of practical, experimental, and theoretical aspects of articulatory and acoustic phonetics.

244 Language and the Sexes (also Women's Studies 244) Spring. 4 credits. Prerequisites: Linguistics 101 or 111, or Psychology 215, or permission of instructor.

M W F 1:25. S. McConnell-Ginet.
A study of sexual differentiation in language and its significance for sex stereotyping, sexual stratification, socialization, and personal interactions.

302 Multilingual Societies and Cultural Policy Spring. 4 credits.

T R 2:30-4. D. F. Solá.
An interdisciplinary analysis of the impact of bilingualism on society, particularly in education and communication arts. The "flexible-technology" model is used to suggest a method of evaluating policy and program alternatives.

303 Phonology Fall. 4 credits. Prerequisite: Linguistics 101 or 111 or 601 or the equivalent.

T R 8:30-9:45. L. R. Waugh.
A general survey of phonemics and of Jakobsonian distinctive feature theory.

304 Morphology Spring. 4 credits. Prerequisite: Linguistics 303 or permission of instructor.

T R 8:30-9:45. L. R. Waugh.
A general survey focusing on meaning and form in morphology, with special attention to morphophonemics and generative phonology.

306 Functional Syntax Fall. 4 credits.

Prerequisite: Linguistics 102 or permission of instructor.
M W F 10:10. D. F. Solá.
A general survey of syntactic theories which highlight grammatical function.

308 Dialectology Spring. 4 credits. Offered alternate years.

Hours to be arranged.
Methods and procedures of dialectological study with introduction to the major dialect atlases.

311-312 The Structure of English 311, fall; 312, spring. 4 credits each term. Prerequisite for Linguistics 311: 102 or permission of instructor.

Prerequisite for Linguistics 312: 311 or permission of instructor.
M W F 2:30. S. McConnell-Ginet.
311 provides an overview of the syntactic structure of English, drawing upon relevant theoretical approaches. 312 deals with phonology, morphology, and special problems of English structure and semantics.

313 English for Teachers of English Fall. 4 credits. Prerequisites: for undergraduate majors, Linguistics 101-102 or equivalent; for non-linguistics majors, permission of instructor; for graduate students, concurrent registration in Linguistics 601.

T R 12:20-1:50. M. Martin.
A course in modern English for teachers of non-native speakers. An analysis of the phonetics, grammar, and semantics of the language in terms applicable to both classroom teaching and materials development.

314 Teaching English as a Foreign Language Spring. 4 credits. Prerequisites: Linguistics 313 or permission of instructor.

T R 12:20-1:50. M. Martin.
Methods and techniques used in the teaching of English language skills to non-native speakers are examined. Attention is given to materials design and to current issues and new trends in the fields.

[318 Style and Language Spring. 4 credits. Prerequisite: Linguistics 101 or permission of instructor. G. M. Messing. Not offered 1980-81.]

[341 India as a Linguistic Area Fall. 4 credits.

Prerequisite: Linguistics 102 or permission of instructor.
J. W. Gair, G. Kelley.
Cross-family influences in an area of interaction over a long time span are considered. No knowledge of Indian languages is expected. Not offered 1980-81.]

400 Language: A Functional and Semiotic System Spring. 4 credits. Prerequisites: Linguistics 101 and one other course in linguistics, or permission of the instructor.

Hours to be arranged. L. R. Waugh.
An introduction to the study of language as a functionally cohesive system and as a system of signs similar to other semiotic systems.

401 Language Typology Fall. 4 credits.

Prerequisite: Linguistics 304.
M W F 1:25. C. F. Hockett.
Examination of a variety of languages in relation to typological categories.

[402 Contrastive Analysis Spring, 4 credits. Prerequisite: Linguistics 101–102 or permission of instructor. H. L. Kufner. Not offered 1980–81; next offered spring 1982.]

403 Applied Linguistics and Second Language Acquisition Spring, 4 credits. Prerequisite: a course in the structure of a language at the 400 level. T R 10:10–11:25. J. S. Noblitt. Examination of the theoretical bases of applied linguistics including current language-teaching methodologies.

404 Comparative Methodology Fall, 4 credits. Prerequisite: Linguistics 303 or permission of the instructor. T R 2:30–3:45. R. B. Jones. Exemplification of the methods of comparative reconstruction of proto-languages using problems selected from a variety of language families; methods of evaluating reconstructions.

405–406 Sociolinguistics 405, fall; 406, spring. 4 credits each term. Prerequisites: Linguistics 101–102 or 111–112 or permission of instructor. Linguistics 405 is not a prerequisite to 406. Hours to be arranged. J. U. Wolff. Social influences (ethnic, socioeconomic, educational) on linguistics behavior; shifts in register, style, dialect, or language in different speech situations.

[410 Historical Linguistics: Methods and Approaches Fall, 4 credits. Prerequisite: Linguistics 102 or permission of instructor. J. Jasanoff. Not offered 1980–81.]

411–412 Transformational Grammar: Syntax and Semantics 411, fall; 412, spring. 4 credits each term. Prerequisite for Linguistics 412: 411. T R 10:10–11:25. J. S. Bowers. 411 introduces the theory of syntax within a generative-transformational framework. 412 is an advanced course on syntax and the relation of syntax to semantics.

[413–414 Generative Phonology 413, fall; 414, spring. 4 credits each term. J. S. Bowers. Offered alternate years. Not offered 1980–81; 1981–82.]

[415–416 Social Functions of Language 415, fall; 416, spring. 4 credits each term. Prerequisites: Linguistics 101 or 111, or permission of instructor. Not offered 1980–81; next offered 1981–82. G. Kelley. The function of language in society; social constraints on linguistic behavior, including taboos, jargons, registers, social and socially perceived dialects.]

417 History of the English Language Fall, 4 credits. Prerequisite: permission of instructor. M W F 1:25. G. Kelley. Development of modern English; external history; phonological, grammatical, and lexical change. The English language in America.

421 Linguistics Semantics Fall, 4 credits. Prerequisites: Linguistics 101–102 or equivalent, plus a course in syntax or the structure of English or some other language, or permission of instructor. M W F 11:15. S. McConnell-Ginet. An introduction to theories of word, sentence, and discourse meaning and their application in linguistic description; readings deal primarily with the semantic analysis of English.

[440 Dravidian Structures Fall or spring according to demand. 4 credits. Prerequisite: Linguistics 102. Not offered 1980–81. G. Kelley. A comparative and contrastive analysis of the structures of several Dravidian languages.]

442 Indo-Aryan Structures Fall or spring according to demand. 4 credits. Prerequisite: Linguistics 102. Hours to be arranged. J. W. Gair. Typological discussion of the languages of the subfamily: phonology and grammar.

493 Honors Thesis Research Fall, 4 credits. Hours to be arranged. Staff. May be taken before or after Linguistics 494 or may be taken independently.

494 Honors Thesis Research Spring, 4 credits. Hours to be arranged. Staff. May be taken as a continuation of, or before, Linguistics 493.

600 Field Methods Spring, 4 credits. Prerequisites: Linguistics 101 or 201. Hours to be arranged. F. E. Huffman. Elicitation, recording and analysis of data from a native speaker of a language not generally known to students.

601–602 Proseminar: Introduction to Graduate Study 601, fall; 602, spring. 4 credits each term. Primarily for entering graduate students majoring in general linguistics, but, with permission of instructor, open to those minoring in linguistics or majoring in the linguistics of specific languages. M W F 10:10 and M 3:35. Staff. A survey of the major sub-areas of linguistics. Emphasis is on basic concepts, current issues and their background, and methodology, with discussions and data-oriented problems based on extensive readings.

603 History of Linguistics Fall, 4 credits. T R 12:20–1:35. G. M. Messing. The history of linguistics from early Greek and Sanskrit grammarians to the modern period.

607 Schools of Linguistics Spring, 4 credits. Prerequisites: Linguistics 102 or 602 and permission of instructor. Hours to be arranged. J. E. Grimes. Readings and descriptions of major schools of linguistic thought in the twentieth century.

608 Discourse Analysis Spring, 4 credits. Prerequisite: permission of instructor. Hours to be arranged. J. E. Grimes. Linguistics theory applied to relationships beyond the sentence.

610 Topics in Transformational Grammar Fall or spring, 3 credits. Prerequisite: permission of instructor. Hours to be arranged. J. S. Bowers. A survey of the development and current state of generative grammatical theory.

[621–622 Hittite 621, fall; 622, spring. 4 credits each term. Prerequisite for Linguistics 621: permission of instructor. Prerequisite for Linguistics 622: 621 or permission of instructor. J. Jasanoff. Not offered 1980–81.]

631–632 Comparative Indo-European Linguistics 631, fall; 632, spring. 4 credits each term. Prerequisite for Linguistics 631: permission of instructor. Prerequisite for Linguistics 632: 631 or permission of instructor. M W F 2:30. J. Jasanoff. Fall: Introduction to phonology, branches of the family. Spring: Grammar.

640 Elementary Pali Fall or spring according to demand. 3 credits. Hours to be arranged. J. W. Gair. An introduction to the language of the canonical texts of Theravada Buddhism. Reading of authentic texts, with emphasis on both content and grammatical structure.

[641–642 Elementary Sanskrit 641, fall; 642, spring. 3 credits each term. Prerequisite for Linguistics 642: 641. Not offered 1980–81.]

651–652 Old Javanese Fall or spring according to demand. 4 credits. Hours to be arranged. J. U. Wolff. Grammar and reading of basic texts.

653–654 Seminar in Southeast Asian Linguistics 653, fall; 654, spring. 4 credits each term. Prerequisite: Linguistics 303 or permission of instructor. Linguistics 653 is not a prerequisite for 654. Hours to be arranged. R. B. Jones. Languages of mainland Southeast Asia. Topics, chosen according to student interests, may include description, dialectology, typology, comparative reconstruction, and historical studies.

655–656 Seminar in Malayo-Polynesian Linguistics 655, fall; 656, spring. 4 credits each term. Prerequisites for Linguistics 655: 102 and permission of instructor. Prerequisite for Linguistics 656: 655. Hours to be arranged. J. U. Wolff. Descriptive and comparative studies of Malayo-Polynesian languages.

657–658 Seminar in Austroasiatic Linguistics 657, fall; 658, spring. 4 credits each term. Prerequisites: Linguistics 102 and permission of instructor. Hours to be arranged. F. E. Huffman. Descriptive and comparative studies of Austroasiatic languages.

671 Comparative Slavic Linguistics Fall, 4 credits. Prerequisite: permission of instructor. Next offered as a sequence in 1981–82. Hours to be arranged. E. W. Browne. Sounds and forms of the Slavic languages and of prehistoric common Slavic; main historical developments leading to the modern languages.

[672 Comparative Slavic Linguistics Spring, 4 credits. Prerequisite: Linguistics 671 or permission of instructor. E. W. Browne. Next offered as a sequence with 671 in 1981–82.]

700 Seminar Fall or spring according to demand. Credit to be arranged. Hours to be arranged. Staff. Seminars are offered according to faculty interest and student demand. (Topics in recent years have included: subject and topic; Montague grammar; speech synthesis; linguistic computation; classical and autonomous phonology; Japanese sociolinguistics; relational grammar; semantics and semiotics; and others.)

701–702 Directed Research 701, fall; 702, spring. 1–4 credits. Staff.

751 Thai Dialectology Fall, 4 credits. Prerequisites: Linguistics 303 and permission of instructor. Hours to be arranged. R. B. Jones. Geographical distribution of the Thai languages and methods of classifying and subgrouping.

752 Comparative Thai Spring, 4 credits. Prerequisites: Linguistics 404 or equivalent and permission of instructor. Hours to be arranged. R. B. Jones. Comparative reconstruction of Proto-Thai including various points of view and criteria for subgrouping.

753 Tibeto-Burman Linguistics Fall, 4 credits. Prerequisites: Linguistics 404 or equivalent, and permission of instructor. Hours to be arranged. R. B. Jones.

Comparative reconstruction of Tibeto-Burman with emphasis on the Lolo-Burmese branch and historical study of Burmese.

Pali

See **Linguistics 640**.

Polish

131-132 Elementary Course 131, fall; 132, spring. 3 credits each term. Prerequisite for Polish 132: 131 or equivalent.
Hours to be arranged. E. W. Browne.

[133-134 Elementary Course II 133, fall; 134, spring. 3 credits each term. Prerequisite for Polish 134: 133 or equivalent. Not offered 1980-81; next offered 1981-82.]

Portuguese

121-122 Elementary Course 121, fall; 122, spring. 4 credits each term. Intended for beginners or those who have been placed in course by examination. Students may attain qualification upon completion of 122 by achieving a satisfactory score on a special examination.

Lec, W 12:20; recs, M T R F 12:20 or 1:25.
Staff.

A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

203-204 Intermediate Composition and Conversation

203, fall; 204, spring. 3 credits each term. Prerequisite for Portuguese 203: qualification in Portuguese. Prerequisite for Portuguese 204: 203 or permission of instructor.
M W F 10:10. Staff.

Conversational grammar review with special attention to pronunciation and the development of accurate and idiomatic oral expression. Includes readings in contemporary Portuguese and Brazilian prose and writing practice.

303-304 Advanced Composition and Conversation

303, fall; 304, spring. 4 credits each term. Prerequisite for Portuguese 303: 204 or equivalent. Prerequisite for Portuguese 304: 303 or equivalent.
M W F 12:20. Staff.

[305-306 Readings in Luso-Brazilian Culture

305, fall; 306, spring. 4 credits each term. Prerequisites: Portuguese 204 or equivalent or permission of instructor. Not offered 1980-81; next offered 1981-82.]

700 Seminar in Portuguese Linguistics

Fall or spring according to demand. 4 credits.
Hours to be arranged. Staff.
Selected problems in the structure of Portuguese.

Quechua

131-132 Elementary Course 131, fall; 132, spring. 3 credits each term. Prerequisite: qualification in Spanish.

M W F 11:15. D. F. Solá.

A beginning conversation course in the Cuzco dialect of Quechua.

133-134 Intermediate Course

133, fall; 134, spring. 3 credits each term. Prerequisite for Quechua 133: 131-132 or equivalent. Prerequisite for Quechua 134: 133 or equivalent.

Hours to be arranged. D. F. Solá.

An intermediate conversation and reading course. Study of the Huarochiri manuscript.

700 Seminar in Quechua Linguistics

Fall or spring. Credit to be arranged. Prerequisite: permission of instructor.

Hours to be arranged. D. F. Solá.

Romanian

131-132 Elementary Course 131, fall; 132, spring. Offered according to demand. 3 credits. Prerequisite for Romanian 132: 131 or equivalent.
Hours to be arranged. Staff.

133-134 Elementary Course II 133, fall; 134, spring. Offered according to demand. 3 credits. Prerequisite for Romanian 134: 133 or equivalent.
Hours to be arranged. Staff.

Romance Studies

Languages and Linguistics

321-322 History of the Romance Languages 321, fall; 322, spring. 4 credits each term. Prerequisite for 322: 321. Offered alternate years.
M W F 1:25. J. Herschensohn.

Diachronic development of the Romance languages from Latin, with emphasis on Spanish, French, Italian, and Romanian. 321 concentrates on external history and phonological changes; 322 concentrates on morphological and syntactic developments.

[323-324 Comparative Romance Linguistics

323, fall; 324, spring. 4 credits each term. Prerequisite for 324: 323. Offered alternate years. Not offered 1980-81.]
C. Rosen.

Basic characteristics of the Romance language family. Salient features of eight Romance languages; broad and localized trends in phonology, syntax, and the lexicon; elements of dialectology.]

620 Area Topics in Romance Linguistics Spring. 4 credits. May be repeated for credit. Topics vary.
Hours to be arranged. J. S. Noblitt.

[621 Problems and Methods in Romance Linguistics

Spring. 4 credits. C. Rosen. Not offered 1980-81; next offered spring 1982.]

[622 Romance Dialectology

Spring. 4 credits. Offered every third year. Not offered 1980-81.
Staff.

Diachronic and synchronic survey of dialects of the Romance language areas.

Literature

[355 The Picaresque Novel in a European Perspective (also Comparative Literature 355) Not offered 1980-81.]

459 Being, God, Mind: Humanistic Revolutions from Plato to Vico (also Spanish 459 and Comparative Literature 359) Fall. 4 credits.
T R 10:10. C. Arroyo.

A study of the origins of scientific language: body and soul, matter and form, act and potentiality, being. A study of the ideological background of Western literatures: the conception of human personality and the presentation of character, the conception of reality and the sense of literary structures. A study of the fusion of Greek thought and the Bible, and its reflection on the development of the ideas of freedom and equality in Western thought.

460 Biology and Theology: Approaches to the Origin of Life, Evolution, Heritage and Freedom, Sexuality and Death (also Comparative Literature 460) Spring. 4 credits.
T R 2:30-3:45. C. Arroyo.

A historical exploration of the conflicts between biology and the understanding of theological concepts about freedom and universal values. Readings include scientific material, biblical exegesis, and philosophical and theological texts by Bergson, Heidegger, and Rahner.

Related Courses in Other Departments

Comparative Literature

295 Culture as Semiotic System

343-344 Medieval Literature

380 Literature and Society

381 History and Theory of Drama

395 Introduction to Twentieth-Century Criticism

464 Early European Fiction

699 Hermeneutics

Russian

Languages and Linguistics

101-102 Elementary Courses 101, fall; 102, spring. 6 credits each term. Prerequisite for Russian 102: 101 or equivalent. Intended for beginners or students placed by examination and those who wish to obtain qualification within two semesters or who wish to enter the 200-level sequence the following fall semester.

Lecs, T R 2:30 or T R 11:15; drills M-F 8, 9:05, 12:20, or 1:25. R. L. Leed and staff.

A thorough grounding is given in all the language skills: listening, speaking, reading, and writing. Language practice is in small groups. Lectures cover grammar, reading, and cultural information.

121-122 Elementary Course 121, fall; 122, spring. 4 credits each term. Prerequisite for Russian 122: 121 or equivalent. Intended for beginners or students placed by examination. Students who obtain a CEEB achievement score of 560 after Russian 121-122 attain qualification and may enter the 200-level sequence; otherwise Russian 123 is required for qualification.

Lec, T 2:30; drills, M W R F 8, or 2:30. Staff.

A thorough grounding is given in all the language skills: listening, speaking, reading, and writing. Language practice is in small groups. Lectures cover grammar, reading, and cultural information.

123 Continuing Russian Fall. 4 credits. Limited to students who have previously studied Russian and have a CEEB achievement score between 450 and 559. Satisfactory completion of Russian 123 fulfills the qualification portion of the language requirements.
M-F 3:35. Staff.

A pre-qualification course designed to prepare students for study at the 200 level. Passing this course is equivalent to qualification.

203-204 Composition and Conversation 203, fall; 204, spring. 3 credits each term. Prerequisite: qualification in Russian. Prerequisite for Russian 204: 203 or equivalent.

Lec, R 1:25; drills; M W F 11:15, 1:25, or 3:35.

A. Nakhimovsky and staff.

Guided conversation, composition, reading, pronunciation, and grammar review, emphasizing the development of accurate and idiomatic expression in the language.

Note: Students placed in the 200-level courses also have the option of taking courses in introductory literature; see separate listings under Russian 200, 201 and 202 for descriptions of these courses, any of which may be taken concurrently with the 203-204 language courses described above. The introductory literature courses are offered by the respective literature departments and the 203-204 language courses by the Department of Modern Languages and Linguistics.

301-302 Advanced Russian Morphology and Syntax 301, fall; 302, spring. 4 credits each term.

102 Arts and Sciences

Prerequisite for Russian 301: 204 or equivalent.

Prerequisite for 302: 301.

Hours to be arranged. L. H. Babby.

This course is intended to increase the students' active command of Russian syntactic constructions and vocabulary.

303-304 Advanced Composition and

Conversation 303, fall; 304, spring. 4 credits each term. Prerequisite for Russian 303: 204 or equivalent; Prerequisite for Russian 304: 303 or equivalent. M W F 12:20. J. Bosky.

305-306 Directed Individual Study 305, fall; 306, spring. 2 credits. Prerequisite for Russian 305: 303-304 or equivalent. Prerequisite for Russian 306: 305.

Hours to be arranged. J. Bosky.

This is a practical language course on an advanced level and is designed to improve oral control of colloquial Russian.

401-402 History of the Russian Language 401, fall; 402, spring. 4 credits each term. Prerequisite for 401 is qualification in Russian. First term or equivalent is prerequisite to the second. Offered alternate years.

Hours to be arranged. L. H. Babby.

Phonological, morphological, and syntactic developments from Proto-Slavic to modern Russian.

[403-404 Linguistic Structure of Russian 403, fall; 404, spring. 4 credits each term. Prerequisite for Russian 403: qualification in Russian; Linguistics 101-102 recommended. Prerequisite for Russian 404: 403 or equivalent. Offered alternate years; not offered 1980-81.

L. H. Babby.

A synchronic study and analysis of Russian linguistic structure. Russian 403 deals primarily with phonology and morphology and 404 with syntax.

[601 Old Church Slavic Fall. 4 credits. This course is prerequisite to Russian 602. Offered alternate years. Not offered in 1980-81; next offered 1981-82.

E. W. Browne.

Grammar and reading of basic texts.]

[602 Old Russian Spring. 4 credits. Prerequisite: Russian 601. Offered alternate years. Not offered in 1980-81; next offered spring 1982.

L. H. Babby.

Structural analysis of Old Russian, and close reading of texts.]

700 Seminar in Slavic Linguistics Offered according to demand. Variable credit.

Staff.

Topics chosen according to the interests of staff and students.

Literature Courses

103 Freshman Seminar: Classics of Russian Thought and Literature Fall and spring, sec 1 only. 3 credits.

Sec 1, T R 2:30-3:45, staff. Sec 2, T R 12:20-1:35, staff.

Emphasis is on connections between Russian literary masterpieces and their historical background, rather than on considering them solely as artistic works. It covers both nineteenth- and twentieth-century works. Readings in translation of Dostoevsky, Solzhenitsyn, and others.

104 Freshman Seminar: Nineteenth-Century Russian Literary Masterpieces Fall and spring. 3 credits.

M W F 12:20. Staff.

Readings in translation of works by Dostoevsky, Tolstoy, and others; limited to nineteenth-century authors. A slightly more literary and less historical course than Russian 103.

105 Freshman Seminar: Twentieth-Century Russian Literary Masterpieces Spring. 3 credits.

M W F 9:05. Staff.

Readings in English of works by Babel, Pasternak, Solzhenitsyn, and others, studied against the background of Soviet social and political developments.

106 Freshman Seminar: Revolution in the Russian Arts Fall. 3 credits.

M W F 9:05. P. Carden.

A study of literature, the dance, film, and the theatre in Russia during the period of the two revolutions, 1905 and 1917. We will look at the way the arts became "revolutionary" in form as well as the way in which they embodied historical events of the revolutionary era.

109 Freshman Seminar: Literature and Society in Russia: 1840-1905 Fall.

M W F 11:15. Staff.

This course will explore the relationship between literature and society in Russia during the second half of the nineteenth century in order to give the student insight into both the period itself and events in the Soviet Union today. Using both historical texts and literary works, the course will place primary emphasis on the evolution of the split between educated society and the state and on the emergence of the idea of the writer as the conscience of a society in which other forms of political expression are repressed. Readings, all in English, will include novels and short stories by Turgenev, Dostoevsky, and Chekhov, as well as selected political treatises.

201-202 Readings in Russian Literature 201, fall; 202, spring. 3 credits. Prerequisite: qualification in Russian. Open to freshmen.

M W F 10:10. C. Emerson.

Completion of this series is the prerequisite for all 300- and 400-level literature courses in which the reading is done in Russian. Close reading of selected texts with attention to their stylistic features and their significance in Russian literary history.

307 Themes from Russian Culture Fall. 4 credits.

M W F 1:25. C. Emerson.

The development of Russian culture, art, music, intellectual life, and literature from their beginnings, with emphasis on the nineteenth century. Readings in translation.

308 Themes from Russian Culture Spring. 4 credits.

M W F 1:25. C. Emerson.

Continuation of 307, into the Soviet period and up to date. Readings in translation.

[314 Intellectual Background of Russian Literature, 1825-1930 Fall. 4 credits. Not offered 1980-81; next offered 1981-82.]

330 The Soviet Union: Politics, Economics, and Culture (also Economics and Government 330) Fall. 4 credits.

T R 2:30-3:45. M. Rush, G. Staller, and G. Gibian. Interdisciplinary survey of the USSR since the Revolution, with emphasis on contemporary developments.

331 Russian Poetry Fall. 4 credits. Prerequisites: Russian 202 or the equivalent and permission of the instructor. This course may be counted towards the 12 credits of Russian literature in the original for the Russian major.

M W F 2:30. N. Perlina.

A survey of Russian poetry with primary emphasis on analysis of individual poems by major poets.

332 Russian Theatre and Drama Spring. 4 credits.

M W F 9:05.

A survey of Russian theatre and drama from the beginning to the present time. In translation.

[335 Gogol Fall. 4 credits. Not offered 1980-81; next offered 1981-82.]

[350 Tolstoy and the Disciplines (also College Scholar 350) Spring. 4 credits. Not offered 1980-81; next offered 1981-82.]

367 The Russian Novel in Translation Fall. 4 credits. Also open to graduate students.

M W F 9:05. G. Gibian.

Study of the major Russian prose writers of the nineteenth and twentieth centuries. Novels and short stories by Gogol, Turgenev, Tolstoy, Dostoevsky, Chekhov, Solzhenitsyn, and others. There will be a special discussion section for those able to read Russian; students taking it will be able to count the course towards their Russian major as one with reading in the original.

[368 Soviet Literature in Translation Fall. 4 credits. Not offered 1980-81; next offered 1981-82.]

[369 Dostoevsky Fall. 4 credits. Not offered 1980-81; next offered 1981-82.

[373 Chekhov Fall. 4 credits. Not offered 1980-81; next offered 1981-82.]

379 The Russian Connection (also Comparative Literature 379) Spring. 4 credits.

M W F 10:10. P. Carden.

Russian literature in its European context. We will discuss great works of the Russian prose tradition in their reciprocal relations with European prose. Among the Russian works to be studied will be Pushkin's *Eugene Onegin*, Gogol's short stories, Tolstoy's *War and Peace*, Dostoevsky's *The Idiot*, and Chekhov's short stories. Among European authors whose work helped to shape or was in some degree shaped by Russian literature, we will look at Byron, Musset, Hoffmann, Stendhal, Sand, Maupassant, and Gide. In English translation.

393 Honors Essay Tutorial Fall or spring. 4 credits.

[415 Fairytale and Narrative (also Comparative Literature 415) Fall. 4 credits. Not offered 1980-81; next offered 1981-82.]

431 Russian Prose Fiction Spring. 4 credits.

Open to graduate students. Prerequisites: Russian 202 or the equivalent, and permission of instructor.

M W F 2:30. N. Perlina.

A study of selected shorter works by Gogol, Leskov, Saltykov, Shchedrin, Tolstoy, Dostoevsky, Babel, Chekhov, Platonov, and others. Read in the original.

[432 Pushkin Spring. 4 credits. Not offered 1980-81; next offered 1981-82.]

492 Supervised Reading in Russian Literature Fall or spring. 2-4 credits.

493 Tolstoy's War and Peace and Children's Stories: Thematic Invariance and Plot Structure Fall. 4 credits.

T R 11:15 plus one hour to be arranged.

A. Zholkovsky.

Structural analysis of works by Tolstoy and other authors. Readings in the original.

499 The Modern Arts in Russia, 1890-1925

Spring. 4 credits. The course may be counted towards the 12 credits of Russian literature in the original for the Russian major.

T R 2:30-3:45. P. Carden.

Russia's rich modern period examined through a variety of themes (the myth of the city, orientalism, surrealism, futurism, *commedia dell'arte*, etc.) that unified the arts in the period. Reading of literary classics in translation: Belyi's *Silver Dove* and *Petersburg*; Blok's *Puppet Theater* and narrative

poems; Khlebnikov's *Snake Train*; Mayakovsky's poems and plays; Mandelstam's *The Noise of Time*; Shklovsky's *Sentimental Journey*; Babel's *Red Cavalry*. An opportunity to do work in Russian will be provided for qualified Russian readers.

611 Supervised Reading and Research Fall or spring. 2-4 credits. Prerequisite: permission of the department.

[617 Russian Stylistics Fall. 4 credits. Conducted in Russian. Not offered 1980-81; next offered 1981-82.]

[618 Russian Stylistics Spring. 4 credits. Conducted in Russian. Not offered 1980-81; next offered 1981-82.]

[621 Russian Literature from the Beginnings to 1700 Fall. 4 credits. Not offered 1980-81; next offered 1981-82.]

[622 Eighteenth-Century Literature Fall. 4 credits. Not offered 1980-81; next offered 1981-82.]

[624 Russian Romanticism Spring. 4 credits. Not offered 1980-81; next offered 1981-82.]

625 Russian Realism Fall. 4 credits.
R 3:35-5:30. P. Carden.

A survey at an advanced level of developments in Russian literature and culture from 1840 to 1880. The emphasis will be on showing the relationship of individual works and authors to the cultural situation as a whole. The interpretations of historically oriented scholars like Lydia Ginzburg will be stressed. The relationships of the individual genres to the total literary economy will be a major theme. Authors to be considered include Herzen, Turgenev, Nekrasov, Ostrovsky, Grigoriev, Dostoevsky, Tiutchev, Fet, and Tolstoy. Readings in the original.

[671 Seminar in Nineteenth-Century Russian Literature Fall. 4 credits. Not offered 1980-81; next offered 1981-82.]

672 Seminar in Twentieth-Century Russian Literature Spring. 4 credits.
T 3:35-5:20.
Topic to be announced.

[701 Proseminar: Problems of Literary Criticism Fall. 4 credits. Not offered 1980-81; next offered 1981-82.]

Courses Offered in Translation

307 Themes from Russian Culture Fall. 4 credits.
M W F 1:25. C. Emerson.
The development of Russian culture, art, music, intellectual life, and literature from their beginnings, with emphasis on the nineteenth century. Readings in translation.

308 Themes from Russian Culture Spring. 4 credits.
M W F 1:25. C. Emerson.

Continuation of 307, into the Soviet period and up to date. Readings in translation.

330 The Soviet Union: Politics, Economics, and Culture (also Economics 330 and Government 330) Fall. 4 credits.
T R 2:30-3:45. M. Rush, G. Staller, and G. Gibian.
Interdisciplinary survey of the USSR since the Revolution, with emphasis on contemporary developments.

332 Russian Theatre and Drama Spring. 4 credits.
M W F 9:05.

A survey of Russian theatre and drama from the beginning to the present time. In translation.

367 The Russian Novel in Translation Fall. 4 credits. Open to graduate students.
M W F 9:05. G. Gibian.

Study of the major Russian prose writers of the nineteenth and twentieth centuries. Novels and short stories by Gogol, Turgenev, Tolstoy, Dostoevsky, Chekhov, Solzhenitsyn, and others.

379 The Russian Connection (also Comparative Literature 379) Spring. 4 credits.
M W F 10:10. P. Carden.

Russian literature in its European context. We will discuss great works of the Russian prose tradition in their reciprocal relations with European prose. Among the Russian works to be studied will be Pushkin's *Eugene Onegin*, Gogol's short stories, Tolstoy's *War and Peace*, Dostoevsky's *The Idiot*, and Chekhov's short stories. Among European authors whose work helped to shape or was in some degree shaped by Russian literature, we will look at Byron, Musset, Hoffmann, Stendhal, Sand, Maupassant, and Gide.

Related Courses in Other Departments

Soc Hum 429 Nature and Culture: The Window Motif in Pasternak Fall. 4 credits.
T 3:35-5:20. A. Zholkovsky.

A discussion of Boris Pasternak's poetic universe and the place occupied in it by "window" as a means of communication between the outer world (Nature) and the home (Culture). The emphasis will be on thematic invariance and on poetic subtleties. Comparisons with invariant motifs of other poets (Pushkin, Mandelstam, Okudzhava). There may be a section for Russian readers.

Sanskrit

See **Linguistics 641-642**.

Serbo-Croatian

[131-132 Elementary Course 131, fall; 132, spring. 3 credits each term. Prerequisite for Serbo-Croatian 132: 131 or equivalent. E. W. Browne. Not offered 1980-81.]

133-134 Elementary Course II 133, fall; 134, spring. 3 credits each term. Prerequisite for Serbo-Croatian 134: 133 or equivalent.
Hours to be arranged. E. W. Browne.

Sinhala (Sinhalese)

101-102 Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for Sinhala 102: 101 or equivalent.

Hours to be arranged. J. W. Gair.
A semi-intensive course for beginners. A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

201-202 Sinhala Reading 201, fall; 202, spring. 3 credits each term. Prerequisite for Sinhala 201: qualification in Sinhala. Prerequisite for Sinhala 202: 201 or equivalent.
Hours to be arranged. J. W. Gair.

203-204 Composition and Conversation 203, fall; 204, spring. 3 credits each term. Prerequisite for Sinhala 203: 202 or permission of instructor. Prerequisite for Sinhala 204: 203 or equivalent.
Hours to be arranged. J. W. Gair.

Related Courses

See also **Linguistics 341, 442, 631, 640, 641, 644**.

Spanish

Languages and Linguistics

121-122 Elementary Course 121, fall; 122, spring. 4 credits each term. Prerequisite for Spanish

122: 121. Special sections of this course are available for students with qualification in another language and there is one section for School of Hotel Administration students. Intended for beginners or students placed by examination. Students who obtain a CEEB achievement score of 560 after Spanish 121-122 attain qualification and may enter the 200-level sequence; otherwise Spanish 123 is required for qualification.

Fall and spring: lec, R 12:20, R 2:30, F 9:05, or F 11:15; drills, M-R 8, 9:05, 10:10, 11:15, 12:20, 1:25, 2:30, 3:35. Evening prelims: fall, 6:30 p.m. Oct. 7, Nov. 11; spring, 6:30 p.m. Mar. 10, April 7. C. Piera, J. Chambers, and staff.

A thorough grounding is given in all language skills: listening, speaking, reading, and writing. Language practice is in small groups. Lecture covers grammar, reading, and cultural information.

123 Continuing Spanish Fall or spring. 4 credits. Limited to students who have previously studied Spanish and have a CEEB achievement score between 450 and 559. Satisfactory completion of Spanish 123 fulfills the qualification portion of the language requirement.

Fall: lec, M 11:15 or 1:25; drills, T-F 8, 9:05, 10:10, 11:15, 12:20, or 1:25. Spring: lec, M 1:25; drills, T-F 9:05, 10:10, or 12:20. Evening prelims: fall, 6:30 p.m. Oct. 7, Nov. 11; spring, 6:30 p.m. Mar. 10, April 7. Staff.

An all-skills course designed to prepare students for study at the 200-level.

203 Intermediate Composition and Conversation

Fall or spring. 3 credits. Prerequisite: qualification in Spanish.

Fall: M W F 8, 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30. Spring: M W F 8, 9:05, 10:10, 12:20, 1:25, or 2:30. Evening prelims: fall, 6:30 p.m. Oct. 9; spring, 6:30 p.m. Mar. 10. Staff.

Conversational grammar review with special attention to the development of accurate and idiomatic oral expression. Includes readings in contemporary Spanish prose and practice in writing.

204 Intermediate Composition and Conversation

Fall or spring. 3 credits. Prerequisite: Spanish 203 or 212, or permission of instructor.

Fall: M W F 12:20 or 1:25. Spring: M W F 9:05, 10:10, 11:15, 12:20, or 1:25. Evening prelims: fall, 6:30 p.m. Oct. 28, spring, 6:30 p.m. Mar. 24. Staff. Practice in conversation with emphasis on improving oral and written command of Spanish. Includes treatment of specific problems in grammar, expository writing, and readings in contemporary prose.

[212 Intermediate Reading and Composition Not offered 1980-81.]

303 Advanced Composition and Conversation

Fall. 4 credits. Prerequisite: Spanish 204 or equivalent.

M W F 10:10. M. Suñer.
Advanced course in grammar, composition, and conversation. Special attention to the fundamental aspects of language styles through the analysis of contemporary spoken and written Spanish.

[304 Advanced Composition and Conversation Spring. 4 credits. Prerequisite: Spanish 303 or equivalent. Not offered 1980-81.]

310 Advanced Conversation and Pronunciation

Spring. 2 credits. Prerequisite: Spanish 204 or equivalent.

M W F 9:05. Staff.

312 Advanced Composition

Spring. 4 credits. Prerequisite: Spanish 201 or 204 or 212 or equivalent. Required of Spanish majors.

M W F 12:30. E. Santí.

[401-402 History of the Spanish Language 401, fall; spring, 402. 4 credits each term. Prerequisites: Linguistics 101 and qualification in Spanish, or

104 Arts and Sciences

permission of the instructor. Not offered 1980–81, next offered 1981–82.

C. Piera.
A historical analysis of the phonology, morphology, syntax, and lexicon of the Spanish language.

407 Applied Linguistics: Spanish Fall. 4 credits.
Prerequisites: qualification in Spanish and Linguistics 101, or permission of instructor.

M W F 9:05. C. Piera.
Designed to equip the teacher of Spanish with the ability to apply current linguistic theory to second-language learning.

408 The Grammatical Structure of Spanish Spring. 4 credits. Prerequisites: qualification in Spanish and Linguistics 101 or permission of instructor.

M W F 11:15. M. Suñer.
Survey of the salient morphological and syntactic characteristics of contemporary Spanish.

601 Hispanic Dialectology Fall. 4 credits.
M 2:30–4:30. M. Suñer
Survey of dialects of Latin America and the Caribbean.

602 Linguistic Structure of Ibero-Romance Fall or spring according to demand. 4 credits.
M 2:30–4:30. C. Piera.

Phonological, Morphological, and syntactic characteristics of the languages and dialects of the Iberian Peninsula.

603 Contemporary Theories of Spanish Phonology Fall or spring according to demand. 4 credits.

Hours to be arranged. M. Suñer.
The sounds of Spanish analyzed according to Prague, structuralist, generative, and natural generative theory.

604 Contemporary Theories of Spanish Grammar Fall or spring according to demand. 4 credits.

Hours to be arranged. M. Suñer.
Selected readings of contemporary Spanish linguists who exemplify different theoretical points of view.

700 Seminar In Spanish Linguistics Fall or spring according to demand. Variable credit.
Hours to be arranged. Staff.
Topics in synchronic and diachronic Spanish linguistics.

Literature

105 Freshman Seminar: The Idea of Quest Spring. 3 credits.

M W F 11:15. M. Randel.
Discussion will explore the ways in which the idea of quest permeates Spanish life and thought in the period of Spain's imperial expansion. Readings in English translation will include texts of the conquistadors, the mystics, the picaresque, Cervantes, and honor plays.

107 Freshman Seminar: Parents and Children Fall. 3 credits.

M W F 9:05. E. Santí.
Literature thrives on the age-old conflict between parents and their children. We shall study literary treatments of this theme in ancient texts (*Oedipus*, *Electra*), baroque plays (*Hamlet*, *Truth Suspect*), and modern narrative (*Doña Perfecta*, *Fathers and Sons*). After reading a modern autobiography, Wolff's *The Duke of Deception*, we shall end the term with discussion of—and writing about—our own contemporary experience of the parent-child relationship.

201 Introduction to Hispanic Literature Fall or spring. 3 credits. Prerequisite: qualification in Spanish or permission of instructor. Conducted

mainly in Spanish. (The literature course that normally follows 201 is 315, 316, or 317.)

Fall: M W F 9:05, 12:20, 1:25 or T R 10:10–11:25; J. Tittler and staff. Spring: M W F 12:20, 1:25, or T R 12:20–1:35; staff.

An intermediate reading course in which texts from Spain and Spanish America are read and analyzed. The course is designed to increase reading and speaking facility in Spanish and to develop critical and analytical skills in the appreciation of literary texts.

[313 **Spanish Civilization** Not offered 1980–81.]

Note: Spanish 315, 316 and 317 can be taken in any order.

315 Readings in Sixteenth- and Seventeenth-Century Hispanic Literature Fall. 4 credits. Prerequisite: Spanish 201 or 4 years of high school Spanish or permission of instructor. This course is not a prerequisite for Spanish 316 or 317.

M W F 11:15. M. Randel.
Readings and discussion of representative texts of the period from both Spain and her colonies in the New World: Garcilaso de la Vega, *Lazarillo de Tormes*, San Juan de la Cruz, Cervantes, Lope de Vega, Calderón, and others.

316 Readings in Modern Spanish Literature Fall. 4 credits. Prerequisite: Spanish 201 or 4 years of high school Spanish or permission of instructor.

M W F 9:05 or 1:25. J. Kronik.
Readings and discussion of representative texts from Spain from the Romantic period to the present: Zorrilla, Galdós, Unamuno, Garcia Lorca, Celá, and others.

317 Readings in Spanish-American Literature Spring. 4 credits.

M W F 10:10. E. Santí.
Reading and discussion of representative texts of the nineteenth and twentieth centuries from Spanish America: Darío, Neruda, Borges, Paz, Garcia Márquez, Cortázar, and others.

[323 **Latin American Civilization** Not offered 1980–81.]

Note: The prerequisite for the following courses, unless otherwise indicated, is Spanish 315 or 316 or 317 or permission of instructor.

[332 **Modern Drama in Spanish America** Not offered 1980–81.]

333 The Spanish-American Short Story Fall. 4 credits.

T R 12:20–1:35. J. Tittler.
An investigation into the potential and limits of the short narrative genre as it has been practiced in Latin America in the twentieth century. In addition to the rich tradition of the *platense* writers (Lugones, Quiroga, Borges, Cortázar), the course will include authors from the Mexican school (Rulfo, Arreola) and others not primarily known for their stories (Cabrera Infante, García Márquez, Ortiz, Vargas Llosa). Readings, papers, lectures, and discussion in Spanish.

[336 **Popular Culture in Contemporary Spanish-American Prose Fiction** Not offered 1980–81.]

351 Spanish Drama of the Golden Age Spring. 4 credits.

M W F 1:25. M. Randel.
This course will stress the variety of Golden Age dramatic forms: *comedia*, *entremés*, tragedy, philosophical drama, *auto sacramental*. The plays will be discussed in the context of contemporary poetics. Readings will include works by Cervantes, Lope, Tirso, Alarcón, Calderón.

[355 **The Picaresque Novel in a European Perspective (also Comparative Literature 355)** Not offered 1980–81.]

[356 **Spanish Lyric Poetry of the Golden Age** Not offered 1980–81.]

[368 **The Birth of the Novel in Spain: Toward Don Quixote** Not offered 1980–81.]

[386 **The Nineteenth-Century Spanish Novel** Not offered 1980–81.]

[389 **Form and Formlessness in the Novel of the Generation of 1898** Not offered 1980–81.]

[390 **Sociology and Literature in Twentieth-Century Spain** Spring. 4 credits. Conducted in Spanish.

T R 10:10–11:25. C. Arroyo.
This course will deal with the following topics and their interrelations: (1) Ethnopsychology at the beginning of the century: discussion of Unamuno's *intrahistoria*, Azorín's *Alma castellana*, regionalism, the distinction of a Latin race from the Germanic, Slavic, and Anglo-Saxon racial identities (with special attention devoted to Rodo and Ruben Dario); (2) Red and White: "pure art" between three wars, social and aesthetic ideas of the avant-garde; (3) Fascism: theoretical background and historical varieties; (4) Literature and society in Franco's Spain: a study of Lain Entralgo, Arangueren, and Julian Marias.

[391 **The Post-Civil War Drama in Spain** Not offered 1980–81.]

[395 **The Post-Civil War Novel in Spain** Not offered 1980–81.]

[398 **Modern Hispanic Poetry** Not offered 1980–81.]

419–420 Special Topics in Hispanic Literature 419, fall, 420, spring. 2–4 credits each term. Prerequisite: permission of instructor.

Staff.
Guided independent study of specific topics. For undergraduates interested in special problems not covered in courses.

429–430 Honors Work in Hispanic Literature 429, fall; 430, spring. 4 credits each term. Limited to seniors. Prerequisite: permission of instructor.

Staff.
439 Medieval Literature Fall. 4 credits. Conducted in Spanish.
R 2:30. C. Arroyo.
From *El Mio Cid* to *La Celestina*: a double approach: linguistic and ideological.

[441 **Medieval Literature 1300–1508** Not offered 1980–81.]

[446 **The Early Spanish Love Lyric: Origins to 1700** Not offered 1980–81.]

459 Being, God, Mind: Humanistic Revolutions from Plato and Vico (also Romance Studies 459 and Comparative Literature 359) Fall. 4 credits.

T R 10:10. C. Arroyo.
A study of the origins of scientific language: body and soul, matter and form, act and potentiality, being. A study of the ideological background of Western literatures: the conception of human personality and the presentation of characters, the conception of reality and the sense of literary structures. A study of the fusion of Greek thought and the Bible, and its reflection on the development of the ideas of freedom and equality in Western thought.

[461 **The Rhetoric of Honor** Not offered 1980–81.]

[466 Cervantes: *Don Quixote* Not offered 1980–81.]

[479 Colonial Spanish-American Literature: Sor Juana, Ruiz de Alarcón, Inca Garcilaso Not offered 1980–81.]

[481 Eighteenth-and Nineteenth-Century Spanish Drama Not offered 1980–81.]

489 Hispanic Romanticism Fall. 4 credits. Open to undergraduates and graduate students.

M W F 12:20. E. Santí.
A detailed study of the major texts of Hispanic Romanticism, its relationship to the broader European context and the critical issues they pose, including lyricism, epistemology, the self, politics, history, and modernity. Authors to be studied will include Cadalso, Zorrilla, Espronceda, Larra, Bécquer, Heredia, Isaacs, Mármol, Zorrilla de San Martín, and Villaverde.

491 The Theatre of García Lorca Fall. 4 credits.
M W F 2:30. J. Kronik.

A close study of the entire theatrical production of Federico García Lorca. The themes, dramatic technique, and mythical structure of his plays will be examined in the light of the Classical and Spanish traditions and of the contemporary European scene.

[496 Resonances of the Quixote in the Modern Hispanic Novel Not offered 1980–81.]

[629 Principles of Aesthetic and Literary Criticism Not offered 1980–81.]

639–640 Special Topics in Hispanic Literature 639, fall; 640, spring. 4 credits each term. To be taken by all new graduate students.
Staff.

667 Góngora and Quevedo Fall. 4 credits.
T 1:25–3:25. M. Randel.

A study of the verse of Góngora and Quevedo, and of Quevedo's *Sueños*. Readings in Golden Age and modern poetic theory. Discussion will explore the meanings of the terms *baroque*, *conceptismo*, *culteranismo*, and the relationship in the poetry itself of metaphysics, ethics, and aesthetics.

686 Seminar in Nineteenth-Century Spanish Literature: Galdós Spring. 4 credits.
W 2:30–4:30. J. Kronik.

The major "Novelas contemporáneas" of Galdós, from *Doña Perfecta* through *Fortunata y Jacinta* to *Misericordia*, will be discussed from various critical perspectives, both as independent narrative constructs and as reflections of their historical circumstances.

[689 Carlos Fuentes Not offered 1980–81.]

[699 Ortega Y Gasset's *The Dehumanization of Art and Ideas of the Novel (1925)* (also Comparative Literature 690) Not offered 1980–81.]

Related Courses in Other Departments

Don Juan and Faust (Comparative Literature 316)

Renaissance Public Theatre (Comparative Literature 452)

Swahili

See Africana Studies and Research Center, p. 126.

Tagalog

101–102 Elementary Course 101, fall; 102, spring. 6 credits each term. Offered according to demand. Prerequisite: permission of instructor. Prerequisite for Tagalog 102: 101.
Hours to be arranged. J. U. Wolff.

201–202 Tagalog Reading 201, fall; 202, spring. 3 credits each term. Prerequisite for Tagalog 201: 102 or equivalent. Prerequisite for Tagalog 202: 201 or equivalent.

Hours to be arranged. J. U. Wolff.

300 Linguistic Structure of Tagalog Fall or spring. 4 credits. Prerequisite: Linguistics 101.
Hours to be arranged. J. U. Wolff.

Tamil

101–102 Elementary Course 101, fall; 102, spring. 6 credits each term. Offered according to demand. Prerequisite for Tamil 102: 101 or equivalent.
J. W. Gair.

Telugu

101–102 Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for Telugu 102: 101 or equivalent.
Hours to be arranged. G. Kelley.

201–202 Telugu Reading 201, fall; 202, spring. 3 credits each term. Prerequisite for Telugu 201: qualification in Telugu. Prerequisite for Telugu 202: 201 or equivalent.

Hours to be arranged. G. Kelley.

See also **Linguistics 341, 440, 646.**

Thai

101–102 Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for Thai 102: 101 or equivalent. Intended for beginners or students placed by examination.

Lecs, T R 11:15; drills, M–F 10:10. R. B. Jones.
A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

201–202 Thai Reading 201, fall; 202, spring. 3 credits each term. Prerequisite for Thai 201: qualification in Thai. Prerequisite for Thai 202: 201 or equivalent.
M W F 2:30. R. B. Jones.

203–204 Composition and Conversation 203, fall; 204, spring. 3 credits each term. Prerequisite for Thai 203: qualification in Thai. Prerequisite for Thai 204: 203.
Hours to be arranged. R. B. Jones.

301–302 Advanced Thai 301, fall; 302, spring. 4 credits each term. Prerequisite: Thai 201–202, or equivalent.
M W F 1:25. R. B. Jones.

Selected readings in Thai writings in various fields.

303–304 Thai Literature 303, fall; 304, spring. 4 credits each term. Prerequisite: Thai 301–302 or the equivalent.

Hours to be arranged. R. B. Jones.
Reading of significant novels, short stories, and poetry written since 1850.

401–402 Directed Individual Study 401, fall; 402, spring. 4 credits each term. For advanced students. Prerequisite: permission of instructor.
Hours to be arranged. R. B. Jones.

Ukrainian

[131–132 Elementary Course 131, fall; 132, spring. 3 credits each term. Prerequisite for Ukrainian 132: 131 or equivalent. E. W. Browne. Not offered 1980–81; next offered 1981–82.]

Vietnamese

101–102 Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for

Vietnamese 102: 101 or equivalent. Intended for beginners or students placed by examination.

Lecs, T R 10:10; drills, M–F 11:15. F. E. Huffman.
A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

201–202 Vietnamese Reading 201, fall; 202, spring. 3 credits each term. Prerequisite for Vietnamese 201: qualification in Vietnamese. Prerequisite for Vietnamese 202: 201.
Hours to be arranged. F. E. Huffman.

203–204 Composition and Conversation 203, fall; 204, spring. 3 credits each term. Prerequisite for Vietnamese 203: qualification in Vietnamese. Prerequisite for Vietnamese 204: 203.
Hours to be arranged. F. E. Huffman.

301–302 Advanced Vietnamese 301, fall; 302, spring. 4 credits each term. Prerequisite: Vietnamese 201–202 or equivalent.
Hours to be arranged. F. E. Huffman.

303–304 Vietnamese Literature 303, fall; 304, spring. 4 credits each term. Prerequisite: Vietnamese 301–302 or equivalent.
Hours to be arranged. F. E. Huffman.
Reading of selections from contemporary literature.

401–402 Directed Individual Study 401, fall; 402, spring. 4 credits each term. Prerequisite: permission of instructor. Intended for advanced students.
Hours to be arranged. F. E. Huffman.

Yiddish

131–132 Elementary Yiddish 131, fall; 132, spring. 4 credits each term.

M W F 10:10; plus 1 hour in language lab and additional hours to be arranged through the term.
S. Slotnick.

A course for beginners. The purpose of the course is to provide a thorough grounding in all language skills: listening, speaking, reading, writing. Three hours will be devoted to language practice, grammar explanation, reading, and cultural information. A fourth hour will be spent in the language lab. A supplemental series of films in Yiddish will form part of the curriculum. This course will satisfy the qualification portion of the language requirement if the student earns a grade of B– or better.

Music

Freshman Seminars

111 Freshman Seminar in Music Fall or spring. 3 credits. Each section limited to 20 students. No prerequisites; students do not need to have studied music.

Fall: sec 1: M W F 10:10, P. Horsley; sec 2: M W F 11:15, S. Ward; sec 3: M W F 12:20, C. Greenspan.
Spring: sec 1: M W F 10:10, P. Horsley; sec 2: M W F 11:15, S. Ward.

Ways of listening, thinking, talking, and writing about music. Non-Western and popular music are considered, as well as Western "classical" music. Student performances in class are welcome.

114 Contemporary Music Spring. 3 credits.

Limited to 20 students. No prerequisites; students do not need to have studied music.

M W F 9:05; J. Spitzer.
Listening, discussing, and writing about music which has been newly created in several different traditions, including rock, avant-garde "classical" music, and country and western. Readings in music criticism, and a good deal of writing of it. Students will also have the opportunity to investigate one style of their own choosing. When possible, we will listen to performances of new music in the Ithaca area.

Music Theory

101 Introduction to the Musics of the World

Spring. 3 credits.

T R 10:10; disc to be arranged. M. Hatch.

The elements of music as they present themselves in folk, popular, and art musics, both in the West and in other cultural areas. Topics include pitch, scale, rhythm, meter, timbre, and forms of instrumental and vocal play with sound. Listening to and analyzing live and recorded musics.

141–142 Rudiments of Music Theory 141, fall; 142, spring. 3 credits each term. Some familiarity with music is desirable. Prerequisite for Music 142: 141 with grade of B– or better. Music 142 is limited to 50 students. May not be counted toward the requirements for the major in music.

M W 9:05; disc to be arranged. D. M. Randel and staff.

An elementary, self-contained introduction to music theory, emphasizing fundamental musical techniques, theoretical concepts, and their application. Music 141: ear training; notation, pitch, meter; intervals, scales, triads; basic concepts of tonality; extensive listening to music in various styles; analysis of representative works of Bach, Mozart, Beethoven, and Debussy. 142: systematic introduction to counterpoint; original composition of four-part chorales or short keyboard pieces.

151–152 Elementary Theory 151, fall; 152, spring. 4 credits each term. Prerequisites for Music 151: a knowledge of the rudiments of music and some ability to perform. Prerequisite for Music 152: 151 or equivalent. Intended for students expecting to major in music and other qualified students. Required for admission to the music major. Students intending to major in music under Option II should enroll in Music 151–152 during their freshman year. Registration for this course is provisional depending upon the demonstration of adequate background and ability in proficiency tests given on the first two days of the term.

M W F 9:05; 2-hour disc to be arranged. S. Stuckey and staff.

Detailed study of the fundamental elements of tonal music; rhythm, scales, intervals, triads; melodic movement, two-part counterpoint, harmonic progression in the chorale style of J. S. Bach; and introduction to analysis of small forms. Drill in aural discrimination, sight singing, keyboard harmony, and elementary figured bass; rhythmic, melodic, and harmonic dictation; and score reading.

251–252 Intermediate Theory 251, fall; 252, spring. 4 credits each term. Prerequisite for Music 251: 152 with a C or better. Prerequisite for Music 252: 251.

M W F 10:10, R 1:25–3. C. A. Barbera.

Continuation of study and writing in the chorale style of J. S. Bach, concentrating on seventh chords; also study of secondary dominants, modulation, augmented sixth chords, and the Neapolitan. Introduction to writing small forms using piano textures, combined with analysis of larger forms and sonatas. Analysis and writing of two- and three-voice chorale preludes. Ear training, keyboard harmony, and score reading.

339 Ear Training and Sight Singing Fall. 1 credit. Limited to students who are participating in a University musical ensemble. Prerequisite: permission of instructor.

T 3:35. T. A. Sokol.

A practical course designed to improve the student's conception of melody and rhythm and to help sight-reading ability. Progressive class exercises in intervals, rhythms, melodies, and counterpoints.

351 Advanced Theory Fall. 4 credits. Prerequisite: Music 252 with a grade of C or better, or the equivalent.

M W F 9:05. E. Murray.

Inventions, chromatic harmony, analysis of larger forms and nineteenth-century music, ear training, score reading, and advanced keyboard studies including figured bass.

352 Advanced Theory Spring. 4 credits.

Prerequisite: Music 351 with a grade of C or the equivalent.

M W F 9:05. E. Murray.

Introduction to some techniques of composers from 1900 to 1950, including expanded tonal resources, atonality, and new approaches to form and rhythm. Analysis of representative smaller works by Bartók, Hindemith, Schoenberg, Stravinsky, Webern, and some American composers. Writing assignments in various styles.

[451 Modal Counterpoint and Analysis Spring. 4 credits. Prerequisite: Music 352 with a grade of C or better, or the equivalent. Not offered 1980–81.]

[454 Fugue Spring. 4 credits. Prerequisite: Music 352 with a grade of C or better, or the equivalent. Not offered 1980–81.]

456 Orchestration Spring. 4 credits. Prerequisite: Music 352 or equivalent.

T 10:10–12:25. K. Husa.

A study of the instruments of the orchestra and their use in representative works from 1700 to the present. Scoring for various instrumental groups including large orchestra. Students will occasionally attend rehearsals of Cornell musical organizations and ensembles.

[457 Analysis and Composition (Proseminar)

Fall. 4 credits. Prerequisite: Music 352 or permission of instructor. T R 10:10; 1 additional hour to be arranged. Not offered 1980–81.]

460 Electronic Music Composition Fall. 3 credits. Limited to 10 students. Prerequisites: Music 252 and permission of instructor.

M 1:25–4:25. M. W. Stith and staff.

The basic techniques of writing music by electronic means, including musique concrète, tape recorder techniques such as rerecording and splicing, and the use of synthesizers. Works by electronic music composers and readings from current literature are studied. Students are allotted studio time to carry out class projects and assignments.

[462 Orchestral Conducting Spring. 2 credits. Prerequisite: Music 352. T 10:10–12:05. K. Husa. Not offered 1980–81.]

[463 Choral Conducting Spring. 2 credits. Prerequisite: Music 252 or permission of instructor. F 2:30–4:10. T. A. Sokol. Not offered 1980–81.]

[464 Choral Style Spring. 2 credits. Prerequisite: Music 352 or permission of instructor. F 2:30–4:10. T. A. Sokol. Not offered 1980–81.]

Music History

213 The Art of Music Fall. 3 credits.

T R 11:15; 1-hour disc to be arranged. W. W. Austin. Explorations, chiefly through study of phonograph records, designed to speed up the continuing development of various independent tastes. Each student chooses individually what to study from among all the diverse styles of music; instructors help refine these choices through the term; everyone studies a few assigned works, especially by J. S. Bach and Bob Dylan, to provide a common focus for tracing and discussing historical continuities and changes. Diversity is represented in the lectures by live performances as well as recordings. The lectures are organized to survey melody, rhythms, chords, and musical forms, suggesting ways to study any music—beyond the course as well as within it.

214 Opera Spring. 3 credits.

T R 11:15. C. Greenspan.

A historical survey of the forms and conventions of opera. The shifting balance between musical and dramatic factors; the changing emphasis on the contributions of the librettist, the composer, and the performer. Emphasis on works of Monteverdi, Handel, Mozart, Verdi, Wagner, Debussy, and Berg.

[218 Chopin, Chaikovsky, Musorgskii Spring. 3 credits. Students may wish to register concurrently in Music 219. T R 11:15; disc to be arranged. W. W. Austin, G. Gibian, and staff. Not offered 1980–81.]

[219 Chopin, Chaikovsky, Musorgskii Spring. 1 credit. Prerequisite: reading knowledge of Russian. Limited to students concurrently enrolled in Music 218. Seminar to be arranged. Not offered 1980–81.]

220 History of Jazz Spring. 3 credits.

M W F 11:15. C. A. Barbera.

A study of the origins and development of jazz from around the turn of the century to the present. Special emphasis is placed on how the melodies, timbre, and rhythms of Afro-American sacred and secular song, the harmonies of American popular song (Tin Pan Alley), and the timbres and meter of European band instruments merge in jazz. Several jazz musicians will be discussed, including Louis Armstrong, Duke Ellington, Charlie Parker, Miles Davis, Lee Konitz, and John Coltrane. The first two weeks of the course are devoted to fundamental musical characteristics of jazz.

303 The Organ and Its Literature Fall. 4 credits. Prerequisite: Music 152, or permission of instructor.

M W F 11:15. D. R. M. Paterson.

Historical, technical, and analytical survey of the history of the organ, its construction and design, and its most significant repertory.

[317 Music and Poetry in France: Late Middle Ages and Renaissance (also French 617) Fall. 4 credits. D. M. Randel, E. P. Morris. Not offered 1980–81.]

[318 Baroque Instrumental Music Fall. 3 credits. Prerequisite: a course in music history or music theory, or permission of instructor. Not offered 1980–81.]

381 Monteverdi to Mozart Fall. 4 credits. Prerequisite: Music 152 or permission of instructor.

M W F 1:25–2:15. M. A. Keller.

The history of music from the emergence of baroque style around 1600 through the classical period at the end of the eighteenth century. Emphasis on works of Monteverdi, Schütz, Purcell, J. S. Bach, Händel, Haydn, and Mozart.

382 Beethoven to Debussy Spring. 4 credits. Prerequisite: Music 152 or ability to read scores at the keyboard or to translate and sing a French or German folk song.

M W F 2:30. W. W. Austin.

The history of musical styles from Beethoven's time through the beginning of the twentieth century. Emphasis on works of Beethoven, Schubert, Schumann, Chopin, Verdi, Wagner, Brahms, Mahler, and Debussy.

385 Schoenberg, Bartók and Stravinsky Fall. 4 credits. Prerequisite: ability to play (on any instrument) a piece from Bartók's *Mikrokosmos*, vol. 1.

M W 11:15. W. W. Austin.

A survey of the three composers' works, their interactions with each other, and their connections with some of the literary, artistic, political, and religious concerns of their time.

[387 Mozart, His Life, Works, and Times (also German 387) Fall. 4 credits. N. Zaslav, S. L. Gilman. Not offered 1980–81.]

426 Poetry and Music In the English Renaissance (also English 426) Spring. 4 credits.

W F 12:20–1:35. E. Murray and B. Rosecrance.
A survey of English poems and their musical settings from late medieval times to the early seventeenth century, with emphasis on the interrelations of music and text. Some attention will also be given to historical background and social context. The course will consider selected medieval lyrics, the words and music of early Tudor songbooks, related European settings and texts, English madrigal composers, and the ayre. Besides anonymous settings and lyrics, settings by Fayrfax, Henry VIII, Tallis, Byrd, Gibbons, Morley, Weelkes, Wilbye, Dowland, and Campion; lyrics by Wyatt, Vaux, Surrey, Raleigh, Spenser, Sidney, Shakespeare, Campion, and Donne will be represented. No theoretical training in music is assumed.

481 Music in Western Europe to Josquin Des Pres Fall. 4 credits. Prerequisite: Music 381–382 or permission of instructor.

T R 10:10–11:25. C. A. Barbera.
An introduction to the monophonic chant of the Roman Church, medieval musical theory, notation, and the origins and development of polyphonic art music in Western civilization up to the threshold of the high Renaissance.

[482 Josquin Des Pres to Monteverdi Spring. 4 credits. Prerequisite: Music 381–382 or permission of instructor. M W F 11:15. C. A. Barbera. Not offered 1980–81.]**Independent Study**

301–302 Independent Study in Music 301, fall; 302, spring. Prerequisite: departmental approval. Hours and credits to be arranged. Staff.

The Honors Program

401–402 Honors in Music 401, fall; 402, spring. 4 credits each term. Limited to honors candidates in their senior year. Staff.

Musical Performance

321–322 Individual Instruction in Voice, Organ, Harpsichord, Piano, and String, Woodwind, and Brass Instruments Prerequisite: successful audition with instructor during registration period. Music 321 is not a prerequisite to 322.

Without credit: basic fee for one half-hour lesson weekly during one term, \$90; fees for a practice schedule of six hours weekly during one term: \$45 for the use of a pipe organ, \$22 for a practice room with piano, \$7 for a practice room without piano.

For credit: one one-hour lesson weekly (or two half-hour lessons) and a double practice schedule earn 2 credits each term, provided the student has earned, or is earning, at least 3 credits in courses in music history or music theory for every 4 credits in Music 321–322. The basic fees are multiplied by one and one-half (lesson fee becomes \$135; practice fees \$67, \$33, or \$10).

All fees are *nonrefundable* once classes begin, even if registration is subsequently cancelled by the student. A student may register for this course in successive years. Members of Cornell musical organizations and ensembles receive scholarships of one-half of their lesson fees. The Department of Music offers a limited number of additional partial scholarships for lesson fees for cases of both need and special merit.

Instruments not taught at Cornell may, under certain conditions, be studied for credit with outside teachers who have been approved by the department. For information inquire at the department office.

321a–322a Individual Instruction in Voice 321a, fall; 322a, spring. 2 credits each term. Hours to be arranged. B. Troxell.

321b–322b Individual Instruction in Organ 321b, fall; 322b, spring. 2 credits each term. Hours to be arranged. D. R. M. Paterson.

321c–322c Individual Instruction in Piano 321c, fall; 322c, spring. 2 credits each term.

Hours to be arranged. M. Bilson and staff.
Students required to take 321c–322c in order to pass the Department of Music's piano examination may enroll without paying the lesson fee.

321d–322d Individual Instruction in Harpsichord 321d, fall; 322d, spring. 2 credits each term. Hours to be arranged. D. R. M. Paterson.

321e–322e Individual Instruction in Violin or Viola 321e, fall; 322e, spring. 2 credits each term. Hours to be arranged. S. Monosoff.

321f–322f Individual Instruction in Cello or Viola da Gamba 321f, fall; 322f, spring. 2 credits each term. Hours to be arranged. J. Hsu.

321g–322g Individual Instruction in Brass Instruments 321g, fall; 322g, spring. 2 credits each term. Hours to be arranged. M. W. Stith.

391–392 Advanced Individual Instruction 391, fall; 392, spring. 4 credits each term. Open only to juniors and seniors who are majoring under Option II with concentration in performance, and to graduate students. Music 391 is not a prerequisite to 392. Hours to be arranged. Staff.

Musical Organizations and Ensembles

Students may participate in musical organizations and ensembles throughout the year. Permission of the instructor is required, and admission is by audition only, except in the Sage Chapel Choir and the Cornell Gamelan Ensemble. Registration is permitted in two of these courses simultaneously and students may register in successive years, but no student may earn more than 6 credits in these courses. Membership in these musical organizations and ensembles is also open to qualified students who wish to participate without earning credit.

331–332 Sage Chapel Choir 1 credit. No audition for admission.
M 7–8:30 p.m., R 7–8:30 p.m., Sunday 9:30 a.m.
D. R. M. Paterson.

333–334 Cornell Chorus or Glee Club 1 credit. Prerequisite: permission of instructor.
Chorus: W 7:15–9:15 p.m., plus 1½ hours to be arranged. Glee Club: T 7:15–9:15 p.m., plus 1½ hours to be arranged. T. A. Sokol.

335–336 Cornell Orchestra 1 credit. Prerequisite: permission of the instructor. Chamber orchestra limited to more experienced players.
Rehearsals for the Cornell Symphony Orchestra: full orchestra, W 7:30–10 p.m.; sectional rehearsals, alternate T or R 7:30–10 p.m.
Rehearsals for the Cornell Chamber Orchestra, R 7:30–10 p.m. E. Murray.

337–338 University Bands 1 credit.
Symphonic band: fall, M 7:30–9:30 p.m. and W 4:40–5:45 p.m.; spring, T 4:30–5:45 p.m. and W 4:30–5:45 p.m. Wind ensemble: spring only, M 7:30–9:30 p.m. and R 4:30–5:45 p.m. M. W. Stith.
Students interested in participating in the Big Red Marching Band may inquire at the Department of Athletics, Teagle Hall.

441–442 Chamber Music Ensemble 1 credit. Prerequisite: permission of instructor.

S. Monosoff and staff.
Study and performance of chamber music literature; string and wind groups; piano trios and quartets, trio sonatas, etc. Emphasis on musical problems, with some practice in sight reading.

443–444 Chamber Singers 1 credit. Prerequisite: permission of instructor.
F 4:30–6. T. A. Sokol.
Study and performance of selected vocal music for small choir.

445–446 Cornell Gamelan Ensemble 1 credit. No previous knowledge of music notation or experience in music performance necessary.
Full ensemble: R 7:30–10 p.m. Small group lessons: M W F 12:20–1:10. Attendance at all full rehearsals and one small group lesson per week required for credit. M. Hatch.
Basic performance techniques and theories of central Javanese gamelan. Tape recordings of gamelan and elementary cypher notation are provided.

447–448 Collegium Musicum 1 credit. Prerequisite: permission of instructor.
Hours to be arranged. J. Hsu.
Study and performance of medieval, Renaissance, and baroque vocal and instrumental music, with recorders, crumhorns, sackbuts, viols, shawms, organ, harpsichord, and other early instruments.

Graduate Courses

Open to qualified undergraduates with permission of the instructor.

[617 Music and Poetry In France: Late Middle Ages and Renaissance (also Music 317 and French 617)] Fall. 4 credits. D. M. Randel, E. P. Morris. Not offered 1980–81.]

651 Twentieth-Century Classics Spring. 4 credits. Prerequisite: Music 352 or permission of instructor.
W 10:10–12:05. R. M. Palmer.
A general analysis of Bartók's string quartets 2, 4, and 6, with a detailed examination of tonality and rhythm. Live performance of the works is an integral part of the course.

652 Rhythms Spring. 4 credits. Open to students in languages, psychology, philosophy, dance, anthropology, etc., who receive permission of instructor.
R 2:30–4:25. W. W. Austin.
Comparative studies of rhythmic schemes and performances in various styles.

[653 Analysis of Structure and Function in Tonal Music Spring. 4 credits. Not offered 1980–81.]

657–658 Composition 657, fall; 658, spring. 4 credits.
W 2:30–4:25. S. Stucky.

659–660 Composition 659, fall; 660, spring. 4 credits.
659: not offered 1980–81. 660: T 2:30–4:25.
K. Husa.

[681 Introduction to Research and Bibliography Fall. 4 credits. Prerequisites: reading knowledge of French and German, and familiarity with music theory and general music history. M 1:25–4:25. M. A. Keller. Not offered 1980–81.]

682 Seminar on Richard Wagner (also German 682) Spring. 4 credits.
M 1:25–4:25. J. Webster and staff.
An analysis of Wagner's music-dramas, with special reference to *Tristan und Isolde* and *Die Meistersinger von Nürnberg*. Attention will be paid to the literary and musical context of Wagner's works and to the relations between his theories and his practice.

684 Seminar in Renaissance Music Fall. 4 credits.

F 1:25–4:25. D. M. Randel.
The *chanson* from Dufay to Josquin.

685 Schoenberg, Bartók, and Stravinsky Fall.

4 credits. Prerequisites: ability to play Stravinsky's *Pieces for the Five Fingers*, and reading knowledge of one relevant foreign language—French, German, Russian, or Hungarian.
M W F 11:15. W. W. Austin.

686 Beethoven Fall. 4 credits.

T 1:25–4:25. J. Webster.
The crystallization of Beethoven's first-period style.

[687 Mozart: His Life, Works, and Times (also German 757)] Fall. 4 credits. N. Zaslav, S. L. Gilman. Not offered 1980–81.]

688 Music of the Grand Siècle Spring. 4 credits.

T 2:30–4:25. N. Zaslav.
In 1981 the seminar will be devoted to the music of Rameau.

[689 Haydn Fall. 4 credits. J. Webster. Not offered 1980–81.]

691–692 Performance Practice 691, fall; 692, spring. 4 credits each term.

691: T 1:25–4:00; C. Greenspan. 692: W 2:30–4:25; N. Zaslav.
691: Nineteenth-century performance traditions and their transmission: the role of the interpreter; the interrelation of interpreter and composer; the problem of the composer-interpreter. Use of reviews, teaching manuals, recollections, editions, and recordings.
692: The study of early instruments.

697–698 Independent Study and Research

Hours and credits to be arranged. Staff.

780 Introduction to Ethnomusicology Fall. 4 credits.

M 2:00–4:25. M. Hatch.
Major aspects of ethnomusicological research, exemplified in the study of two musical cultures: Karnatic (South Indian) and Javanese. Problems, theories, and methods, especially those affecting transcription, analysis, and fieldwork. Translation and transcription of words and tones in the literature on music from past to present.

[783 Seminar in Medieval Music Fall. 4 credits. C. A. Barbera. Not offered 1980–81.]

784 Seminar in Medieval Music Spring. 4 credits.

F 2–4:30. D. M. Randel.
The secular works of Guillaume de Machaut.

785–786 History of Music Theory 785, fall; 786, spring. 4 credits each term.

785: not offered 1980–81. 786: R 1:25–4:25; C. A. Barbera.
The musical theories of the Greeks and their influence on Western medieval theory.

[787–788 Debussy to Boulez 787, fall; 788, spring. 4 credits each term. W. W. Austin. Not offered 1980–81.]

[789 Liturgical Chant in the West Fall. 4 credits. Not offered 1980–81.]

completion of NES 102 fulfills the qualification portion of the language requirement.

Sec 1, M–F 9:05; sec 2, M–F 10:10; sec 3, M–F 11:15; sec 4, M–F 1:25. N. Scharf.

The fundamentals of modern Israeli Hebrew, emphasizing reading, writing, listening, and speaking skills. Small groups led by native Hebrew speakers are supplemented with work at the language laboratory.

103–104 Elementary Classical Hebrew 103, fall; 104, spring. 4 credits each term. Prerequisite for 104: 103 or equivalent with permission of instructor.

M W F 11:15. M. Collins.
A thorough introduction to the grammar and syntax of biblical Hebrew. Stress is placed on acquisition of basic language structures and vocabulary and on fluency in reading and translating. This course provides the basis for understanding the role of biblical Hebrew in shaping Modern Hebrew and for the study of the historical development of Hebrew.

201–202 Intermediate Modern Hebrew I and II

201, fall; 202, spring. 3 credits each term. Each section limited to 15 students. Prerequisite for NES 201: 102 or permission of instructor. Prerequisite for NES 202: 201 or permission of instructor. Satisfactory completion of NES 202 fulfills the proficiency portion of the language requirement.

Sec 1, M W F 9:05; sec 2, M W F 11:15. E. Kadar.
Second-year modern Israeli Hebrew. Continued development of reading, writing, listening, and speaking skills. Review of grammar; readings from contemporary Israeli prose and poetry; guided conversation and composition. Small groups led by native Hebrew speakers are supplemented with work at the language laboratory.

[231–232 Readings in Classical Hebrew Literature 231, fall; 232, spring. 3 credits each term. Not offered 1980–81.]

[301–302 Advanced Modern Hebrew I and II 301, fall; 302, spring. 4 credits each term. Not offered 1980–81.]

303 Independent Study Fall or spring. Variable credit. Prerequisite: permission of instructor. Staff.

Arabic

111–112 Elementary Arabic 111, fall; 112, spring. 6 credits each term. Limited to 15 students.

Prerequisite for NES 112: 111 or permission of instructor.
M–F 9:05. D. S. Powers.
An introduction to the fundamentals of classical and modern standard Arabic. Reading, writing, listening, and speaking skills are stressed. Short selections for the Qur'an, classical literature, and modern literature are studied.

211–212 Intermediate Arabic 211, fall; 212, spring. 3 credits each term. Prerequisite for NES 211: one year of Arabic or permission of instructor. Prerequisite for NES 212: 211 or permission of instructor.

M W F 12:20. P. D. Molan.
The grammar of classical and modern standard Arabic is stressed. Extensive readings are selected from the Qur'an, the classical period, and the modern period.

311 Advanced Arabic Fall. 4 credits. Prerequisite: two years of Arabic or permission of instructor.
Hours to be arranged. D. S. Powers.
Readings in selected literary and historical texts.

[312 Advanced Arabic Spring. 4 credits. Not offered 1980–81.]

351 Independent Study Fall or spring. Variable credit. Prerequisite: permission of instructor. Staff.

Akkadian

[323–324 Elementary Akkadian 323, fall; 324, spring. 4 credits each term. Not offered 1980–81.]

[325 Readings in Akkadian Texts Fall or spring. 3 credits. Not offered 1980–81.]

Aramaic

[327 Aramaic Spring. 4 credits. Not offered 1980–81.]

Ugaritic

[328 Ugaritic Fall. 3 credits. Not offered 1980–81.]

Comparative Semitic Linguistics

[329 Introduction to Comparative Semitic Linguistics Spring. 4 credits. Not offered 1980–81.]

Ancient Near Eastern Literature

[282 Ancient Near Eastern Literature (also Comparative Literature 226)] Spring. 4 credits. Not offered 1980–81.]

384 Folklore in the Ancient Near East Spring. 4 credits.

M W F 11:15. R. F. Falkowitz.
Selected readings and analyses of literary sources in translation from Egypt, Ugarit (Canaanite), Anatolia (Hittite), Mesopotamia (Sumerian and Babylonian), and Israel (Hebrew Bible). Introduction to folkloric methodology with particular emphasis on comparative motifs from the various literatures of the ancient world, and on the place of ancient Near Eastern literature in the context of cultures to both its east and west.

Biblical Literature

[221 Literature of Ancient Israel I Fall. 3 credits. Not offered 1980–81.]

[222 Literature of Ancient Israel II: Bible, Dead Sea Scrolls, Apocalyptic Literature Spring. 3 credits. Not offered 1980–81.]

225 Freshman Seminar in Biblical Literature: Heroes and Heroines of the Bible Spring.

3 credits. May be used toward fulfillment of the distribution requirements in the humanities. May also be used toward completion of a concentration in Jewish Studies.
M W F 9:05. M. Collins.

A study of the characterization of famous figures in ancient Israel known for their accomplishments as soldiers, sages, kings, queens, and courtiers. The focus is on the significance and portrayal of personalities such as Abraham, David, and Ruth.

[231–232 Readings in Classical Hebrew Literature 231, fall; 232, spring. 3 credits each term. Not offered 1980–81; next offered 1981–82.]

322 Undergraduate Seminar in Biblical Literature: Prophecy in Ancient Israel Spring. 4 credits.

M W F 12:20. M. Collins.
A study of the speeches and predictions of ancient Israel's famous rhetoricians (such as Amos, Hosea, Isaiah, Jeremiah, Ezekiel). The focus is on major issues which the prophets address: the human state and divine rule, man and society, freedom and responsibility, war and peace, exile and restoration.

326 Independent Study Fall or spring. Variable credit. Prerequisite: permission of instructor.
M. Collins.

Near Eastern Studies

Hebrew

101–102 Elementary Modern Hebrew I and II 101, fall; 102, spring. 6 credits each term. Each section limited to 15 students. Prerequisite for NES 102: 101 or permission of instructor. Satisfactory

Rabbinic Literature

[333 The Historical Development of Rabbinic Literature] Spring. 4 credits. Not offered 1980–81.]

334 Biblical Interpretation in Rabbinic Literature Fall. 4 credits.

M W F 12:20. M. Collins.

A general introduction to modes of interpreting the Hebrew Bible from the sixth century B.C.E. through the early medieval period. Readings are in English translation from the Dead Sea Scrolls, Philo and Josephus, Rabbinic *midrashim*, Rashi, and others. The background of each period and text, the process of the development of biblical interpretation, and its importance to different communities is discussed.

339 Independent Study Fall or spring. Variable credit. Prerequisite: permission of instructor. Staff.

Modern Hebrew Literature

[260–261 Modern Hebrew Literature in English Translation] 260, fall; 261, spring. 4 credits each term. Not offered 1980–81.]

[361–362 Seminar in Modern Hebrew Literature: The National Renaissance] 361, fall; 362, spring. 4 credits each term. Not offered 1980–81.]

[363–364 Seminar in Modern Hebrew Literature: The Enlightenment] 363, fall; 364, spring. 4 credits each term. Not offered 1980–81.]

[366 Seminar in Modern Hebrew Literature: The Israeli Short Story] Fall. 4 credits. Not offered 1980–81.]

367 Seminar in Modern Hebrew Literature: The Early Hebrew Novel Spring. 4 credits.

T R 2:30–3:45. S. Zipperstein.

This course will concentrate on the development of the Hebrew novel, examining selected works of Mapu, Smolenskin, Abramovitsch, Feierberg, and Brenner. The preoccupation of these authors with the reconciliation of traditional values and modern concerns will be of particular interest.

[368 Agnon and Hazaz] Spring. 4 credits. Not offered 1980–81.]

369 Independent Study Fall or spring. Variable credit. Prerequisite: permission of instructor. Open to majors and other qualified students. Staff.

Yiddish Language and Literature

131–132 Elementary Yiddish 131, fall; 132, spring. 4 credits each term. This course will satisfy the qualification portion of the language requirement for students who earn a grade of B– or better.

M W F 10:10, plus 1 hour in language lab and additional hours through the term. S. Slotnick.

The purpose of the course is to provide a thorough grounding in all language skills: listening, speaking, reading, and writing. Three hours will be devoted to language practice, grammar explanation, reading, and cultural information. A fourth hour will be spent in the language laboratory. A supplemental series of films in Yiddish will form part of the curriculum.

[375 The Shtetl in Modern Yiddish Fiction in English Translation (also German Literature 375)] Fall. 4 credits. Not offered 1980–81.]

[377 Topics in Yiddish Literature (also German Literature 377)] Spring. 4 credits. Not offered 1980–81.]

Related Course in Another Department

[Yiddish Literature in Translation (German 350)] Not offered 1980–81.]

History of the Jewish People

[243 History of Ancient Israel to 450 B. C. E.] Spring. 4 credits. Not offered 1980–81.]

244 Jews of the Ancient and Muslim Near East: 450 B. C. E.–1204 C. E. Fall. 4 credits.

T R 9:05; disc to be arranged. S. Zipperstein.

A survey of the political, cultural, and social history of the Jews, from the period of Ezra and Nehemiah until the death of Moses Maimonides. The focus is on the link between the Jewish history of late ancient and early medieval times and the evolution of the classical Jewish world view, as the development of the Jewish community is traced from that of a local tribal kingdom to that of a multinational religion. Of special concern is the interaction of the Jews with innovative cultural trends in the Gentile world around them—first that of Greece and Rome, then those of Christianity and Islam to which the Jewish community helped give rise. Emphasis is on the reading of historical documents in translation.

245 Jews of the Christian West: 476–1948

Spring. 4 credits.

T R 12:20; disc to be arranged. S. Zipperstein.

A survey of the political, cultural, and social history of the Jews in the West, from the fall of Rome until the Holocaust and the establishment of the State of Israel. The treatment of Jews in medieval Christendom and their gradual emancipation into modern society, along with corresponding developments in Jewish culture are emphasized as the complex background of the modern Jewish experience is explored. Emphasis is on the reading of historical documents in translation.

331 Seminar in Jewish History: Eastern European Jewry in the Modern Age Spring. 4 credits.

T R 10:10–11:25. S. Zipperstein.

After an introductory survey on the origin and development of the Eastern European Jewish community, the seminar will explore the process of Eastern European Jewish modernization from the late eighteenth century up until the 1917 revolution, particularly as it related to the following concerns: the consolidation of new definitions of Jewish identity and community and changing attitudes toward the Russian state. The origins of the Eastern European Jewish community as well as the impact of the Enlightenment, positivism, socialism, nationalism, and communism on the Jewish community in Eastern Europe will be discussed.

[343 The Jewish Community Throughout History] Spring. 4 credits. Not offered 1980–81.]

[344 Age of the Patriarchs] Fall. 4 credits. Not offered 1980–81.]

[347 Judaism and Christianity in Conflict] Fall. 4 credits. Not offered 1980–81.]

[348 Independent Study] Fall or spring. Variable credit. Directed readings on the history, culture, and civilization of ancient Israel and the Jewish people. Not offered 1980–81.]

History of Ancient Near Eastern Civilizations

341 The History and Culture of Ancient Mesopotamia Fall. 4 credits.

M W F 11:15. R. S. Falkowitz.

An intensive survey of Mesopotamian civilization from ca. 4000 B. C. E. to the conquest of Alexander the Great. The course will include the following topics: geography, history of Assyriology, political, social and intellectual history, literature, technology, and archaeology. Essential for an understanding of all of the Ancient Near East, including biblical Israel, Egypt, ancient Iran, Anatolia, as well as early Greece and

certain contemporary anthropological theories about political development, urbanization, and the development of technology.

[345 History of the Ancient Near East in Biblical Times] Fall. 4 credits. Not offered 1980–81.]

346 The Roots of Greek Civilization (also College Scholar 346 and Government 352) Fall. 4 credits.

Prerequisite: permission of instructor. Some knowledge of Greek and/or Hebrew would be helpful but is not necessary. The Greek writers will be read in English and although ability to read the originals would be an advantage, the questions being studied can be approached through the translated texts.

T R 12:20–1:35. M. Bernal.

The course will investigate the present paradigm or general framework used to explain the origins of Mycenaean and Classical Greece. It will focus on the use of history, linguistics, and archaeology to sustain it. The course will then examine the rise and social context of each of these disciplines and the political function of ancient Greece in the nineteenth and twentieth centuries. There will be close reading of fifth-century Greek writers on their past. An alternative paradigm will then be suggested and the problems of competing paradigms will be discussed.

[349 Independent Study] Fall or spring. Variable credit. Directed readings on the history, culture, and civilization of the ancient Near East. Not offered 1980–81.]

[385 Interconnections in the Eastern Mediterranean World in Antiquity] Spring. 4 credits. Not offered 1980–81.]

Related Course in Another Department

[Greeks and Their Eastern Neighbors (Classics 322)] Not offered 1980–81.]

Near Eastern and Biblical Archaeology

[248 Introduction to Art History: Art of Egypt and Mesopotamia (also History of Art 211)] Spring. 3 credits. Not offered 1980–81.]

[249 Ancient Seafaring (also Archaeology 275)] Fall. 3 credits. Not offered 1980–81.]

[280 Mediterranean Archaeology (also Classics 200 and Ancient Mediterranean Studies 200)] Fall. 3 credits. Not offered 1980–81.]

[285 Introduction to Biblical Archaeology] Spring. 3 credits. Not offered 1980–81.]

[386 Introduction to Field Archaeology in Israel] Summer. Not offered summer, 1981.

D. I. Owen.

See course description in *Cornell Summer 1980*.]

[387 Archaeology of the Ancient Near East (also Archaeology 310)] Spring. 4 credits. Not offered 1980–81.]

[388 Archaeology of Ancient Egypt] Fall. 4 credits. Not offered 1980–81.]

[481 Seminar in Syro-Palestinian Archaeology: The Israelite Conquest of Canaan] Fall. 4 credits. Not offered 1980–81.]

Related Course in Another Department

[The Archaeology of Cyprus (Classics 321)] Not offered 1980–81.]

Islamic

244 Jews of the Ancient and Muslim Near East: 450 B. C. E.–1204 C. E. See course description under "History of the Jewish People."

250 Classics of Islamic Literature Spring, 3 credits. A Freshman Seminar.
M W F 1:25. P. D. Molan.

A study of the culture and poetry of pre-Islamic Arabia, Muhammad and the Koran, and works of traditional and secular authors of the eighth to thirteenth centuries. The diversified culture of the Islamic "Golden Age," which has set the standard for subsequent intellectual and cultural developments in the Muslim World, is introduced through readings in translation.

253 Introduction to Islamic Civilization Fall, 3 credits.
M W F 10:10. D. S. Powers.

A general introduction to Islamic history, culture, and civilization from the birth of Muhammad to the present. Students read translations of primary sources and view a series of films on the traditional Islamic world.

371 Classical Islamic Literatures Fall, 4 credits.
M W F 11:15. P. D. Molan.

The rise and development of courtly, Islamic literatures will be traced through readings of the literary classics, both religious and secular, of the Islamic Middle East. All major literary genres will be studied in the light of medieval Muslim and modern critical theory and relations with Western letters and thought will be examined. Students may read works in translation and/or the vernacular languages at their discretion.

372 Islamic Popular Literature Spring, 4 credits.
M W F 11:15. P. D. Molan.

Condemned or ignored by Muslim court critics, a lively popular culture nonetheless thrived throughout the Middle Ages in the Islamic world. It underlies much of modern Middle Eastern literature as well. Popular narrative, popular poetry, and popular medieval theatricals, as well as modern Islamic literature, will be read and studied in the light of folkloric and structuralist theory.

376 Seminar on Islamic Law and Society Spring, 4 credits.
M W F 10:10. D. S. Powers.

The course seeks to enable the student to develop an appreciation for the uniqueness of Islamic society, both past and present, by means of an examination of its legal system, the *Shari'a*. The course is divided into three units: (1) An analysis of the historical development of the *Shari'a* between the seventh and tenth centuries A.D.; (2) an examination of the central role of the *Shari'a* in the social, political, and economic life of medieval Islamic society; (3) a study of the role of Islam in the modern Near East, with special reference to Turkey, Egypt, and Iran.

Honors Course

400 Independent Study: Honors Fall or spring. Variable credit.

Directed readings and conferences center on the candidate's honors thesis. The thesis topic must be approved by the honors adviser at the end of the second term of the junior year.

Related Courses in Other Departments

[Introduction to Medieval Latin (Classics 214) Not offered 1980–81.]

Introduction to Classical Archaeology (Classics 220 and Art History 220)

[Minoan-Mycenaean Art and Archaeology (Classics 221) Not offered 1980–81.]

New Testament Greek (Classics 308)

[Art and Archaeology of Archaic Greece (Classics 326) Not offered 1980–81.]

[Pagan and Christian at Rome (Classics 332) Not offered 1980–81.]

Problems in Minoan-Mycenaean Archaeology (Classics 629)

Man and His Environment in Western Religious Thought (Society for the Humanities 415–416)

Pali

See Modern Languages, Literatures, and Linguistics, p. 92.

Philosophy

In some courses, there may be a small fee for photocopying materials to be handed out to students.

Introductory Courses

These courses have no prerequisites; all are open to freshmen.

100 Freshman Seminar in Philosophy Fall or spring, 3 credits. Limited to freshmen who have not taken Philosophy 101. Independent sections, each limited to 20 students. Letter grade only.

Fall: M W F 9:05, staff; M W F 10:10, D. Zaret; M W F 11:15, staff; M W F 1:25, R. Miller; M W F 2:30, staff; T R 10:10–11:25, C. Ginet; T R 12:20–1:35, R. Boyd; T R 2:30–3:45, staff. Spring: M W F 9:05, staff; M W F 10:10, staff; M W F 11:15, H. Hodes; M W F 1:25, staff; M W F 2:30, staff; T R 10:10–11:25, N. Kretzmann; T R 12:20–1:35, R. Stalnaker; T R 2:30–3:45, J. Bennett.

101 Introduction to Philosophy Fall or spring, 3 credits.

Fall: M W F 9:05, T. Irwin. Spring: M W F 9:05, N. Sturgeon.

Classical and contemporary problems in philosophy studied through the writings of some of the major philosophers in the Western tradition (such as Plato, Descartes, Hume, Kant, Mill, Russell). Questions discussed may include: what is knowledge, and how can we know anything? Can we have rational grounds for belief in God? Are human beings anything more than machines? Is anything objectively right or wrong?

131 Logic: Evidence and Argument Spring, 3 credits.

M W F 11:15. J. Bennett.

An introduction to the fundamental principles of inference, intended to systematize and develop skills in evaluating arguments. Both deductive and inductive arguments will be considered. The course is not a general introduction to philosophy, but develops skills useful in all areas of study, including philosophy.

[210 Ancient Thought Not offered 1980–81.]

211 Ancient Philosophy Fall, 4 credits.
T R 12:20–1:35. G. Fine.

An introduction to the major arguments and theories of ancient Greek and some Roman philosophy: the pre-Socratics, Plato, and Aristotle; the Stoics and Epicureans. Questions to be considered include: What is the nature of the universe, and how can it be known? What are the nature and limits of human knowledge? Is there any rational basis for moral beliefs? Has man free will?

212 Modern Philosophy Spring, 4 credits.
T R 12:20–1:35. G. Fine.

A survey of some central philosophical problems in the rationalists, empiricists, and Kant. Typical problems include: the nature and limits of knowledge;

perception; the existence and nature of God; free will and determinism; mind and body. Readings from Descartes, Spinoza, Leibniz, Locke, Berkeley, Hume, and Kant.

213 Existentialism Spring, 4 credits.
T R 2:30–3:45. A. Wood.

A study of selected writings, literary as well as philosophical, by four major thinkers to whom the term "existentialist" has often been applied: Søren Kierkegaard, Friedrich Nietzsche, Fyodor Dostoevski, Jean-Paul Sartre.

[214 Philosophical Issues in Christian Thought Not offered 1980–81.]

231 Formal Logic Spring, 4 credits.
M W F 11:15. C. Ginet.

Analysis and evaluation of deductive reasoning in terms of formalized languages. The logic of sentences, predicates, and quantifiers.

241 Ethics Spring, 4 credits.
M W F 1:25. T. Irwin.

Introduction to philosophical study of major ethical questions, including both general theoretical issues (e.g., Are there objective values? Is human nature inevitably selfish?) and also practical moral problems (e.g., war, abortion, equality of opportunity, and reverse discrimination). Readings from classical ethical writers (e.g., Plato, Mill, Nietzsche) and from contemporary sources.

242 Social and Political Theory Fall, 4 credits.
T R 10:10–11:25. J. Bennett.

A survey of five main problems of political philosophy: the need for the state; the moral legitimacy of the state; freedom, democracy, and economic justice. Organized around selected writings of five major political philosophers: Hobbes, Locke, Mill, Rousseau, and Marx.

243 Aesthetics Fall, 4 credits.
T R 2:30–3:45. R. Miller.

An introduction to philosophical problems concerning the nature of art, aesthetic value, and critical reasoning. Classical attempts to define the nature of genuine art; the objectivity of aesthetic judgment, the relation between the value of a work of art and the truth of the ideas it embodies.

245 Biomedical Ethics Fall, 3 credits.
See course description under Biological Sciences 205.

246 Environmental Ethics Spring, 3 credits.
See course description under Biological Sciences 206.

261 Knowledge and Reality Spring, 4 credits.
M W F 9:05. J. Bennett.

Introduction to problems concerning the nature of knowledge and the nature of the world and human beings. Problems discussed will include whether our knowledge has secure foundations, or needs them, what the nature of personal identity is, whether human beings are free or slaves of deterministic causation, what the relation between the mental and the physical is.

262 Philosophy of Mind Fall, 4 credits.
M W F 1:25. R. Stalnaker.

Discussion of a number of problems about the nature of mind. For example, can thoughts and feelings be physical events in the brain? Might computers or robots be conscious beings? What is it that constitutes a person's identity—the unity of his consciousness? Is there a conflict between free will and determinism?

263 Religion and Reason Fall, 4 credits.
T R 10:10–11:25. N. Kretzmann.

Recent and traditional literature will be taken into account in the examination of such topics as

evidence for and against the existence of a god; philosophical problems associated with the attributes of God, as described in the great monotheistic religions; and philosophical problems associated with the relationship of God to the physical universe and to man.

286 Science and Human Nature Spring. 4 credits.
M W F 11:15. R. Boyd, N. Sturgeon.

An examination of attempts in the biological and social sciences to offer scientific theories of human nature and human potential and to apply such theories to explain important social and psychological phenomena. Topics vary and may include issues in psychology such as behaviorism, Freudianism, and artificial intelligence, or issues in the foundations of historical theory such as methodological individualism and economic determinism as well as relevant issues in the biological sciences. Topic for 1980-81: Darwin, social Darwinism, and sociobiology.

Intermediate Courses

Some of these courses have prerequisites.

[309 Plato Not offered 1980-81.]

310 Aristotle Spring. 4 credits.

T R 2:30-3:45. G. Fine.
Aristotle's main philosophical doctrines will be studied: essence and necessity, substance, form and matter; scientific method and the structure of scientific knowledge; philosophy of nature; teleology; the nature of universals. Aristotle's criticisms of Plato, and his relevance to modern philosophical concerns will also be discussed.

311 Modern Rationalism Spring. 4 credits.

W F 2:30-3:45. C. Ginet.
Topic for 1980-81: Descartes and Leibniz.

312 Modern Empiricism Fall. 4 credits.

M W F 11:15. N. Sturgeon.
Locke, Berkeley, and Hume. Substance, causality and necessity; meaning, the possibility of scientific and moral knowledge. Historical and critical emphasis, with some illustrations of influences on more recent empiricist theories.

313 Medieval Philosophy Fall. 4 credits.

T R 2:30-3:45. N. Kretzmann.
Examination of selected classical works in medieval philosophy.

[314 Topics in Ancient Philosophy Not offered 1980-81.]

315 Special Topics in the History of Philosophy Fall. 4 credits.

M W F 2:30. T. Irwin.
Topic for 1980-81: Knowledge, doubt, and morality in ancient and modern philosophy.

[316 Kant Not offered 1980-81.]

[317 Hegel Not offered 1980-81.]

319 Philosophy of Marx Spring. 4 credits.

T R 10:10-11:25. A. Wood.
The philosophical aspects of the thought of Karl Marx. The dialectical method; Marx's concepts of humanity and alienation; the materialist conception of history; the foundations of Marxian economic theory; the Marxian critique of capitalism.

331 Introduction to Formal Logic Fall. 4 credits.

M W F 9:05. H. Hodes.
Sentential logic and first order quantification theory. Covers the same material as 231, but in more depth and with additional metatheory.

332 Semantics Fall. 4 credits. Prerequisite: at least one philosophy course, some background in logic.

M W F 10:10. R. Stalnaker.

Introduction to the philosophy of language. Discussion of the nature of representation and communication, alternative conceptions of meaning, the analysis of speech acts, the relation between logic and natural language.

[341 Ethical Theory Not offered 1980-81.]

342 Law, Society, and Morality Spring. 4 credits. Prerequisite: one course in philosophy or one course in a related subject matter.

M W F 10:10. D. Lyons.
An introduction to legal and political philosophy emphasizing the nature of law, the problem of coercion, principles of justice, and general welfare.

361 Metaphysics and Epistemology Spring.

4 credits. Prerequisite: one course in philosophy.
M W F 11:15. R. Stalnaker.
Topics for 1980-81: Induction and Probability.

[363 Topics in the Philosophy of Religion Not offered 1980-81.]

381 Philosophy of Science Fall. 4 credits.

W 7:30-10:30 p.m. R. Boyd.
An examination of central epistemological and metaphysical issues raised by scientific theorizing: the nature of evidence, scientific objectivity, the nature of theories, "models" and paradigms, the character of the scientific revolution. In addition to the contemporary literature in the philosophy of science, readings are also drawn from the history of science and from the works of modern philosophers such as Locke, Hume, and Descartes.

382 Philosophy and Psychology Spring. 4 credits.

W 7:30-10:30 p.m. R. Boyd.
Philosophy of psychology as a special case of the philosophy of science: problems of measurement, theory construction, experimental design, and the relation of psychology to other sciences.

[383 Philosophy of Choice and Decision Not offered 1980-81.]

[387 Philosophy of Mathematics Not offered 1980-81.]

388 Social Theory Spring. 4 credits. Prerequisites: one course in philosophy or two in the social sciences.

M W F 2:30. R. Miller.
A study of leading modern conceptions of society, including those of Marx, Durkheim, and Weber. Among the topics to be considered: the functions of the state, the nature of ideology, the origins and consequences of economic systems, the relation between sociological and psychological explanation.

390 Informal Study Fall or spring; to be taken only in exceptional circumstances. Credit to be arranged. Must be arranged by the student with his or her adviser and the faculty member who has agreed to direct the study.
Staff.

Advanced Courses and Seminars

These courses are offered primarily for majors and graduate students.

395 Majors' Seminar Fall. 4 credits. S-U grades.

Limited to junior and senior philosophy majors.
T R 10:10-11:25. N. Sturgeon.
An examination of some contemporary discussions of three or four classical philosophical problems. For example, free will versus determinism, the problem of induction, personal identity, the justification of moral claims, the problem of universals.

[412 Medieval Philosophy Not offered 1980-81.]

413 Plato and Aristotle Spring. 4 credits. Seminar suitable for undergraduates; open to non-philosophy majors with instructor's permission.

M 3:45-5:45. T. Irwin.
Topic for 1980-81: Plato's *Republic*. A thorough examination of the *Republic*, of the many philosophical problems it raises, and of its place in Plato's philosophical development. We will discuss the structure and purpose of the dialogue, and its contribution to ethics, political theory, moral psychology, theory of knowledge, metaphysics and philosophy of art.

431 Deductive Logic Spring. 4 credits.

Prerequisite: Philosophy 231 or 331 or equivalent.
M W F 1:25. H. Hodes.
The first order predicate calculus; proof theory and model theory; the completeness theorem. Theories and definition; elementary set theory.

[433 Philosophy of Logic Not offered 1980-81.]

[436 Intensional Logic Not offered 1980-81.]

[437 Problems in the Philosophy of Language Not offered 1980-81.]

441 Contemporary Ethical Theory Fall. 4 credits.

T 12:20-2:20. D. Lyons.
Topic for 1980-81: Ethical relativism. A critical study of relativistic conceptions of morality, with an emphasis on recent work by Philippa Foot, Gilbert Harman, and Bernard Williams, among others.

[443 Topics in Aesthetics Not offered 1980-81.]

444 Contemporary Legal Theory (also Law 623) Fall. 4 credits.

Hours to be arranged. D. Lyons.
Recent work on the nature of law and its relations to morality, with an emphasis on the writings of H. L. A. Hart and Ronald Dworkin.

461 Metaphysics Fall. 4 credits

T R 2:30-3:45. C. Ginet.
Topic for 1980-81: The nature of human action. What makes an event an action? Must it begin with an act of will? And what is that? What is it to do something intentionally? What is required for freedom of action? What makes one responsible for something that happens? What is required for the truth of an intentional explanation of an action? Are such explanations compatible with mechanistic explanations?

[462 Theory of Knowledge Not offered 1980-81.]

481 Problems in the Philosophy of Science

Spring. 4 credits.
T R 12:20-1:35. D. Zaret.
Topic for 1980-81: Philosophical problems in quantum mechanics.

490 Special Studies in Philosophy Fall or spring. 4 credits. Open only to honors students in their senior year.
Staff.

611 Ancient Philosophy Fall. 4 credits.

R 3:45-5:45. G. Fine.
Topic for 1980-81: Aristotle on Essence, Necessity, and Determinism. A study of Richard Sorabji's *Necessity, Cause, and Blame*.

612 Medieval Philosophy Spring. 4 credits.

R 3:45-5:45. N. Kretzmann.
Topic for 1980-81 to be announced.

[613 Modern Philosophers Not offered 1980-81.]

[619 History of Philosophy Not offered 1980-81.]

[631 Logic Not offered 1980-81.]

[632 Semantics Not offered 1980–81.]

[633 Philosophy of Language Not offered 1980–81.]

641 Ethics and Value Theory Fall. 4 credits.
T 3:45–5:45. J. Bennett.

Topic for 1980–81: Human goodness and economic justice. How conceptions of human goodness interact with theories of economic justice.

[661 Theory of Knowledge Not offered 1980–81.]

[662 Philosophy of Mind Not offered 1980–81.]

[664–665 Metaphysics Not offered 1980–81.]

[681 Philosophy of Science Not offered 1980–81.]

682 Philosophy of Social Science Spring.
4 credits.

T 3:45–5:45. R. Miller.
Topic for 1980–81: The logic of explanation in the social sciences.

700 Informal Study Fall or spring. Credit to be arranged. To be taken by graduate students only in exceptional circumstances and by arrangement made by the student with his or her special committee and the faculty member who has agreed to direct the study.
Staff.

Physics

101–102 General Physics 101, fall, except by special permission; 102, spring; may also be offered during summer session. 4 credits each term.

Prerequisites: three years of high school mathematics, including some trigonometry. Prerequisite for Physics 102: 101 or 112 or 207. Includes more modern physics and less mathematical analysis than Physics 207–208 or 112–213–214, but more mathematics than courses in Physics 201 to 205. Students planning to major in a physical science should elect Physics 207–208 or 112–213–214. A self-paced, mastery-oriented audiotutorial format; students work in a learning center at hours of their own choice. Repeated tests on each unit are given until mastery is demonstrated.

One large orientation meeting on T Sept. 2, 10:10 or 12:20 or W Jan. 21, 7:30 p.m. B. Richardson and staff.

Basic principles treated quantitatively but without calculus. Major topics for 101: Particle structure of matter; kinematics; forces and fields (including electric fields); momentum, angular momentum, energy (including nuclear energy); relativity; sound waves. 102: Electricity and magnetism; optics; thermal physics; quantum physics. Laboratory emphasizes instrumentation, measurement and interpretation of data. Text: *Physics for College Students — with Applications to the Life Sciences* by Tillye and Thumm.

112 Physics I: Mechanics and Heat Fall or spring; may also be offered during summer session. 4 credits. Primarily for students of engineering and for prospective physics majors. Prerequisite: coregistration in Mathematics 192 (or 194 or 112), or substantial previous contact with introductory calculus, combined with coregistration in Mathematics 191 (or 193 or 111).

Lecs, M W 10:10 or 12:20; 2 recs each week; one 2-hour lab alternate weeks. Evening exams: fall, Oct. 9, Nov. 20; spring, Feb. 26, April 3. Fall, P. Stern; spring, R. Littauer.

Mechanics of particles: kinematics, dynamics, special relativity, conservation laws, central force fields, periodic motion. Mechanics of many-particle

systems: center of mass, rotational mechanics of a rigid body, static equilibrium. Introduction to thermodynamics. At the level of *Physics* by Tipler.

201 Great Ideas of Physics Fall. 3 credits. Intended for nonscientists; does not serve as a prerequisite to further science courses. Assumes no scientific background, but may use some high school mathematics.

Lecs, M W F 2:30; disc to be arranged. H. Mahr. Topics include the nature of light and the interaction of light and matter, with applications such as lasers and holograms; also the concepts of energy and the arrow of time, with a discussion of solar and nuclear energy conservation.

202 Physics in the World Around Us Spring. 3 credits. Intended for nonscientists; does not serve as a prerequisite to further science courses. Assumes no scientific background, but may use some high school mathematics.

Lecs, M W F 2:30; disc to be arranged. H. Mahr. Basic principles of physics are used for the understanding of the universe at large as well as the submicroscopic world of elementary particles. Short discussions of the origin of life, relativity, and cosmology are included.

203 The Physics of Space Exploration Spring. 3 credits. Intended for nonscientists; does not serve as a prerequisite to further science courses. Assumes no scientific background, but may use some high school mathematics.

Lecs, M W F 2:30. E. Salpeter. The principles of physics (plus simple mathematics) are applied to gain knowledge about planets, stars, and galaxies. The physics behind space probes (and their limitations) is discussed. Interpretation of data from astronomical observations are described. The level of the course will be that of a typical article in *Scientific American* and of Pasachoff's *Astronomy Now*.

[204 Physics of Musical Sound Not offered 1980–81.]

205 Luck and Reason Fall. 3 credits. Limited to 25 students. Intended for nonscientists; does not serve as a prerequisite to further science courses. Assumes no scientific background, but will use some high school algebra.

Lecs, M W F 2:30; disc to be arranged. V. Ambegaokar. An attempt to explain how and when natural scientists can cope rationally with chance. Starting from simple questions (such as how one decides if an event — meeting someone with the same birthday, being dealt a bridge hand all in one suite — is "likely," "unlikely," or just incomprehensible) the course will attempt to reach an understanding of more subtle points: why it is, for example, that in large systems likely events can become overwhelmingly likely. From these last considerations, it may be possible to introduce the interested students in a nontrivial way to the second law of thermodynamics, that putative bridge between C. P. Snow's two cultures.

207–208 Fundamentals of Physics 207, fall; 208, spring. 4 credits each term. Prerequisites for Physics 207: high school physics plus coregistration in Mathematics 192 or 112, or substantial previous contact with introductory calculus, combined with coregistration in Math 191 or 111. Prerequisites for Physics 208: Physics 207 (or 112 or 101) and at least coregistration in Mathematics 192 or 112. Physics 207–208 is intended as the first college physics course for students majoring in a physical science, mathematics, or an analytically oriented biological science.

Lecs, M W 9:05 or 11:15; 2 recs each week; one 3-hour lab alternate weeks. Evening exams: fall, Oct. 9, Nov. 13; spring, Feb. 26, April 14. Fall, R. Cotts; spring, H. Newhall. Core-plus-branch plan. The first nine weeks of each semester are devoted to core material

(lec/discussion/lab format): 207, particle mechanics and waves; 208, electromagnetic fields and circuits. For the last five weeks each term, each student selects one branch topic and the work on this topic is done on an unstructured, self-paced basis. Possible branches: 207, thermodynamics, acoustics and the physics of music, special relativity, gravitation; 208 optics, introduction to quantum mechanics, nuclear physics, electronics. Core at the level of *Physics* by P. A. Tipler.

213 Physics II: Electricity and Magnetism Fall or spring; may also be offered during summer session. 4 credits. Primarily for students of engineering and for prospective physics majors. Prerequisites: Physics 112 and coregistration in the continuation of the mathematics sequence required for 112.

Lecs, T R 9:05 or 11:15; 2 recs each week; one 3-hour lab alternate weeks. Evening exams: fall, Oct. 2, Nov. 13, Dec. 4; spring, Feb. 26, Mar. 26, Apr. 30. Fall, J. Orear; spring, K. Berkelman. Electrostatics, behavior of matter in electric fields, magnetic fields, Faraday's law, electromagnetic oscillations and waves, magnetism. At the level of *Physics* by Tipler. Lab work supplements written and oral work: electrical measurements, dc and ac circuits, resonance phenomena.

214 Physics III: Optics, Waves, and Particles Fall or spring; may also be offered during summer session. 3 or 4 credits. Primarily for students of engineering and for prospective physics majors. Prerequisites: Physics 213 and coregistration in the continuation of the mathematics sequence required for 112. (Physics 310 may be taken, with permission of the instructor, in place of the Physics 214 lab and credit for 214 is reduced to 3 credits.)

Lecs, T R 9:05 or 11:15; 2 recs each week; one 3-hour lab alternate weeks. Evening exams: fall, Oct. 2, Nov. 13, Dec. 4; spring, Mar. 3, Mar. 26, Apr. 23. Fall, R. Richardson; spring, D. Holcomb. Wave phenomena; electromagnetic waves; physical optics; quantum effects, matter waves; uncertainty principle; introduction to wave mechanics, elementary applications.

217 Physics II: Electricity and Magnetism Fall or spring. 4 credits. Intended for students who have done very well in Physics 112 and desire a more analytic treatment than that of Physics 213. Prospective physics majors are encouraged to select Physics 217. Prerequisites: permission of the instructor and approval of the student's adviser before course enrollment. Prerequisites also include a knowledge of the fundamentals of electricity and magnetism and a good mathematical background, including the use of vector calculus.

Lecs, T R S 11:15; rec. T 3:35; lab, R 1:30–4:30. Evening exams may be scheduled. Fall, K. Wilson. A more rigorous version of Physics 213, at the level of *Electricity and Magnetism* by Purcell (Vol II, Berkeley Physics Series).

218 Physics III: Optics, Waves, and Particles Fall or spring. 3 or 4 credits. A special section of Physics 214. Conditions governing enrollment are similar to those of Physics 217. Students are required to do the lab work offered in 214 or to enroll concurrently in Physics 310 (in which case credit for Physics 218 is reduced to 3 credits).

Lecs, T R S 11:15; sec T 2:30; lab, see Physics 214 or 310. Evening exams may be scheduled. Fall, K. Berkelman; spring, J. Orear.

310 Intermediate Experimental Physics Fall or spring. 3 credits. Prerequisite: Physics 208 or 213. May be taken concurrently with 214 or 218 in place of the lab work offered in Physics 214, with permission of student's adviser.

Labs, R F 1:25–4:25. P. Hartman and staff. Students select from a variety of experiments and may work on experiments of their own design if equipment is available. An individual, independent approach is encouraged. Facilities of the Physics 410 lab are available for some experiments.

315 Phenomena of Microphysics Fall or spring. 3 credits. Primarily for students of engineering and prospective majors in physics. Prerequisites: Physics 214 and Mathematics 294.

Fall: lec, M W F 9:05; E. Siggia. Spring: T R S 11:15; J. Scott.

Introduction to the physics of atoms, solids, and nuclei, emphasizing the description of phenomena using the results of elementary quantum and statistical physics. At the level of *Introduction to Modern Physics* by Richtmyer, Kennard, and Cooper.

318 Analytical Mechanics Spring. 4 credits. Prerequisites: Physics 208 or 214 plus one of Mathematics 421, 422, or 423, or permission of instructor. Intended for physics majors concentrating in physics. Similar material is covered in Physics 431 at a less demanding analytical level. (Applied and Engineering Physics 333 is approximately equivalent.)

Lecs, M 11:15–1:15, W F 11:15. R. Cotts. Newtonian mechanics of particles and systems of particles including rigid bodies; oscillating systems; gravitation and planetary motion; moving coordinate systems, relativistic kinematics; wave propagation; Euler's equations; Lagrange's equations; Hamilton's equations; normal modes and small vibrations. At the level of *Classical Dynamics* by Marion.

325 Electricity and Magnetism Fall. 4 credits. Prerequisites: Physics 208 or 214 plus coregistration in one of Mathematics 421, 422, or 423, or permission of instructor. Intended for physics majors concentrating in physics. Similar material is covered in Physics 432 at a less demanding analytical level.

Lecs, T R S 11:15, R 1:25. B. Gittelman. Electrostatics: electric charge and fields, potential, multipoles, conductors, Laplace equation and formal solutions, field energy, dielectric materials, polarization. Magnetostatics: currents, magnetic fields and vector potential, magnetic materials, field energy. Maxwell's equations, Poynting vector. Electrodynamics: plane waves, fields from moving and oscillating charges. At the level of *Lectures on Physics* Vol. II by Feynman and *Foundations of Electromagnetic Theory* by Reitz and Milford.

326 Electromagnetic Waves and Physical Optics Spring. 4 credits. Prerequisite: Physics 325.

Lecs, T R S 9:05, W 1:25. A. Sievers. Electrodynamics: applications of Maxwell's equations, wave equation, transmission lines, wave guides, radiation, special relativity. Physical optics: reflection, refraction, dispersion, polarization, Fresnel and Fraunhofer diffraction. At the level of *Classical Electromagnetic Radiation* by Marion.

330 Modern Experimental Optics Spring. 3 credits. Prerequisite: one year of physics.

Lec, M 2:30; lab, T W R or F 1:25–4:15. A practical, lab-based course for students of physical and biological sciences. Students select four or five subject units to match their interests and backgrounds. The units include: physics of lasers, image formation, holography, spectroscopy, light pulses, coherence and correlation, diffraction and interference, light sources and detectors. Each unit involves one or more experiments from a set of varying difficulty and sophistication, and readings, supplementary notes, and problems. An introduction to modern optical techniques and equipment used in current research in such fields as biology, chemistry, physics and astronomy.

341 Thermodynamics and Statistical Physics Fall. 4 credits. Prerequisites: Physics 214 and Mathematics 294.

Lecs, T R S 9:05, T 2:30. D. Lee. Statistical physics, developing both thermodynamics and statistical mechanics simultaneously. Concepts of temperature, laws of thermodynamics, entropy, thermodynamics relations, free energy. Applications to phase equilibrium, multicomponent systems, chemical reactions and thermodynamic cycles.

Application of statistical mechanics to physical systems; introduction to treatment of Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics with applications. Elementary transport theory. At the level of *Fundamentals of Statistical and Thermal Physics* by Reif or *Thermal Physics* by Morse.

360 Introductory Electronics (also Engineering A&E 363) Fall or spring. 4 credits. Prerequisite:

Physics 208 or 213 or permission of instructor; no previous experience with electronic circuits is assumed; however, the course moves through the introductory topics (dc and ac circuits, basic circuit elements) rather quickly. Students wishing a somewhat slower-paced treatment might consider taking Electrical Engineering 210 before Physics 360. Lec, M 2:30–4:25; labs, T R or W F 1:25–4:25. Fall, H. Newhall; spring, A. Kuckes.

Basic analysis and design of semiconductor circuits useful in electronic instrumentation, such as amplifiers; oscillators and waveform generators; switching, digital, and timing circuits; power supplies. The level is that of *Electronic Measurements for Scientists*, by Malmstadt, Enke, and Crouch. This text is not followed in detail and is not required reading.

400 Informal Advanced Laboratory Fall or spring; may also be offered during summer session. Variable credit. Prerequisite: two years of physics and permission of instructor.

Lab, see Physics 410. Experiments of widely varying difficulty in one or more areas, as listed under Physics 410, may be done to fill the student's special requirements.

410 Advanced Experimental Physics Fall or spring. 4 credits. Limited to seniors except by special permission. Prerequisites: Physics 214 (or 310 or 360) plus 318 and 325, or permission of instructor.

Lec, M 2:30–4:25; labs, T W 1:25–4:25. Fall, J. C. Scott and staff; spring, S. Gregory and staff. Selected topics in experimental concepts and techniques. About seventy different experiments are available in mechanics, acoustics, optics, spectroscopy, electrical circuits, electron and ion physics, heat, X rays and crystal structure, solid-state physics, cosmic rays, and nuclear physics. The student performs three to six diverse experiments, depending on difficulty, selected to meet individual needs and interests. Independent work is stressed.

431–432 Introductory Theoretical Physics I and II 431, fall; 432, spring. 4 credits each term.

Prerequisites: Physics 431 and 207–208 plus Mathematics 294 or equivalent and Mathematics 431 and 432 or equivalent; or permission of instructor. Primarily for physics majors with concentrations outside physics, and for graduate students in a science other than physics (such as chemistry, engineering, biology, geology). Physics 318 and 325 cover similar material at a higher analytical level, and are intended for physics majors concentrating in physics.

Lecs, M W F 11:15 and F 1:25. Fall, K. Gottfried; spring, R. Talman. 431: Mechanics. Includes Newtonian mechanics, Lagrange's and Hamilton's equations, central forces, rigid-body motion, and small oscillations. At the level of *Classical Dynamics* by Marion. 432: Electricity and magnetism. Includes electrostatics, magnetostatics, boundary value problems, dielectric and magnetic media, circuit theory. Maxwell's equations and electromagnetic waves. At the level of *Electricity and Magnetism*, third ed., by Bleaney and Bleaney.

443 Introductory Quantum Mechanics Fall. 4 credits. Prerequisites: Physics 318 and 325, or 431–432; Physics 315, and Mathematics 421; or permission of instructor.

Lecs, M W F 9:05, M 3:35. A. Sievers. Introduction to concepts and techniques of quantum mechanics, at the level of *Introduction to Quantum Mechanics*, by Dicke and Wittke.

444 Nuclear and High-Energy Particle Physics Spring. 4 credits. Prerequisite: Physics 443 or permission of instructor.

Lecs, M W F 9:05, F 1:25. M. Gilchriese. Behavior of high-energy particles and radiation; elementary particles; basic properties of nuclei; nuclear reactions; nuclear forces; cosmic rays; general symmetries and conservation laws. At the level of *Subatomic Physics* by Frauenfelder and Henley.

454 Introductory Solid-State Physics Spring. 4 credits. Prerequisite: Physics 443 or Chemistry 793, or permission of instructor.

Lecs, T R S 10:10, R 3:35. An introduction to modern solid-state physics, including lattice structure, lattice vibrations, thermal properties, electron theory of metals and semiconductors, magnetic properties, and superconductivity. At the level of *Introduction to Solid State Physics*, fifth edition, by C. Kittel.

464 Physics of Macromolecules Spring. 3 credits. Prerequisite: a course in quantum mechanics.

T R 10:10; disc or guest lecturer T 2:30. P. Champion. An introduction to the physics associated with the models for and the experimental investigation of the structure and physical properties of macromolecules. Primary emphasis will be on macromolecules of biological interest.

481–489 Special Topics Seminar Spring. 2 credits. Limited to senior physics majors and those who receive permission of instructor. S-U grades only. Hours to be arranged.

One selected topic of current interest is studied. Students participate in organization and presentation of material.

490 Independent Study in Physics Fall or spring. 1–3 credits. Ordinarily limited to seniors. Prerequisite: permission of professor who will direct proposed work. Individual project work (reading or laboratory) in any branch of physics.

500 Informal Graduate Laboratory Fall or spring. Variable credit.

506 Design of Electronic Circuitry Spring. 3 credits.

M W 9:05. D. Hartill. Circuit techniques and design in electronic measurement and instrumentation with emphasis on applications to physics experiments. At the level of *Integrated Electronics* by Millman and Halkias.

510 Advanced Experimental Physics Fall or spring. 3 credits.

Labs, T W 1:25–4:25. Fall, J. C. Scott and staff; spring, S. Gregory and staff. About seventy different experiments are available in mechanics, acoustics, optics, spectroscopy, electrical circuits, electronics and ionics, heat, x rays, crystal structure, solid-state, cosmic rays, nuclear physics. Students perform four to eight experiments selected to meet individual needs. Independent work is stressed.

520 Projects in Experimental Physics Fall or spring. 1–3 credits. To be supervised by faculty member. Projects of modern topical interest that involve some independent development work by student. Opportunity for more initiative in experimental work than is possible in Physics 510.

551 Classical Mechanics Fall. 3 credits.

Lecs, T R S 10:10. J. Krumhansl. Lagrangian and Hamiltonian formulation of classical mechanics and modern applications in nonlinear dynamics. The foundations will be taught at the level

of the Landau and Lifshitz's tract on mechanics, together with selected portions from V. I. Arnold, *Mathematical Methods of Classical Mechanics*. Approximately the latter third of the course will be directed at questions of stability and stochasticity in nonlinear systems and nonlinear waves such as solitons.

553-554 General Relativity (also Astronomy 509-510) 553, fall; 554, spring. 4 credits. Prerequisite: knowledge of special relativity at the level of *Classical Mechanics*, by Goldstein. Offered alternate years.

Fall: lecs, T R 8:30-9:55. Spring: lecs, T R 10:10-11:35. S. Teukolsky.
553 is a systematic introduction to Einstein's theory, with emphasis on modern coordinate-free methods of computation. Topics include review of special relativity, modern differential geometry, foundations of general relativity, laws of physics in the presence of a gravitational field, experimental tests of gravitation theories. At the level of *Gravitation* by Misner. 554 is a continuation of 553 that emphasizes applications to astrophysics and cosmology. Topics include relativistic stars, gravitational collapse and black holes, gravitational waves, cosmology.

561 Classical Electrodynamics Fall. 3 credits. Lecs, M W F 10:10. D. Yennie.
Maxwell's equations, electromagnetic potentials, electrodynamics of continuous media (selected topics), special relativity, radiation theory. At the level of *Classical Electrodynamics* by Jackson.

562 Statistical Mechanics (also Chemistry 796) Spring. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 793 or equivalent. Lecs, T R 8:30-9:55. M. E. Fisher.
Thermodynamic assemblies; Legendre transformation. Ergodic and information theory ideas. Ensembles and partition functions; equivalences and fluctuations; indistinguishability. Thermodynamic properties of ideal gases and crystals; Third Law; chemical equilibria. Imperfect gases; correlation functions and their applications. Ideal quantum gases; Bose-Einstein condensation. Ideal paramagnets. Ising models and lattice gases. At the level of Kubo's *Statistical Mechanics*.

572 Quantum Mechanics I Fall or spring. 4 credits. Lecs, M W F 11:15. Fall, D. Mermin; spring, T. Yan.
The formulation of quantum mechanics in terms of states and operators. Symmetries and the theory of angular momentum. Stationary and time-dependent perturbation theory. Fermi's golden rule, and variational methods. The elements of scattering theory. At a level between *Quantum Mechanics* by Merzbacher and *Quantum Mechanics* by Landau and Lifshitz. Familiarity with elementary aspects of the Schroedinger equation is assumed, including its application to simple systems such as the hydrogen atom.

574 Quantum Mechanics II Spring. 4 credits. Required of all Ph.D. majors in theoretical physics. Lecs, M W F 11:15. V. Ambegaokar.
Discussion of various applications of quantum mechanics, such as collision theory, theory of spectra of atoms and molecules, theory of solids, emission of radiation, relativistic quantum mechanics. At the level of *Intermediate Quantum Mechanics* by Bethe and Jackiw.

612 Experimental Atomic and Solid-State Physics Fall. 3 credits. Lecs, M W F 1:25. S. Gregory.
Lectures on techniques and design principles, emphasis on study of solids by their interactions with electromagnetic fields. Topics: sources and detectors, scanning and resonance techniques, signal processing, sample characterization, environmental control.

[614 Experimental High-Energy Physics Not offered 1980-81.]

635 Solid-State Physics I Fall. 3 credits. First semester of a two-semester sequence of solid-state physics for graduate students who have had the equivalent of Physics 572 and 562. Lecs, T R S 11:15. N. Ashcroft.
Electronic and phonon properties of metals and insulators, including transport processes. Discussions at the level of *Solid State Physics* by N. W. Ashcroft and N. D. Mermin.

636 Solid-State Physics II Spring. 3 credits. Lecs, T R 2:30-4
Concepts developed in Physics 635 are extended and applied in a survey of the following: band theory and Fermi surface in metals, localized states, magnetism, neutron and light scattering, phenomenological superconductivity, and other topics of current-interest in condensed-matter physics.

645 High-Energy Particle Physics Fall. 3 credits. Lecs, M W F 11:15. J. Lee-Franzini.
Introduction to the physics of nucleons and mesons. Strong, electromagnetic, and weak interactions. Relevance of symmetry laws to particle physics. Introduction to the quark model. Unification of weak and electromagnetic interactions. At the level of *Introduction to High Energy Physics* by Perkins.

646 High-Energy Particle Physics Spring. 3 credits. Lecs, M W F 11:15. B. Gittelman.
Topics of current interest, including hadron electroproduction, electron positron annihilation, and high-energy neutrino reaction, are surveyed. Lectures and reading material are at the level of *High Energy Hadron Physics* by Perl. Students share in leading the discussions.

Only S-U grades will be given in courses numbered 650 or above.

651 Advanced Quantum Mechanics Fall. 3 credits. Lecs, M W F 10:10. M. Peskin.
Relativistic quantum mechanics with emphasis on perturbation techniques. Extensive applications to quantum electrodynamics. Introduction to renormalization theory. At the level of *Relativistic Quantum Mechanics* by Bjorken and Drell.

652 Quantum Field Theory Spring. 3 credits. Lecs, M W F 10:10. D. Yennie.
Canonical field theory, model field theories, Green's functions, renormalization. Introduction to analytic properties of scattering amplitudes and dispersion relations. Applications to strong interactions. At the level of *Relativistic Quantum Fields* by Bjorken and Drell.

653 Statistical Physics Fall. 3 credits. Normally taken by students in their second or later years. Prerequisites: competence in the basic principles of quantum mechanics, statistical mechanics, and thermodynamics. Lecs, M W F 9:05. M. Fisher.
Survey of topics in modern statistical physics including the theory of simple classical and quantum fluids; the theory of ordered systems such as superfluids and superconductors; kinetic theory and the Boltzmann equation; phenomenological Fermi liquid theory and hydrodynamics; theories of inhomogeneous systems. The contents of the course vary with the current interests of the instructor. There is rarely any set text, though *Statistical Physics* by Landau and Lifshitz gives an idea of the level.

654 Theory of Many-Particle Systems Spring. 3 credits. Prerequisites: Physics 562, 574, 635, 636, and 653. Lecs, T R 10:10-11:35. E. Siggia.
Equilibrium and transport properties of microscopic systems of many particles studied at zero and finite temperatures. Thermodynamic Green's function

techniques introduced and applied to such topics as normal and superconducting Fermi systems, superfluidity, magnetism, insulating crystals.

661 High-Energy Phenomena Fall. 3 credits. Lecs, M R F 3:35. T. M. Yan.
Topics vary at the discretion of the instructor.

665 Topics in Theoretical Astrophysics (also Astronomy 555) Lecs, M W F 2:30. E. Salpeter.
Usually concentrates on the theory of the interstellar medium.

[667 Theory of Stellar Structure and Evolution (also Astronomy 560) Usually offered during the fall term of odd calendar years. Not offered 1980-81.]

681-689 Special Topics Offerings are announced each term. Typical topics are: group theory, analyticity in particle physics, weak interactions, superfluids, stellar evolution, plasma physics, cosmic rays, general relativity, low-temperature physics, x-ray spectroscopy or diffraction, magnetic resonance, phase transitions and the renormalization group.

690 Independent Study in Physics Fall or spring. Variable credit.
Special graduate study in some branch of physics, either theoretical or experimental, under the direction of any professional member of the staff.

Polish

See Modern Languages, Literatures, and Linguistics, p. 92.

Portugese

See Modern Languages, Literatures, and Linguistics, p. 92.

Psychology

101 Introduction to Psychology: The Frontiers of Psychological Inquiry Fall. 3 credits. Students may not receive credit for both Psychology 101 and Education 110. Students who would like to take a discussion seminar should also enroll in Psychology 103.
M W F 10:10. J. Maas.

The study of human behavior. Topics include sleep and dreaming, brain control, psychological testing, perception, learning, motivation, abnormal behavior, psychotherapy, social psychology, and other aspects of applied psychology. Emphasis is on developing skills to critically evaluate claims made about human behavior.

103 Introductory Psychology Seminars Fall. 1 credit. Prerequisites: none but concurrent enrollment in Psychology 101 required. Limited to 400 students.
Hours to be arranged; 32 different time options. Staff.

A weekly seminar that may be taken in addition to Psychology 101 to provide an in-depth exploration of selected areas in the field of psychology. Involves extensive discussion and a term paper related to the seminar topic. Choice of seminar topics and meeting times will be available at fall registration.

123 Introduction to Psychology: Biopsychology Fall. 3 credits. May not be taken for credit by students who are registered in or have completed one or more courses offered by the Section of Neurobiology and

Behavior of the Division of Biological Sciences, or two or more biopsychology courses.

T R 9:05; sec to be arranged. E. Adkins, D. Regan, and staff.

A survey of behavior emphasizing evolutionary and physiological approaches, designed to introduce students to the interface between biology and psychology. Both human and nonhuman behavior is included, together with theoretical issues pertaining to the application of biological principles to human behavior. Films, discussion.

[128 Understanding Personality and Social Behavior Spring. 4 credits. Limited to 450 students. M W F 10:10, sec to be arranged. Staff. Not offered 1980-81.]

190 Thought and Intelligence Spring. 4 credits. Open to juniors and seniors in any field, or to freshmen and sophomores who have had at least one course in psychology.

M W F 9:05. Staff.

The concepts underlying the measurement of intelligence and the problems involved in interpreting such measurements are considered in the context of psychological studies of problem solving and thinking. Topics include: introspective accounts of thought, experiments on problem solving and concept formation, cross-cultural studies of thinking, the history of the concept of intelligence, reliability and validity of tests, heritability of intelligence, and recent relevant research.

[201 Introduction to Psychology as a Laboratory Science Fall. 3 credits. Prerequisite: one course in psychology (normally Psychology 101, 123, 128, or 190). High school credit in psychology may meet this prerequisite with permission of instructor. Staff. Not offered 1980-81.]

205 Perception Fall. 3 credits. Limited to 65 students.

M W F 10:10. J. Cutting.

Basic concepts and phenomena in the psychology of perception, with emphasis on the stimulus variables and sensory mechanisms involved. Visual and auditory perception are discussed in detail, and some attention is paid to other senses.

206 Psychology in Business and Industry (also Hotel Administration 314) Fall. 3 credits. Limited to 35 psychology students. Prerequisites: Psychology 101, 123, 128, or 190, or permission of instructor. Not recommended for upperclass students in ILR.

T 12:20, R 12:20-2. S. Davis.

The principles of psychology applied to industrial and business systems; personnel selection; placement and training; problems of people at work including evaluation, motivation, efficiency, and fatigue; and the social psychology of the work organization.

[207 Motivation Theory: Contemporary Approaches and Applications Fall. 4 credits. Prerequisite: an introductory psychology course; Psychology 201 is recommended but not required. Offered alternate years. Not offered 1980-81; next offered 1981-82.

T R 10:10-12:05; periodic demonstration-discussion sections. A. W. Boykin.

Models and research in human motivation are examined and integrated. Traditional approaches are used as departure points for the study of more current themes, such as intrinsic motivation and achievement motivation. Attention is given to how pertinent various themes are to real-life behavioral settings.]

209 Developmental Psychology Spring. 4 credits. Prerequisite: an introductory psychology course.

M W F 9:05; sec to be arranged. F. Keil.

A comprehensive introduction to current thinking and research in developmental psychology. Topics include perceptual and cognitive development in infancy and childhood, attachment, language development, Piagetian theory and research, moral development, cross-cultural perspectives, and socialization.

214 Introduction to Cognitive Psychology Fall. 3 credits. Prerequisite: one course in psychology.

T R 10:10-11:25. A. Walker.

An introduction to psychology emphasizing the perceptual and cognitive processes that underlie human behavior. The course is designed to introduce the student to topics such as perception, memory, language, thinking, development, problem solving, and decision making, and to discuss techniques for investigating problems in these areas.

[215 Introduction to Linguistics and Psychology

Fall. 3 or 4 credits. The 4-credit option involves a laboratory project or paper. Open to first-year students by permission of instructor. T R 12:20-2:15. Staff. Not offered 1980-81.]

275 Introduction to Personality Psychology Fall. 3 or 4 credits; the additional (or fourth) credit is given for attendance at the optional section meeting and the term paper. Prerequisite: an introductory psychology course.

T R 10:10-11:35; sec to be arranged. D. Bem.

An introduction to research and theory in personality psychology, emphasizing contemporary approaches. Topics include the dynamics, structure, and assessment of personality as well as personality development and change. Biological and sociocultural influences on personality are also considered.

277 Psychology of Sex Roles (also Women's Studies 277 and Sociology 277) Spring. 3 or 4 credits. Prerequisite: an introductory psychology course.

T R 10:10-11:30. S. Bem.

The course addresses the question of why and how adult women and men come to differ in their overall life styles, work and family roles, personality patterns, cognitive abilities, etc. This broad question is examined from five perspectives: (a) the psychoanalytic perspective, (b) the biological perspective, (c) the historical and cultural evolutionary perspective, (d) the child development perspective, and (e) the social-psychological and contemporaneous perspective. Each of these perspectives also bears on more specialized phenomena relating to the psychology of sex roles, including psychological androgyny, women's conflict over achievement, the male sex role, equalitarian marriage relationships, female sexuality, homosexuality, and transsexualism.

280 Introduction to Social Psychology (also Sociology 280) Spring. 3 or 4 credits. Prerequisite: an introductory psychology course.

T R 10:10-11:25. D. Bem.

An introduction to research and theory in social psychology. Topics include human processing of social information; social influence, persuasion, and attitude change; social interaction and group phenomena. The application of social psychological knowledge to current social problems will also be discussed. (The additional (or fourth) credit is given for attendance at the optional section meeting, and the term paper.)

281 Interpersonal Relations and Group Processes (also Sociology 281) Fall. 4 credits.

Lec, M W F 11:15; lab-disc, two-hour period to be arranged. L. Meltzer.

Shyness and assertiveness, productive and defensive communication, participation and alienation, conflict and harmony, social pressures, group decision-making, leadership, group emotionality, nonverbal communication, and social skills. The laboratory will involve the class in self-study exercises. Students also work outside of class, in groups of four or five, on a term project having two aspects: research on one of the above topics and self-study of the group processes which occur during the conduct of the project. The combination throughout the course of academic and

experiential approaches should develop sensitivity to group processes and to the effects we ourselves have on other persons.

289 Conformity and Deviance (also Sociology 289) Fall. 4 credits. Prerequisites: one course in psychology or sociology.

T R 2:30. R. Kraut.

What are the ways in which conformity pressures, in all their variations, can lead to deviance? To attempt an answer we will examine some of the conformity bases for run-of-the-mill, normal behavior, and then use the concepts developed to illuminate such behavior as mob violence, suicide, juvenile crime, and craziness.

[303 Learning Spring. 3 credits. Prerequisite: Psychology 201 or a 300-level laboratory course in psychology. T R 9:05. Staff. Not offered 1980-81.]

305 Visual Perception Fall. 3 or 4 credits depending on whether the student chooses to do an independent laboratory project. Prerequisite: 205 or permission of instructor.

T R 10:10. C. Krumhansl.

A detailed examination of theories and processes in visual perception. Topics will include the perception of color, space, and motion; perceptual constancies; adaptation; pattern perception; and aspects of perceptual learning and development.

[308 Perceptual Learning Fall. 3 credits. Prerequisite: Psychology 205 or 209 or 305 or permission of instructor. Not offered 1980-81.]

309 Development of Perception and Attention

Spring. 3 credits. Prerequisite: Psychology 205, 209, 214, 305, or permission of instructor. Not offered 1981-82.

M W F 10:10. A. Walker.

An ecological view of perceptual development: development of perception of objects, events, the spatial layout, pictures, and symbols. The level of the course is that of E. J. Gibson, *Perceptual Learning and Development*.

313 Perceptual and Cognitive Processes Spring. 3 credits. Prerequisite: Psychology 205 or 214, or permission of instructor.

T R 10:10-11:40. Staff.

Survey of research and theory in the area of perceptual and higher mental processes. Emphasis is on the human as an information processing system. Topics include visual information processing, pattern recognition, cognition, memory, and artificial intelligence.

314 The Social Psychology of Language Spring. 4 credits. Prerequisite: a course in linguistics or psycholinguistics and in social or personality psychology, or permission of instructor.

T R 2:30-4:25. H. Levin.

We are aware that one talks differently to children than to adults, to foreigners than to native speakers, to people we like than to those we detest, to people whose intelligence we respect compared to those we think are idiots. Speech varies by social setting, by the relationships between people, and by formality, friendship, affection; and purposes of the communication: deception, persuasion, propaganda, etc. What are the rules of social language? How do we acquire the abilities to vary language appropriately and to understand the meanings of such variations? We will attend not only to what is said but to the style of the language: for example, to paralanguage (e.g., intonation, hesitations, etc.) and to the structure (grammar and semantics) of speech.

316 Auditory Perception Spring. 3 or 4 credits (the 4-credit option involves a laboratory project or paper). Prerequisites: Psychology 205, 209, 214, or 215 (other psychology, linguistics, or biology courses could serve as prerequisite with permission of the instructor).

Lecs, T R 2:30–4:25; lab, hours to be arranged.
Staff.

Basic approaches to the perception of auditory information, with special consideration of complex patterns such as speech, music, and environmental sounds.

322 Hormones and Behavior (also Biological Sciences 322) Spring. 3 or 4 credits. (The 4-credit option involves a one-hour section once a week. Students will be expected to participate in discussion and read original papers in the field.) Prerequisites: one year of introductory biology plus a course in psychology or Biological Sciences 321. Limited to juniors and seniors; open to sophomores only by permission.

T R 10:10–11:30. E. Adkins and R. Johnston.
The relationship between endocrine and neuroendocrine systems and the behavior of animals, including humans. Major emphasis is on sexual, parental, and aggressive behavior.

324 Biopsychology Laboratory (also Biological Sciences 324) Spring. 3 credits. Limited to 25 juniors and seniors. Prerequisites: Psychology 201 or Biological Sciences 103–104 or Psychology 123 or Biological Sciences 321, and permission of instructor. S-U grades optional.

T R 1:25–4:25. Staff.
Experiments designed to provide research experience in animal behavior (including learning) and its neural and hormonal mechanisms. A variety of techniques, species, and behavior patterns are included.

325 Introductory Psychopathology Fall. 3 or 4 credits (the 3-credit option entails lectures, readings, and two exams; the 4-credit option requires an additional seminar-recitation meeting and a term paper). Enrollment in Psychology 327 is limited. Prerequisite: a course in introductory psychology. May be taken concurrently with Psychology 327 (for 3 credits in 325 and 2 credits in 327) with permission of instructor.

T R 12:20–2:15. R. Mack.
A survey of the various forms of psychopathology, child and adult, as they relate to the experiences of human growth and development. Presents a description of the major syndromes, investigations, theories of etiology, and approaches to treatment.

326 Biopsychology of Animal Behavior Fall. 4 credits. Prerequisite: Psychology 123 or an introductory biology course. Offered alternate years.

T R 2:30–4:25. Staff.
Causation, development, and evolution of behavior in animals, primarily birds and mammals. Content areas include communication and social behavior, courtship and mating, aggression, parental behavior, imprinting, and socialization.

327 Fieldwork in Psychopathology and the Helping Relationship Fall. 2 credits. Prerequisites: Psychology 325 or concurrent registration in 325 and permission of the instructor. Students do not enroll in advance for this course. Field placement assignments are made in Psychology 325 during the first two weeks of the semester. Students who have already taken Psychology 325 must contact the instructor during the first week of the semester. Enrollment is limited by the fieldwork placements available. Fee, \$20.

Hours to be arranged. R. Mack.
An introductory fieldwork course for students currently enrolled in, or who have taken, Psychology 325. In addition to fieldwork, weekly supervisory/seminar meetings are held to discuss fieldwork issues and assigned readings.

328 Continuing Fieldwork in Psychopathology and the Helping Relationship Fall or spring. 2 credits each term. Prerequisites: Psychology 325, 327, and permission of instructor. S-U grades only. May not be taken more than twice. Students do not

enroll in advance for this course. Students in Psychology 327 should inform their teaching assistant before the end of the semester of their desire to take Psychology 328. Students not currently in a field placement who want to take Psychology 328 should contact the instructor during the first week of the semester. Field placement assignments will be made during the first two weeks of the semester. Enrollment is limited by the fieldwork placements available. Fee, \$20.

Fieldwork and supervisory times to be arranged.
R. Mack and staff.
Designed to allow students who have begun fieldwork as part of Psychology 327 to continue their field placements, under supervision and for academic credit. A limited number of students may be allowed to begin their fieldwork with Psychology 328 but only with permission of the instructor.

[345 Afro-American Perspectives in Experimental Psychology (also Africana Studies 345)] Spring. 3 or 4 credits. Prerequisite: introductory course in psychology or AS&RC 171. Offered alternate years. Not offered 1980–81; next offered 1981–82.

T R 2:30–4:25, plus one hour to be arranged if taken for 4 credits. A. W. Boykin.
Designed to examine crucial conceptual, empirical, and philosophical issues in experimental psychology that are directly relevant to Afro-Americans. Traditional approaches are probed and evaluated. Alternative thrusts from a black perspective are entertained and critiqued. Finally, the research process is evaluated as a potential tool for analysis and action in black communities.]

350 Statistics and Research Design Fall. 4 credits. Prerequisite: a course in the behavioral sciences.

M W F 10:10. R. Darlington.
Devoted about equally to elementary applied statistics — both estimation and hypothesis testing — through two-way analysis of variance, and to general problems in the design and analysis of research projects.

361 Biochemistry and Human Behavior (also Nutritional Sciences 361) Fall. 3 credits. Prerequisites: Biological Sciences 101–102, Chemistry 103–104, Psychology 123, or permission of instructor.

M W F 11:15. D. Levitsky.
The course is intended to survey the scientific literature on the role of the brain and body biochemical changes as determinants of human behavior. The topics covered include action and effects of psychopharmacologic agents, biochemical determinants of mental retardation, biochemical theories of psychosis, effects of nutrition on behavior. A fundamental knowledge of human biology and chemistry is essential.

381 Person Perception and Impression Management (also Sociology 381) Spring. 4 credits. Limited to 25 students. Prerequisite: one course in social psychology.

T R 10:10–12:05. R. Kraut.
How do we learn about other people and influence what they learn about us? Person perception, attribution theory, impression management, and nonverbal communication are relevant topics. Seminar format.

383 Social Interaction (also Sociology 383) Spring. 4 credits. Prerequisite: a course in social psychology.

T R 2:30–4:30. D. Hayes.
Analysis of social behavior episodes, their detailed structure, and changes. Materials include chronobiological, ethnomethodological, and nonverbal interactional considerations. Extensive practice in analysis of filmed and taped interactions required.

384 Cross-cultural Psychology (also Sociology 384) Fall. 4 credits. Prerequisites: a course in psychology and one in either sociology or social or cultural anthropology; or permission of instructor.

M W F 12:20. W. W. Lambert.
A critical survey of approaches, methods, discoveries, and applications in emerging attempts to study human nature, experience, and behavior cross-culturally. Focus on studies of cognition, values, socialization, sociolinguistics, personality, attitudes, stereotypy, ideology, sociocultural development, and mental illness.

[385 Theories of Personality (also Sociology 385)] Spring. 4 credits. Prerequisite: Psychology 101, 128, 214, or 275, or permission of instructor. Not offered 1980–81.

M W F 12:20. W. Lambert.
An intermediate analysis of comparative features of the historically and currently important theories of personality, with an evaluation of their systematic empirical contribution to modern personality study, to psychology and to other behavioral sciences.]

[386 Human Ethology Spring. 4 credits. Prerequisites: a course in social psychology or animal social behavior or permission of instructor. Offered alternate years. Not offered 1980–81.

T R 2:30–4. R. Kraut and R. Johnston.
Biological and other approaches to human social behavior will be examined using naturalistic observation techniques. One emphasis will be on parallels between nonhuman vertebrates and humans. Topics include nonverbal communication, use of space, bonding, and interaction rituals.]

396 Introduction to Sensory Systems (also Biological Sciences 396) Spring. 3 credits. Prerequisites: an introductory course in biology or biopsychology, plus a second course in neurobiology and behavior or perception or cognition or biopsychology. Students will be expected to have elementary knowledge of perception, neurophysiology, and chemistry. S-U grades optional for graduate students only. No auditors. Offered spring 1981; next offered spring 1983 and each spring term thereafter.

T R 9:05; one-hour discussion to be arranged.
B. Halpern.
Both those characteristics of sensory systems which are common across living organisms and those sensory properties which represent adaptations of animals to particular habitats or environments will be studied. The principles and limitations of major methods used to examine sensory systems will be considered. Behavioral, including psychophysical, biophysical, neurophysiological, and anatomical, methods will usually be included.

402 Current Research on Psychopathology Spring. 4 credits. Prerequisite: Psychology 325.

T R 12:50–2:15; sec to be arranged. Staff.
Current research and theory on the nature and etiology of schizophrenia, the affective disorders, and psychopathy. Approaches from various disciplines are considered. Minimal attention to psychotherapy.

407 Selected Issues in Human Motivation Fall. 4 credits. Limited to 20 students. Prerequisites: 207 or 10 credits in psychology, and permission of instructor.

T 2–4:25. A. W. Boykin.
An in-depth probe of selected contemporary topics in the field of human motivation, such as motivation and academic achievement, intrinsic motivation, motivation in cognitive development. The course will combine instructor lectures and student presentations. Special topic for fall 1980: Intrinsic motivation.

410 Undergraduate Seminar in Psychology Fall or spring. 2 credits. Written permission of section instructor required for registration. Nonmajors may be admitted but psychology majors are given priority.

Hours to be arranged. Staff.
Information on specific sections for each term, including instructor, prerequisites, and time and place may be obtained from the Department of Psychology Office, 211 Uris Hall.

411 Memory and Human Nature Fall. 4 credits. Limited to 20 students. Prerequisite: Psychology 201 or 214 or permission of instructor.
T R 2:30-4. Staff.

Memory and other cognitive activities are considered in their natural and social context. Laboratory studies of memory are reviewed to the extent that they help us to understand ordinary mnemonic activities. Specific topics include memory for remote events and for one's childhood; for controversial and unacceptable material; for stories and conversations; for events; individual, developmental, and cultural differences in memory; effects of schooling and of specific skills.

416 Psychology of Language Fall. 4 credits. Prerequisite: Psychology 215 or permission of instructor.
M W F 9:05. F. Keil.
An advanced treatment of the nature of the human capacity for language. Topics include the nature of linguistic theory, syntax and semantics, aspects of language use (comprehension, memory and knowledge, thought and action, communication), and language acquisition.

422 Developmental Biopsychology Spring. 4 credits. Prerequisites: a course in introductory biology and a course in biopsychology or neurobiology (such as Psychology 123 or Biological Sciences 321).
M W F 9:05. B. Finlay.

Various aspects of the relation of the development of the nervous system to the unfolding of behavior are discussed. Topics include how growing neurons seek, recognize, and communicate with their targets; normal neuroembryology and the emergence of reflexive and complex behavior; how experience affects the developing brain and reorganizational capabilities of the young mammalian brain in response to trauma.

425 Brain and Behavior Fall. 3 or 4 credits; 4-credit option includes a discussion section and requires an additional paper. Prerequisites: a course in introductory biology and a course in biopsychology or neurobiology (such as Psychology 123 or Biological Sciences 321.) Not offered 1980-81; next offered 1981-82.
M W F 9:05. B. Finlay.

The relation between structure and function in the central nervous system is studied. Human neuropsychology and the contribution of work in animal nervous systems to the understanding of the human nervous system will be stressed. Some topics to be discussed include visual and somatosensory perception, the organization of motor activity, emotion and motivation, psychosurgery, and the neuropsychology of memory and language.]

426 Seminar and Practicum in Psychopathology Spring. 4 credits. Limited to 16 juniors or senior majors in psychology or the equivalent (such as HDFS). Prerequisites: Psychology 325; permission of instructor required in all cases. Not offered 1981-82.

T R 2:30-4:25; fieldwork to be arranged. R. Mack. A seminar and fieldwork course for advanced students who have mastered the fundamental concepts of personality and psychopathology. An opportunity to explore in depth the various forms of psychopathology, etiology, and treatment, to discuss these in seminar, and to work with mental health professionals and those who seek their help.]

436 Language Development (also HDFS 436) Fall. 3 or 4 credits. Limited to 30 students. Prerequisites: at least one course in cognitive

psychology, cognitive development, or linguistics. A course in linguistics is strongly recommended. Not offered 1980-81; next offered 1981-82.

T R 10:10-12:05. B. Lust.
A survey of basic literature in language development. Major theoretical positions in the field are considered in the light of studies in first-language acquisition of phonology, syntax, and semantics from infancy onward. Attention is given to models of sentence processing in perception, production, and memory. The acquisition of communication systems in nonhuman species such as chimps and birds and the fundamental issue of relations between language and cognition are also discussed.]

437 Human Behavior Genetics Fall. 4 credits. Limited to 25 students. Prerequisites: one year of college biology and two courses in psychology. Recommended: course in statistics. Offered alternate years. Not offered 1980-81; next offered 1981-82.
T R 12:50-2:15. R. Dworkin.

Research examining genetic influences on personality, cognitive abilities, and mental disorders is considered. Some attention is also paid to biochemical and physiological factors that may be involved in the gene-behavior pathway. The interaction of genetic and environmental influences in human behavior is a continuing theme.]

440 Sleep and Dreaming Spring. 4 credits. Limited to 15 students. Prerequisites: advanced undergraduate or graduate standing and permission of instructor. J. Maas. Not offered 1980-81.]

443 The Politics of I.Q. Fall. 3 credits. Limited to 20 students. Prerequisite: elementary knowledge of theories and measurement of intelligence from prior courses or independent reading and permission of instructor.
T R 2:30-4. H. Levin.

The research on the ethnic, racial, and sexual bases of intelligence will be taken as the primary example with which to discuss political and social influences on the choice of research topics, the methods of investigation, and the interpretation of results. Some insights about these issues are available from historical changes in the research and by the comparing the research in various countries, particularly the United States and Great Britain. The writings of Jensen, Herrnstein, Schockley, Burt, Eysenck, Kamin, and their critics will be studied. Novels by Koestler and C. P. Snow will be read. Three brief papers will be required. The genetics of intelligence will not be covered.

445 Research Contours of Black Psychology Spring. 4 credits. Prerequisites: Psychology 345, or twenty credits of behavioral sciences, or graduate standing, and permission of instructor. Offered alternate years.

T R 2:30-4:25. A. W. Boykin.
An in-depth probe of a selected topic in psychology that pertains directly to black Americans with heavy emphasis on the research process. The course will revolve around five major concerns: (1) critically appraising the relevant research and theorizing already in existence, (2) advancing alternative conceptual models whenever necessary, (3) formulating rigorous and heuristic research paradigms, (4) discussing implications and applications for community-level programs and institutions, and (5) developing a practical yet analytical understanding of research design, and methodology, and the dynamics of problem selection and data inference.

464 Motivation and Human Learning Spring. 4 credits. Prerequisites: Psychology 303 plus 307, or permission of instructor. Offered alternate years. Not offered 1980-81.]

465 Mathematical Psychology Spring. 4 credits. Prerequisites: one year of college mathematics (finite mathematics and/or calculus), a course in probability

or statistics, and a course in psychology. Offered even-numbered years. Not offered 1980-81; next offered 1981-82.

T R 10:10-11:40. J. Cunningham.
Mathematical approaches to psychological theory are discussed. Possible topics include choice and decision, signal detectability, measurement theory, scaling, and stochastic models.]

467 Seminar: The Examined Self—A Psychohistorical View Spring. 4 credits. Prerequisites: 9 credits of psychology including Psychology 325 or equivalent, and permission of instructor before course enrollment. H. Feinstein. Not offered 1980-81.]

468 American Madness Spring. 4 credits. Limited to 15 students. Prerequisite: Psychology 325 and permission of instructor.

T 12:20-2:15. H. Feinstein.
The seminar will be devoted to an analysis of insanity as a psychological and historical phenomenon. Selected writings by the mentally ill and their definers will be studied.

469 Psychotherapy: Its Nature and Influence Spring. 4 credits. Limited to senior psychology majors. Prerequisites: Psychology 325 or equivalent and permission of instructor before course enrollment. Not offered 1980-81; next offered 1981-82.

W 7:30-10:30 p.m. R. Mack.
A seminar on the nature of psychotherapy. Issues related to therapeutic goals, differing views of the nature of man, ethical concerns, and research problems also are considered. Presentations by therapists of differing orientations and experiential and role-play exercises may be an integral part of the seminar experience.]

470 Undergraduate Research in Psychology Fall or spring. 1-4 credits. S-U grades optional. Written permission from the staff member who will supervise the work and assign the grade must be included with the course enrollment material. Students should enroll in the section listed for that staff member. A section list is available from the Department of Psychology.

Hours to be arranged. Staff.
Practice in planning, conducting, and reporting independent laboratory, field, and/or library research.

471 Statistical Methods in Psychology I Fall. 4 credits. Prerequisite: Psychology 201 or equivalent, or permission of instructor.

M W F 11:15. J. Cunningham.
Basic probability, descriptive and inferential statistics. Topics include parametric and nonparametric tests of significance, Bayesian inference, correlation, and simple linear regression. The level of the course is that of W. L. Hays, *Statistics for Psychologists*.

472 Statistical Methods in Psychology II Spring. during the first 7 weeks only. 2 credits. Prerequisites: Psychology 471 or 350 or permission of instructor.
M W F 10:10. Staff.

Analysis of variance, experimental design, and related topics. The level of the course is that of G. Keppel, *Design and Analysis: A Researcher's Handbook*.

473 Statistical Methods in Psychology III Spring. during the last 7 weeks only. 2 credits. Prerequisite: Psychology 472 or permission of instructor.
M W F 10:10. R. Darlington.

General-linear-model approach to analysis of variance, analysis of covariance, and multiple regression, at the level of *Multiple Regression in Behavioral Research* by F. Kerlinger and E. Pedhazur.

475 Analysis of Nonexperimental Data Fall, during the first 7 weeks only. 2 credits. Prerequisite: Psychology 473 or permission of instructor. Offered odd-numbered years. Not offered 1980-81; next offered 1981-82.

T R 10:10–12:05. R. Darlington.

Correlational methods, factor analysis, canonical analysis, canonical reduction analysis, discriminant analysis, panel analysis, multiple comparisons, robust regression.]

[476 Representation of Structure in Data] Spring. 3 credits. Prerequisite: one year of college mathematics (finite mathematics and/or calculus) and a course in the social sciences.

T R 10:10–11:40. Staff.

Spatial and discrete representations of preferences and psychological distances are discussed. Topics include unidimensional and multidimensional scaling, unfolding, individual differences scaling hierarchical clustering, and graph-theoretic analysis.]

478 Psychometric Theory Fall, during the first 7 weeks only. 2 credits. Prerequisite: Psychology 473 or permission of instructor. Offered even-numbered years.

T R 10:10–12:05. R. Darlington.

Statistical methods relevant to the use, construction, and evaluation of psychological tests.

480 Attitudes and Social Cognitions (also Sociology 480) Spring. 4 credits. Prerequisites: Psychology or Sociology 280, or two courses in psychology or sociology, or graduate standing. M W F 1:25. L. Meltzer.

An intensive analysis of theory, research, measurement, and practical implications concerning beliefs, attitudes, values, opinions, stereotypes, self-concepts, intentions, and other social cognitions.

481 Advanced Social Psychology (also Sociology 481) Fall. 4 credits. Limited to 30 students. Prerequisite: a course in social psychology or permission of instructor.

T R 10:10–11:25. D. Regan.

Selected topics in social psychology are examined in depth, with heavy emphasis on experimental research. Readings are usually original research reports. Topics discussed may include: social comparison theory, social and cognitive determinants of the emotions, cognitive dissonance, attribution processes, interpersonal attraction, and research methods in social psychology.

482 Death and Dying Spring. 4 credits. Limited to 40 juniors and seniors. Prerequisites: 6 credits in sociology or psychology.

Sec 1, T 2:30–4:25; sec 2, R 2:30–4:25. W. Collins.

Issues of death and dying in modern American society are explored, from the perspectives of psychology, sociology, and the health-related professions. Possible inadequacies in current practice are examined and alternatives discussed.

483 Socialization and Maturity (also Sociology 483) Spring. 4 credits. Limited to upperclass and graduate students or those who receive permission of instructor. Prerequisite: some work in psychology, sociology, and/or anthropology; some background in statistics is assumed.

T R 12:20–2:15. W. Lambert.

Representative theories of research on socialization at different ages are analyzed, focusing particularly on the underlying processes. The newer topic of personal and sociocultural maturity is also analyzed and its relation to socialization processes is evaluated in terms of recent evidence.

[484 Individual Differences and Psychological Assessment (also Sociology 484)] Spring. 4 credits. Limited to upperclass students. Prerequisites: an introductory course in psychology or sociology and a course in statistics. Not offered 1980–81.

T R 10:10–12:05. D. Bem, R. Darlington.

An analysis of current methods and models for assessing individual and group differences. Particular emphasis is on the measurement of personality. Quantitative models for predicting behavior from assessment instruments are examined, and current controversial issues in assessment are discussed.]

486 Interpersonal and Social Stress and Coping (also Sociology 486) Fall. 4 credits. Limited to 25 upperclass students. Prerequisites: background in psychology and introductory statistics; or permission of instructor.

R 2:30–4:30. W. W. Lambert.

A critical review of work in intrapersonal, interpersonal, situational and sociocultural sources of stress, the major psychophysiological concomitants of such stress; resultant coping strategies and aids to coping. Data from laboratory, industry, and other cultures will be analyzed.

488 Research Practicum in Socialization (also Sociology 488) Spring. 4 credits. Prerequisites: two courses in social psychology or human development and one course in statistics, or permission of instructor.

R 2:30–4:25. U. Bronfenbrenner.

Supervised participation in field and experimental studies bearing on the impact of family support systems on socialization practices and outcomes. The work concentrates on the American phase of a project being conducted cooperatively in five industrialized societies.

489 Seminar: Selected Topics in Social Psychology and Personality (also Sociology 489) Fall. 4 credits. Limited to seniors. Prerequisites: one course in psychology and one course in sociology or permission of instructor.

Sec 1: T 2:30–4:25. L. Meltzer.

The specific topics of discussion vary, but the general emphasis is on a critical examination of the study of individuals in social contexts.

Sec 2: W 2–4:25. R. Dworkin.

Prerequisites: Psychology 275 or permission of instructor. Enrollment limited to 20. Preference given to junior and senior psychology majors. Selected topics in personality research and theory will be examined in depth. The topics to be discussed will include environmental influences on personality, life-span personality development, cognitive approaches to personality, and intentional personality change. A major goal of the seminar will be to attempt to integrate what has been learned about personality into a richer understanding of persons, as opposed to the more traditional focus on personality psychology on traits or variables considered in isolation.

490 Historical Roots of Modern Psychology (also Education 490; Human Development and Family Studies 490; Industrial and Labor Relations 470) Spring. 4 credits. Intended for sophomores, graduate students, majors, and nonmajors. Prerequisites: at least three courses in behavioral science, or permission of the instructor.

M W F 12:20–1:10. Staff.

A survey of the major historical antecedents of contemporary psychology, including the philosophical tradition (from Aristotle through the Enlightenment), the medical-therapeutic tradition, and the rise of modern science and experimental psychology. Scholars from across the University give presentations in their own specialties. Students do concentrate work in their own area of interest.

491 Principles of Neurobiology, Laboratory (also Biological Sciences 491) Fall. 4 credits. Limited to 36 students. Prerequisites: Biological Sciences 396 or Psychology and Biological Sciences 495 or written permission of instructors.

M W or T R 12:20–4:25. B. Land and staff.

Laboratory practice with neurobiological preparations and experiments, designed to teach the techniques, experimental designs, and research strategies used to study biophysical and biochemical properties of excitable membranes, sensory receptors, and the central nervous system transformations of afferent activity as well as the characteristic composition and metabolism of neural tissue. Theoretical content at the level of Jung's *Nerve and Muscle Excitation*.

494 Junior Honors Spring. 4 credits. Prerequisite: admission to the departmental honors program. Staff.

498 Senior Honors Dissertation Fall. 4 credits. Prerequisite: admission to the departmental honors program. Staff.

499 Senior Honors Dissertation Spring. 4 credits. Prerequisite: admission to the departmental honors program. Staff.

Advanced Courses and Seminars

Advanced seminars are primarily for graduate students, but with the permission of the instructor, they may be taken by qualified undergraduates. The selection of seminars to be offered each term is determined by the needs of the students.

A supplement describing these advanced seminars is available at the beginning of each semester and can be obtained from the department office. Except where indicated, the following courses may be offered either term, and carry 4 credits unless otherwise indicated.

502 Practicum in Article Writing (May not be taken by undergraduates for credit.)

510–511 Perception

512–514 Visual Perception

513 Learning

515 Motivation

517 Language and Thinking

518 Psycholinguistics

519–520 Cognition

521 Psychobiology

522 Topics in Perception and Cognition

523 Physiological Psychology

525 Mathematical Psychology

531 History of Psychology

535 Animal Behavior

541 Statistical Methods

543 Psychological Tests

544 Topics in Psychopathology and Personality

545 Methods in Social Psychology

547 Methods of Child Study

561 Human Development and Behavior

580 Experimental Social Psychology (also Sociology 580)

582 Sociocultural Stress, Personality, and Somatic Pathology (also Sociology 582)

583–584 Proseminar in Social Psychology (also Sociology 583–584)

585 Social Structure and Personality (also Sociology 585)

586 Interpersonal Interaction (also Sociology 586)

587 **Personality (also Sociology 587)**

588 **Social Change, Personality, and Modernization (also Sociology 588)**

591 **Educational Psychology**

595 **Teaching of Psychology**

596 **Improvement of College Teaching**

599 **How to Generate Stimuli and Control Experiments with a Small Computer** Fall. Prerequisite for undergraduates: written permission of instructor before course enrollment.

M 1:25-3:35. W. Hemsath.

Individuals who expect to use the EPIC computer facility, or other small computer facilities, should register for this course.

600 **General Research Seminar** 0 credits.

682 **Social Psychology (also Sociology 682)**

683 **Seminar in Interaction (also Sociology 683)**

684 **Seminar: Self and Identity (also Sociology 684)**

[685 **Seminar in Sex Differences, Sex Roles, and Sexuality (also Sociology 685)** Fall. Limited to 15 students. Not offered 1980-81.

R 2:30-4:25. S. Bem.]

690 **Nutrition and Behavior (also Nutritional Sciences 690)**

700 **Research in Biopsychology**

710 **Research in Human Experimental Psychology**

720 **Research in Social Psychology and Personality**

730 **Research in Clinical Neuropsychology** Limited to Clinical Neuropsychology Program trainees.

800 **Master's Thesis Research in Biopsychology**

810 **Master's Thesis Research in Human Experimental Psychology**

820 **Master's Thesis Research in Social Psychology and Personality**

900 **Doctoral Thesis Research in Biopsychology**

910 **Doctoral Research in Human Experimental Psychology**

920 **Doctoral Thesis Research in Social Psychology and Personality**

930 **Doctoral Research in Clinical Neuropsychology** Limited to Clinical Neuropsychology Program trainees.

Summer Session Courses

The following courses are also frequently offered in the summer session though not necessarily by the same instructor as during the academic year. Not all of these courses will be offered in a particular summer. Information regarding these courses and additional summer session offerings in psychology is available from the department before the end of the fall semester.

101 **Introduction to Psychology: The Frontiers of Psychological Inquiry**

124 **Introduction to Psychology: The Cognitive Approach**

128 **Introduction to Psychology: Personality and Social Behavior**

209 **Developmental Psychology**

215 **Introduction to Linguistics and Psychology**

281 **Interpersonal Relations and Small Groups (also Sociology 281)**

286 **Nonverbal Behavior and Communication (also Sociology 286)**

325 **Introductory Psychopathology**

381 **Social Psychology**

385 **Theories of Personality**

469 **Psychotherapy: Its Nature and Influence**

543 **Psychological Testing**

Quechua

See Modern Languages, Literatures, and Linguistics, p. 92.

Romance Studies

See Modern Languages, Literatures, and Linguistics, p. 92, and Department of Romance Studies, p. 101.

Romanian

See Modern Languages, Literatures, and Linguistics, p. 92.

Russian

See Modern Languages, Literatures, and Linguistics, p. 92, and Department of Russian Literature, p. 101.

Sanskrit, Serbo-Croatian, and Sinhala (Sinhalese)

See Modern Languages, Literatures, and Linguistics, p. 92.

Sociology

101 **Introduction to Sociology** Fall. 3 credits.

M W 12:20, plus one hour to be arranged.

K. Donow.

An introduction to basic aspects of social structure including culture, social roles, the nature of groups, and inequalities of wealth, honor, and power. Essential methods of social research are also covered, along with an overview of current research findings about American society.

103 **Myth and Image in Modern Society (also History of Art 105)** Fall. 3 credits.

T R 9:05, plus one hour to be arranged.

R. Goldsen, P. Kahn.

The course views myth as a universal human language. Its components are widely recognizable images and symbols, arranged in structures that validate the legitimacy of a society's moral order. The course, taught jointly by an artist and a sociologist,

invites students to analyze certain mythic forms in American society, from mass-produced myths of the media to modern art.

107 **Introduction to Sociology: Conflict and Cooperation** Spring. 3 credits. Limited to freshmen and sophomores.

M W F 10:10. R. M. Williams, Jr.

Are human societies fundamentally cooperative or conflictual? In what ways? Why? And with what consequences? Examination of contemporary sociological analyses and the views of such precursors as Hobbes, Marx, Sumner, and Simmel. Data from recent studies of conflict and conflict reduction are discussed.

141 **Introduction to Sociology: Applications to Policy** Fall. 3 credits.

M W F 10:10. S. Caldwell.

Concentrates on sociology applied to actual decisions by regulatory commissions, executive agencies, courts, Congress, and other public policymakers. How does sociology become useful? Who makes it useful? What effects do personal values have on its uses? How well does expert knowledge coexist with political process? For fall 1980, the course will cover topics such as welfare reform, teenage pregnancies, Social Security, daycare school effectiveness, a national family policy, and energy.

172 **Introduction to Sociology: Urban Society** Spring. 3 credits.

M W F 11:15. B. Bowser.

The sociological analysis of urbanism and urbanization. Alternative explanations of industrial urban development are assessed with a specific focus on historical and contemporary urban community studies that serve as models of social structure and group (class, ethnic, race) divisions. Trends in the United States and in other countries are also examined, using such information as a basis for considering contemporary problems and the urban future.

207 **Ideology and Social Concerns** Fall. 3 credits; 4-credit option available.

M W F 11:15. R. M. Williams, Jr.

Analysis of social and cultural bases of public policies at national, state, and local levels. Relates demographic, social, and cultural factors to the changing recognition of problems and to shifting modes of collective action, such as direct mobilization, legislation, administration, and adjudication. Public issues examined include affirmative action, civil rights, environmental regulation, military affairs, social security and income maintenance, health, medicine, bioethics, centralization, and local control. Deals with two basic dilemmas of social choice: the problem of the commons and the problem of collective action.

222 **Studies in Organizational Behavior: Regulating the Corporation (also I&LR 222)** Fall. 3 credits.

T R 10:10. R. Stern.

Public and private power from an organizational perspective. The resource dependence approach to organization-environment relations provides a framework for interpreting government attempts at the regulation of corporate behavior. Topics cover the structure and functioning of government regulatory agencies and corporate responses to regulation, including strategy, change, and political influence. The role of interest groups such as consumer or citizens' organizations is also considered. Research and case materials focus on the implementation of environmental protection, occupational health and safety equal opportunity, antitrust, and rate-setting regulations.

230 **Population Problems** Spring. 3 credits; 4-credit option available.

M W 12:20 and hour to be arranged. J. M. Stycos.

The practical and scientific significance of population

growth and composition. Fertility, migration, and mortality in relation to social and cultural factors and in relation to questions of population policy. National and international data receive equal emphasis.

238 American Women and the Female Professions, 1815–Present (also Women's Studies 238) Fall. 3 credits.

T R 2:30–4. J. Brumberg.
The historical evolution of the female professions in America, including prostitution, midwifery, nursing, teaching, librarianship, social work, and medicine. Lectures, readings, and discussions are geared to identifying the cultural patterns which fostered the conception of gender-specific work and the particular historical circumstances which created these different work opportunities. The evolution of "professionalism" and the consequences of professionalism for women, family structure, and American society are also discussed.

240 Personality and Social Change Spring. 3 credits (4-credit option available).

T R 2:30–3:45. B. C. Rosen.
An analysis of social and psychological factors that affect and reflect social change. Topics to be examined will include models of man and society, national character, modern melancholy, feminism, family and sex roles, industrialism, economic development, and psychocultural conflict.

242 Social Welfare in Europe and North America Spring. 3 credits. Prerequisite: at least one course in sociology.

M W F 9:05. S. Caldwell.
Review of the growth and consequences of modern welfare state policies in Europe and North America and how such policies reduce social and economic inequities. How do welfare policies differ under state socialist, democratic socialist, and mixed economy governments? How has the extension of welfare state policies affected political rights? Are there limits to the extension of social welfare? What can be learned from the successes and failures of particular programs in different nations?

243 Family (also HDFS 253) Fall. 3 credits.

T R 10:10 and hour to be arranged. B. C. Rosen.
A social and historical analysis of the family both in the West and cross-culturally. Specific areas examined include sex roles, socialization, mate selection, sex and sexual controls, internal familial processes, divorce, disorganization, and social change.

245 Inequality in America Spring. 3 credits (4-credit option available).

M W F 1:25. J. Kahl.
Recent trends in the unequal distribution of income, occupation, and education in the United States; inheritance of riches and of poverty; importance of ethnic membership; sex differences; deliberate attempts by government policy to alter these trends; evaluation of the "war on poverty."

252 Public Opinion Spring. 4 credits.

T R 9:05 and hour to be arranged. K. Donow.
Analysis of television as a social institution—how it defines social roles (e.g., race and sex) and alters the cultural habitat within which public opinion forms. New communications techniques and their social significance are analyzed.

255 Sociology of Science and Technology Fall. 3 credits (4-credit option available).

T R 2:30 and hour to be arranged. P. Allison.
How the growth of knowledge is facilitated and impeded by the social behavior of scientists, including competition, teamwork, communication, secrecy, conformity, and deviance: causes and consequences of scientific revolutions; factors affecting scientific careers; history of science as a social institution.

265 Hispanic Americans Spring. 3 credits (4-credit option available).

T R 2:30–4. H. Velez.
Analysis of the present-day Hispanic experience in the United States. An examination of sociohistorical backgrounds as well as the economic, psychological, and political factors that converge to shape and influence a Hispanic group-identity in the United States. Perspectives are developed for understanding the diverse Hispanic migrations, the plight of Hispanics in urban and rural areas, and the unique problems faced by the different Hispanic groups. Groups studied include Dominicans, Chicanos, Cubans, and Puerto Ricans.

277 Psychology of Sex Roles (also Psychology 277 and Women's Studies 277) Spring. 3 credits (4-credit option available). Prerequisite: any introductory course in psychology.

T R 10:10–11:30. S. Bem.
This course addresses the question of why and how adult women and men come to differ in their overall life styles, work and family roles, personality patterns, cognitive abilities, etc. This broad question is examined from five perspectives: (a) the psychoanalytic perspective, (b) the biological perspective, (c) the historical and cultural evolutionary perspective, (d) the child development perspective, and (e) the social-psychological and contemporaneous perspective. Each of these perspectives also bears on a number of more specialized phenomena relating to the psychology of sex roles, including psychological androgyny, women's conflict over achievement, the male sex role, equalitarian marriage relationships, female sexuality, homosexuality, and transsexualism.

280 Social Influence Processes: Attitude and Behavior Change (also Psychology 280) Spring. 3 or 4 credits. Prerequisite: an introductory psychology course.

T R 10:10–11:25. D. Regan.
Intended to provide an extensive review of the literature of social influence processes. Beginning with the effects of the mere presence of others on behavior, we will discuss theory and empirical research related to conformity, compliance, group decision making, and attitude change. The relationship between attitudes and behavior will be examined in detail, and application will be made to naturally occurring social influence situations.

281 Interpersonal Relations and Group Processes (also Psychology 281) Fall. 4 credits.

Lecs. M W F 11:15; 2-hour lab-disc to be arranged. L. Meltzer.
Shyness and assertiveness, productive and defensive communication, participation and alienation, conflict and harmony, social pressures, group decision-making, leadership, group emotionality, nonverbal communication, and social skills. The laboratory will involve the class in self-study exercises. Students also work outside of class, in groups of four or five, on a term project having two aspects: research on one of the above topics and self-study of the group processes which occur during the conduct of the project. The combination throughout the course of academic and experiential approaches should develop sensitivity to group processes and to the effects we ourselves have on other persons.

289 Conformity and Deviance (also Psychology 289) Fall. 4 credits. Prerequisite: one course in psychology or sociology.

T R 2:30. R. Kraut.
What are the ways in which conformity pressures, in all their variations, can lead to deviance? To attempt an answer we will examine some of the conformity bases for run-of-the-mill, normal behavior, and then use the concepts developed to illuminate such behavior as mob violence, suicide, crime, and craziness.

[307 Collective Behavior and Social Movements (also HDFS 307)] Fall. 3 credits (4-credit option available). Not offered 1980–81.

T R 2:30–4. G. Elder.
An inquiry into social behavior that breaks with institutionalized or conventional forms, such as acting crowds, riots, social movements, and revolution. Analysis of antecedent conditions, emergent forms, processes, and consequences. Historical and contemporary studies are covered.]

321 Field and Laboratory Techniques in Sociology Fall. 4 credits. Prerequisite: a course in sociology.

T R 10:10–11:25; lab, R 3–5. D. Hayes.
Foundations of sociological analysis: issues arising from using humans as data sources; the quality of our primary data; methods of its collection; research designs in wide use and their limitations; pragmatic considerations in doing research on humans, organizations, communities, and nations.

324 Organizations and Deviant Behavior (also I&LR 324) Spring. 3 credits. Limited to 40 students. Prerequisite: one or more courses in both sociology and psychology.

H. Trice.
Focus is on the relationship between organizations and deviant behavior. Covers (1) the nature and etiology of psychiatric disorders, particularly schizophrenia, the psychoneuroses, and psychosomatic disorders; (2) organizational factors related to these disorders and to the more general phenomena of role conflict and stress; (3) an examination of alcoholism as a sample pathology, in terms of personality characteristics and precipitating organizational factors; (4) evaluation of organizational responses to deviance; (5) the nature of self-help organizations such as Alcoholics Anonymous; and (6) the structure and functioning of the mental hospital.

325 Evaluating Statistical Evidence Spring. 4 credits.

M W F 10:10. R. McGinnis.
A first course in the use of statistical evidence in the social sciences. Theory is supplemented with numerous applications. Includes an introduction to multivariate causal analysis.

[348 Sociology of Law Fall. 4 credits. Not offered 1980–81.

M W 1:25 and hour to be arranged. J. Jacobs.
The subject matter and course materials vary. In 1979 the course focused on civil rights and civil liberties in the context of institutions of social control. The main theme is that the extension of constitutional rights to such "marginal" citizens as prisoners, mental patients, students, and soldiers has created something of a crisis in the authority for the institutions with which these groups are associated. The basis of institutional authority and order is explored in light of the drive to expand personal rights. Readings consist of a casebook of legal decisions and excerpts from legal and sociological studies.]

[352 Prisons and Other Institutions of Coercion Spring. 4 credits. Prerequisite: a course in the social sciences. J. Jacobs. Not offered 1980–81.]

[355 Social and Political Studies of Science (also Science, Technology, and Society 355)] Spring. 3 credits. Not offered 1980–81.

W 2:30–4:30. D. Nelkin.
A view of science, less as an autonomous activity than as a social and political institution. The focus is on its relationship to government, the media, religion, and education. Drawing from recent controversies over science, such questions as ethics and social responsibility in science, struggles to maintain internal control over research and over the teaching of science, and the concept of limits to inquiry are discussed.]

[356 Contemporary Sociology for Scientists and Engineers Spring. 4 credits. Prerequisite: elementary finite mathematics or consent of the instructor. R. McGinnis. Not offered 1980-81.]

357 Medical Sociology Fall. 4 credits. Prerequisite: a course in the social sciences. M W F 2:30. B. Edmonston.

Health, illness, death, and the health institutions from a sociological perspective. Factors affecting health care; organization of the medical professions; health and illness behavior; social epidemiology; and key issues in policies affecting the administration and delivery of medical care in the United States.

[364 Race and Ethnicity Spring. 3 credits (4-credit option available). Not offered 1980-81. M W F 10:10. Staff.

An examination of the importance of race and ethnicity in contemporary American society. Some review of historical background through such topics as the Old World roots of ethnic cultures, migration, slavery, and American responses to immigration. Of fundamental concern is the tension between assimilation and the persistence of racial and ethnic identities, traced through patterns of mobility, intermarriage, and organized crime. Blacks, Jews, Italians, and other ethnic groups are considered.]

365 Criminology Spring. 4 credits.

M W 2:30 and one hour to be arranged. J. Jacobs. This course examines crime as a social phenomenon. It takes both a historical and a cross-cultural approach in order to investigate the processes by which different societies generate different crime problems. Attention is paid to the historical evolution of criminology as a discipline and to the most prevalent theories of criminology and crime causation. Special attention is also placed on such topics as white-collar crime, organized crime, and youth gangs. In light of the analysis of crime as a social phenomenon various strategies of crime control are considered critically.

367 After the Revolution: Mexico and Cuba Fall. 4 credits. Prerequisites: two courses in the social sciences.

M W F 1:25. J. Kahl.

A comparison of the economic, political, and social development of Mexico and Cuba following their revolutions. Assigned readings will be in English.

378 Economics, Population, and Development (also Economics 378) Fall. 4 credits.

M W F 10:10. R. Avery.

An introduction to population from an economic perspective. Particular attention is paid to economic views of population size, fertility, mortality, and migration, and to the impact of population change on development, modernization, and economic growth.

381 Person Perception and Impression

Management (also Psychology 381) Spring. 4 credits. Limited to 25 students. Prerequisite: one course in social psychology.

T R 10:10-12:05. R. Kraut.

How do we learn about other people and influence what they learn about us? Person perception, attribution theory, impression management, and nonverbal communication are relevant topics. Seminar format.

383 Social Interaction (also Psychology 383)

Spring. 4 credits. Prerequisite: a course in social psychology.

T R 2:30-4:30. D. Hayes.

Analysis of social behavior episodes, their detailed structure, and changes. Materials include chronobiological, ethnomethodological, and nonverbal interactional considerations. Extensive practice in analysis of filmed and taped interactions required.

384 Cross-Cultural Psychology (also Psychology

384) Fall. 4 credits. Prerequisites: a course in psychology and one in either sociology or social or cultural anthropology; or permission of instructor.

M W F 12:20. W. W. Lambert.

A critical survey of approaches, methods, discoveries, and applications in emerging attempts to study human nature, experience and behavior cross-culturally. Focus on studies of cognition, values, socialization, sociolinguistics, personality, attitudes, stereotyping, ideology, sociocultural development, and mental illness.

385 Theories of Personality (also Psychology

385) Spring. 4 credits. Prerequisite: Psychology 101, 128, or 275 or permission of the instructor.

M W F 12:20. W. Lambert.

An intermediate analysis of comparative features of the historically and currently important theories of personality, with an evaluation of their systematic empirical contribution to modern personality study, to psychology, and to other behavioral sciences.

[386 Human Ethology (also Psychology 386)

Spring. 4 credits. Prerequisite: a course in social psychology or animal social behavior or permission of instructor. Offered alternate years. Not offered 1980-81.

T R 2:30-4. R. Kraut and R. Johnston.

Biological and other approaches to human social behavior will be examined using naturalistic observation techniques. One emphasis will be on parallels between nonhuman vertebrates and humans. Topics include nonverbal communication, use of space, bonding, and interaction rituals.]

404 Intermediate Sociological Theory (also Rural Sociology 404) Fall. 4 credits.

T R 10:10-12:05. P. Eberts.

An advanced undergraduate seminar for senior majors in sociology and rural sociology. The course will focus on (1) the central concepts of the sociological tradition; (2) major classical theorists (Marx, Weber, Durkheim, de Tocqueville) and contemporary counterparts; (3) application of the classical ideas in contemporary research.

420 Mathematics for Sociologists (also CRP 520) Fall. 1-4 credits.

M W 2:25-4:30; lab, F 2:25-4:30. R. McGinnis. Elementary matrix algebra, probability theory, and calculus.

422 Sociology of Industrial Conflict (also I&LR 425) Spring. 4 credits.

R. Stern.

The focus is on the variety of theoretical and empirical evidence available concerning social, economic, and political causes of industrial conflict. The manifestations of conflict such as strikes, labor turnover, absenteeism, and sabotage, and the influence of the environments in which they occur is emphasized.

423 Evaluation of Social Action Programs (also I&LR 423) Fall. 3 credits.

M W 11:15. H. Trice.

A consideration of the principles and strategies involved in evaluation research; experimental research designs, process evaluation, and adaptations of cost benefits and cost efficiency to determine the extent to which intervention programs in fields such as training and therapy accomplish their goals. The adaptation of these strategies to large social contexts, such as child guidance clinics, mental health clinics, and programs in the poverty areas such as Head Start is considered. Includes fieldwork and emphasizes assessment of program implementation.

424 Multivariate Analysis with Quantitative Data

Spring. 4 credits. Prerequisite: a college course in statistics (such as Sociology 325) and matrix algebra.

T R 10:10-11:40. S. Caldwell.

The general linear regression model with interval scaled variables. Detecting violations of assumptions of the model in real data and providing remedies. Both single and multiple equation models (including path analysis).

425 Categorical Data Analysis Fall. 4 credits.

Prerequisite: Sociology 424 or equivalent.

T R 10:10-11:45. P. Allison.

Techniques for including categorical (discrete) variables in multivariate models. Log-linear analysis of multidimensional contingency tables; dummy variable regression; logit, probit, and regression models with categorical dependent variables. Emphasis on applications.

[426 Policy Research: Uses, Methods, Case Studies (also Rural Sociology 426) Spring.

3 credits. Prerequisite: a course in multivariate statistics. T R hours to be arranged. Staff. Not offered 1980-81.]

427 The Professions: Organization and Control (also I&LR 427) Fall. 4 credits.

T R 1:25. R. Stern.

The professions (including medicine, law, and several others) are the cases used in this course to examine issues of occupational organization and control. Professional associations attempt to set standards of ethics and practice, regulate educational programs, maintain specific images, and control the supply of entrants to professions. How do such associations function and how successful is their attempt at regulation of professional conduct? How might the potential transformation of some professional associations into union-style organizations be interpreted? These issues are considered in the context of the role of professions in contemporary society.

429 Theories of Industrial Society (also I&LR

426) Fall. 4 credits. Prerequisites: I&LR 120 or any 100- or 200-level sociology course, and permission of instructor.

T R 8:30. S. Bacharach.

Some of the critical issues in social theory to be found in the works of Durkheim, Marx, Pareto, and Weber. Their views of man's relation to society are compared to the views of such literary figures as Balzac, Beckett, Camus, Flaubert, Goethe, Sartre, Stendhal, and Zola.

430 Social Demography Spring. 4 credits.

Prerequisites: junior class standing or permission of instructor.

T R 2:30-3:45. R. Avery.

A survey of the methods, theories, and problems of contemporary demography. Special attention is directed to the social determinants and consequences of fertility, mortality, and migration. The populations of both developed and developing areas are examined.

431 Techniques of Demographic Analysis Fall. 4 credits. Prerequisite: Sociology 230 or 330.

T R 1:25 and hour to be arranged. B. Edmonston.

A description of the nature of demographic data and the specific techniques used in their analysis. Mortality, fertility, migration, and population projection are covered, as well as applications of demographic techniques to other types of data.

434 Human Fertility in Developing Nations Fall.

4 credits. Offered alternate years. Prerequisite: Sociology 230 or permission of instructor.

T 2:30-4:25. J. M. Stycos.

A review of the major literature dealing with the social causation of variation in human fertility. Emphasis will be on international comparisons and on the methodology of field research.

[440 Educational Institutions Spring. 4 credits. Not offered 1980-81.

T R 10:10-11:35. Staff.

The role of educational institutions in industrialized societies is studied. The primary focus will be on the debate between those who see educational institutions as extending opportunity and assimilating marginal groups and others who see them as arenas of conflict in which privileged groups successfully struggle to maintain their advantages.]

441 Structure and Functioning of American Society Fall. 4 credits. Prerequisite: a course in sociology or permission of instructor.

M W F 9:05. R. M. Williams, Jr.
Analysis of a total societal system. Critical study of the institutions of kinship, stratification, the economy, the polity, education, and religion. Special attention is given to values and their interrelations, and to deviance and evasion. A survey of the groups and associations making up a pluralistic nation is included.

[445 Law and Social Theory Spring. 4 credits. Prerequisite: Sociology 348 or permission of instructor, or graduate standing. Not offered 1980-81.

T 3:35-5:30. J. Jacobs.
Major intellectual traditions contributing to what is loosely called the sociology of law. Attention is paid to the classical theorists—Weber, Durkheim, and Marx—as well as to contemporary American and European legal and sociological scholars. The underlying theme is the relationship of law to social order.]

[454 Religion and Secularism in Western Society Spring. 4 credits. Prerequisite: Sociology 101 or permission of instructor. Not offered 1980-81.

M W F 9:05. Staff.
The interrelationship of culture, society, and religion. Religion and social stratification, religion and economic and political institutions, social change and religion. The major emphasis will be on American society and American religious institutions.]

[462 Society and Consciousness Spring. 4 credits. Limited to 15 students. Prerequisite: permission of instructor. Not offered 1980-81.

Hours to be arranged. R. Goldsen.
An examination of the role of the social system in the formation of human consciousness.]

480 Attitudes and Social Cognitions (also Psychology 480) Spring. 4 credits. Prerequisite: Psychology or Sociology 280, or two courses in psychology or sociology, or graduate standing.

M W F 1:25. L. Meltzer.
An intensive analysis of theory, research, measurement, and practical implications concerning beliefs, attitudes, values, opinions, stereotypes, self-concepts, intentions, and other social cognitions.

481 Advanced Social Psychology (also Psychology 481) Fall. 4 credits. Limited to 30 students. Prerequisite: a course in social psychology or permission of instructor.

T R 10:10-11:25. D. Regan.
Selected topics in social psychology are examined in depth, with heavy emphasis on experimental research. Readings are usually original research reports. Topics discussed may include: social comparison theory, social and cognitive determinants of the emotions, cognitive dissonance, attribution processes, interpersonal attraction, and research methods in social psychology.

483 Socialization and Maturity (also Psychology 483) Spring. 4 credits. Limited to upperclass and graduate students or those who receive permission of instructor. Prerequisite: some work in psychology, sociology, and/or anthropology; some background in statistics is assumed.

T R 12:20-2:15. W. Lambert.
Representative theories of research on socialization at different ages are analyzed, focusing particularly on the underlying processes. The newer topic of

personal and sociocultural maturity is also analyzed and its relation to socialization processes is evaluated in terms of recent evidence.

[484 Individual Differences and Psychological Assessment (also Psychology 484) Spring. 4 credits. Prerequisites: introductory course in psychology or sociology and a course in statistics and junior standing. Not offered 1980-81.

T R 10:10-12:05. D. Bem, R. Darlington.
An analysis of current methods and models for assessing individual and group differences. Particular emphasis is on the measurement of personality. Quantitative models for predicting behavior from assessment instruments are examined, and current controversial issues in assessment are discussed.]

486 Interpersonal and Social Stress and Coping (also Psychology 486) Fall. 4 credits. Limited to 25 upperclass students. Prerequisite: background in psychology and introductory statistics; or permission of instructor.

R 2:30 4:30. W. Lambert.
A critical review of work in intrapersonal, interpersonal, situational and sociocultural sources of stress, the major psychophysiological concomitants of such stress; resultant coping strategies and aids to coping. Data from the laboratory, industry, and other cultures will be analyzed.

488 Research Practicum in Socialization (also Psychology 488) Spring. 4 credits. Prerequisites: two courses in social psychology or human development and one course in statistics, or permission of instructor.

R 2:30-4:25. U. Bronfenbrenner.
Supervised participation in field and experimental studies bearing on the impact of family support systems on socialization practices and outcomes. The work concentrates on the American phase of a project being conducted cooperatively in five industrialized societies.

489 Seminar: Selected Topics in Social Psychology and Personality (also Psychology 489) Fall. 4 credits. Limited to seniors. Prerequisites: one course in psychology and one course in sociology or permission of instructor.

Sec 1: T 2:30 4:25. L. Meltzer.
The specific topics of discussion vary, but the general emphasis is on a critical examination of the study of individuals in social contexts.

Sec 2: W 2-4:25. R. Dworkin.
Prerequisites: Psychology 275 or permission of instructor. Enrollment limited to 20. Preference given to junior and senior psychology majors. Selected topics in personality research and theory will be examined in depth. The topics to be discussed will include environmental influences on personality, life-span personality development, cognitive approaches to personality, and intentional personality change. A major goal of the seminar will be to attempt to integrate what has been learned about personality into a richer understanding of persons, as opposed to the more traditional focus on personality psychology on traits or variables considered in isolation.

491 Selected Topics in Sociology Fall or spring. 2-4 credits. Prerequisite: permission of instructor.
Hours to be arranged.

495 Honors Research: Senior Year Fall or spring. 4 credits. Limited to sociology majors. Prerequisite: permission of instructor.
Hours to be arranged. D. Hayes and staff.

496 Honors Thesis: Senior Year Fall or spring. 4 credits. Prerequisite: Sociology 495.
Hours to be arranged. D. Hayes and staff.

497 Social Relations Seminar (also Anthropology 495) Spring. 4 credits. Limited to seniors majoring in social relations.
Staff.

Graduate Seminars

These seminars are primarily for graduate students but may be taken by qualified advanced undergraduates who have permission of the instructor. Which seminars are to be offered any term is determined in part by the interests of the students, but it is unlikely that any seminar will be offered more frequently than every other year. Lists and descriptions of seminars are available from the department well in advance of each semester. The list below indicates seminars that are likely to be offered 1980-81, but others may be added. Students should check with the department before each term. All seminars are offered for 4 credits unless otherwise specified.

521 Organizational Behavior II (also I&LR 521) Spring. 3 credits.

R. Stern.
Formal organizations are studied from the perspectives of classical organization, theory, human relations theory, and comparative and cross-cultural analysis. Contemporary theories and quantitative approaches to organizational structure are also considered in some detail. Intended to be preliminary to more intensive work in organizational behavior.

523 Analysis of Data with Measurement Error Fall. 4 credits. Prerequisite: Sociology 424 or equivalent.

Hours to be arranged. P. Allison.
Multivariate statistical methods with explicit treatment of measurement error. Classical test theory, path analysis of unmeasured variables, econometric "errors-in-variables" models, confirmatory factor analysis, and Joreskog's general model for estimating linear structural relations (LISREL). Introduction to latent structure analysis. Emphasis on applications.

541 Social Organization and Change Spring. 4 credits. Prerequisite: graduate standing or permission of instructor.

M W 1:25-3:20. R. M. Williams, Jr.
Systematic review of theory and research, with emphasis on substantive knowledge and testable hypotheses. Subjects included are social processes, social structures, cultural content, and social and cultural change. Attention is given to the nature and size of the social system (small groups, communities, large organizations, societies) and also to both macro- and micro-social processes and properties (integration, authority, conformity, and deviance).

585 Social Structure and Personality (also Psychology 585) Fall. 4 credits.

Hours to be arranged. B. C. Rosen.
An analysis of the ways in which social and psychological factors interact to affect the development of personality, the rates of individual and group behavior, and the functioning of social systems.

603 Classical Theory—Marx, Weber, and Durkheim Fall. 4 credits.

J. Kahl.

632 Research Seminar in Population Spring. 4 credits.

R. Avery and B. Edmonston.

[645 Social Networks Spring. 4 credits. Not offered 1980-81.

Hours to be arranged. Staff.
An examination of the patterns of linkage between people, organizations, and institutions as constituting the foundation of social structure. These patterns and their implications are explored in areas such as the sociology of science and the study of power and influence. Theoretical and methodological issues receive equal attention.]

655 Latin American Society and Politics Spring. 4 credits.

R 2:30. J. Kahl.

656 Seminar in Family Studies: The History of the American Family (also Women's Studies 656 and HDFS 655) Spring. 3 credits. Students in endowed units must register for Women's Studies or Sociology 656; students in statutory units must register for HDFS 655.

Hours to be arranged. J. Brumberg. Considers the historical literature on change and variation in American family life and form, from the European background (sixteenth century) to the present. Reading, discussion and papers focus on the social, economic, political and cultural circumstances in the past which affected families and their relations to the larger society.

[683 Social Interaction (also Psychology 683)] Spring. D. Hayes, R. Kraut, L. Meltzer. Not offered 1980-81.]

[685 Seminar in Sex Differences, Sex Roles, and Sexuality (also Psychology 685 and Women's Studies 685)] Fall. Limited to 15 students. R 2:30-4:25. S. Bem. Not offered 1980-81.]

691-692 Directed Research Fall or spring. Up to 4 credits, to be arranged. Prerequisite: permission of instructor.

695 Thesis Research Fall or spring. Up to 6 credits, to be arranged. Prerequisite: permission of thesis director.

Spanish

See Modern Languages, Literatures, and Linguistics, p. 92, and Department of Romance Studies, p. 101.

Swahili

See Africana Studies and Research Center, p. 126.

Tagalog, Tamil, Telugu, and Thai

See Modern Languages, Literatures, and Linguistics, p. 92.

Theatre Arts

Freshman Seminars

120 Modern Drama and Modern Production Fall and spring. 3 credits.
T R 12:20-1:35. Fall, J. Haarstick; spring, K. Solow. A study of modern European drama in its philosophical contexts. Topics covered will include: surrealism, existentialism, Theatre of the Absurd, Theatre of Cruelty, and others. Reading will include works by Breton, Artaud, Genet, Sartre, Ionesco, Beckett, Camus, Brecht, and Weiss.

130 Tragedy and Comedy Fall and spring. 3 credits.
M W F 9:05. R. Short. Studies in the development of Western drama from the Greek classics through the twentieth century. The major units of the course will be Greek tragedy, Roman comedy, Shakespearean tragedy, the commedia dell'arte, Racinean tragedy, sentimental comedy, Romantic tragedy, social comedy, and tragicomedy. The plays will be studied in the contexts of the social, theoretical, and critical movements of the periods.

140 Script and the Stage Fall and spring. 3 credits.

M W F 9:05. P. Auslander. A chronological investigation of some of the highlights of world dramatic literature. The course will focus on the following questions: What are the major trends in the history of dramatic literature? What is the relationship between dramatic literature and theatrical production? Such dramatists as Aeschylus, Plautus, Tourneur, Ibsen, Beckett, and Stoppard will be considered.

Acting

280 Introduction to Acting Fall or spring. 3 credits. Each section limited to 16 students. Prerequisite: registration only through department roster in 104 Lincoln Hall.

Sec. 1, M W 2:30-4:25 (primarily for prospective majors and those planning further performance courses), A. Van Dyke. Sec. 2, M W 10:10-12:15, M. Hillyer. Sec. 3, T R 12:20-2:15, R. Rachele. Sec. 4, T R 12:20-2:15, G. Patnaude. Sec. 5, T R 12:20-2:15, J. Dewey. Sec. 6, T R 12:20-2:15, M. Harris. Sec. 7, T R 12:20-2:15, M. Reed.

Introduction to the problems and techniques of acting through history, theory, and practice. Appreciation of the actor's function as a creative artist and social interpreter through selected readings, lectures, and play attendance. Examination of the actor's craft through improvisation and exercises in physical, emotional, and intellectual skills.

281 Acting I—Basic Technique Fall or spring. 3 credits. Each section limited to 14 students. Prerequisites: Theatre Arts 280; audition and registration only through department roster in 104 Lincoln Hall.

Sec. 1, M W 2:30-4:25, E. Johnson. Sec. 2, T R 10:10-12:05. Staff.

Practical exploration of the actor's craft through improvisation, exercises in physical and psychological action; problems in the use of imagination, observation, and research as tools for exploring the script.

380 Acting II—Characterization Fall or spring. 3 credits. Each section limited to 12 students. Prerequisites: Theatre Arts 281; permission and registration only through department roster in 104 Lincoln Hall.

Sec. 1, T R 2:30-4:25, A. Van Dyke. Sec. 2, M W 10:10-12:05, staff.

Scene study and improvisational work designed to develop consistency in the student's use of communicative action and emotional support in creating a role. Emphasis on text analysis, use of imagery in handling dramatic language, and exercises in emotional and sense memory.

282 Introduction to Voice and Speech for Performance Fall. 2 credits. Limited to 12 students. Primarily for department majors. Prerequisite: registration only through department roster in 104 Lincoln Hall.

T R 2:30-4:25. E. Johnson. Study and practice in the correct physical use of the voice through exercises in relaxation, alignment, breath control, support, and freedom in exploring range and resonance potential.

283 Voice and Speech for Performance Spring. 2 credits. Limited to 12 students. Primarily for department majors. Prerequisites: Theatre Arts 282; registration only through department roster in 104 Lincoln Hall.

T R 2:30-4:25. E. Johnson. Development of vocal technique with additional emphasis on articulation and basics of Standard American pronunciation.

575 American Mime Orientation I Fall. 2 credits. Prerequisite: Theatre Arts 280. Students enrolled in American Mime must contact the Department of

Theatre Arts about supplies one month before the beginning of classes. Registration only through department roster in 104 Lincoln Hall.

F 2:30-4:25. P. Curtis and other teachers from the American Mime Theatre.

American Mime is a unique performing art created by a particular balance of playwriting, acting, moving, pantomime, and theatrical equipment. It is a complete theatre medium defined by its own aesthetic laws, terminology, techniques, script material, and teaching methods, in which nonspeaking actors, in characterization, perform the symbolic activities of American Mime plays through movement that is both telling and beautiful.

576 American Mime Orientation II Spring. 2 credits. Prerequisite: Theatre Arts 575 or permission of instructor. Registration only through department roster in 104 Lincoln Hall.

F 2:30-4:25. P. Curtis and other teachers from the American Mime Theatre. A continuation of Theatre Arts 575.

730 Dramatic Text Analysis Fall or spring. 2 credits; may be repeated for credit.

M W F 1:15-2:15. Fall, E. Johnson; spring, J. Haarstick. An examination of selected works of dramatic literature for the theatre artist. Intensive study of the play's text for techniques in interpretation, character development, plot articulation, and the aesthetics of prose and poetry for performance.

751 Rehearsal and Performance Fall. 2 credits. Limited to students in M.F.A. Professional Actor Training. Repeated for credit.

Staff. Study, development, and performance of assigned roles.

752 Rehearsal and Performance Spring. 2 credits. Limited to students in M.F.A. Professional Actor Training. Repeated for credit.

Staff. Study, development, and performance of assigned roles.

780 Acting Technique I Fall and spring. 2 credits. Limited to students in First-Year M.F.A. Professional Actor Training. Repeated for credit.

Sec. 1, M W 2:30-4:25; S. Cole. Sec. 2, T R 2:30-4:25. Staff. Study and practice of fundamental techniques and methodologies. Exploration and use of the basic dynamics of the actor's organism.

781 Acting Technique II Fall and spring. 2 credits. Prerequisite: Theatre Arts 780. Limited to students in Second-Year M.F.A. Professional Actor Training. Repeated for credit.

M T W R 2:30-4:25. Staff. Development and integration of the personal dynamic into the total acting process.

782 Voice Technique I Fall and spring. 2 credits. Limited to students in the First-Year M.F.A. Professional Actor Training. Repeated for credit.

M T W R F 10:45-2. E. Johnson. Emphasis on correct use of the vocal instrument through exercises designed to achieve the freedom, flexibility, control, and power required for the professional actor.

783 Voice Technique II Fall and spring. 2 credits; may be repeated for credit. Prerequisite: Theatre Arts 782. Limited to students in Second-Year M.F.A. Professional Actor Training.

T R 10:45-12. E. Johnson. Practice and development of technique. Use of text to explore vocal action and voice as an integral part of developing characterization.

784 Speech Technique I Fall and spring. 2 credits. Limited to students in First-Year M.F.A. Professional Actor Training. Repeated for credit.

T R 10:45–12. A. Van Dyke.
Ear training; sound designation of vowels, consonants, and diphthongs through exercises; sound symbolization through use of the International Phonetic Alphabet (IPA); eradication of regionalisms; development of Standard American speech.

785 Speech Technique II Fall and spring. 2 credits. Prerequisite: Theatre Arts 784. Limited to students in Second-Year M.F.A. Professional Actor Training. Repeated for credit.
M W 10:45–12. A. Van Dyke.
Refinement of sound distinction and execution; study of dramatic texts in prose and poetry to develop techniques in scansion, emphasis rhythm, range, and melody.

Directing

398 Directing I Fall. 3 credits. Prerequisites: Theatre Arts 354, 280, and permission of instructor.
M W 2:30–4:25. R. Shank.
An exploration of the role of the director through study and exercises: the process of conceptualization; use of visual, temporal, and dramatic values for interpretation of the script; directorial text analysis; applied project.

498 Directing II Spring. 4 credits. Prerequisites: Theatre Arts 398 and permission of instructor.
M W F 2:30–4:25. R. Shank.
Use of movement and space; character development techniques; rehearsal process; production procedures; applied project in performance.

499 Projects in Directing Fall or spring. Credit to be arranged. Prerequisite: permission of the department staff.
R. Shank.
The planning and execution of directing projects by advanced students in the public performance facilities of the Department of Theatre Arts.

Theatre Design/Technology

250 Fundamentals of Theatre Design/Technology Fall or spring. 4 credits. Not offered to first-term freshmen.
Lecs, T R 12:20–2:15; project lab, W 2:30–4:25. Staff.
An introduction to the design/technical experience in the theatre with particular attention to the unique collaboration of director, designer, and technician. The visual principles of designing scenery, costumes, and lighting will be related to production techniques by which designs are realized on the stage. This course is prerequisite to all further courses in the design/technology of scenery, costumes, and lighting.

260 Visual Concepts for the Theatre Fall. 3 credits.
T R 10:10–12:05. V. Becker.
The exploration through practical experimentation of the graphic expression of ideas and concepts within the theatre. Particular emphasis upon developing skill in visualization and communication as a foundation for stage design and directing.

261 Production Concepts for the Theatre Spring. 3 credits.
T R 10:10–12:05. R. Archer.
Lectures, exercises, and projects focused on developing concepts of space, scale, proportion, and texture as definitions of theatrical environments. Particular emphasis upon manipulating and controlling space as the key to understanding the design and technical objectives of theatre production.

362 Lighting Design and Technology Spring. 4 credits. For both majors and qualified nonmajors in related fields. Prerequisite: Theatre Arts 250 or permission of instructor.

M W 12:20–2:15. R. Dressler and K. Golden.
An intensive study of stage lighting practices and their associated technology as an expressive theatrical design medium.

363 Advanced Lighting Design and Technology Fall. 4 credits. Prerequisite: Theatre Arts 362 and permission of the instructor. May be repeated for credit.
M W 12:20–2:15. R. Dressler.
An exploration of lighting design and technology on a more advanced level with particular stress upon project work and practical design assignments.

364 Scene Design and Technology Fall. 4 credits. For both majors and qualified nonmajors in allied fields. Prerequisite: Theatre Arts 250 or permission of the instructor.
M W 12:20–2:15. R. Dressler and R. Archer.

A study of the basic problems of design and technology of scenery for the stage. The course will consider the design process, use of research and imagery, techniques of communicating, materials and their associated tools, and a wide variety of styles of construction and of handling those styles.

365 Advanced Scene Design and Technology Spring. 4 credits. Prerequisite: Theatre Arts 364 and permission of the instructor. May be repeated for credit.
M W 12:20–2:15. R. Dressler and R. Archer.
An exploration of scene design and technology on a more advanced level with particular stress upon project work and occasional inclusion of practical design assignments.

366 Costume Design and Technology Fall. 4 credits. For both majors and qualified nonmajors in allied fields. Prerequisite: Theatre Arts 250 or permission of the instructor.
M W 12:20–2:15. S. Perkins.

An introduction to costume design and technology which includes the analysis of the play and its characters, color, line, silhouette, figure drawing, rendering techniques, research, draping, drafting, period pattern-making and construction, and applied crafts.

367 Advanced Costume Design and Technology Spring. 4 credits. Prerequisite: Theatre Arts 366 and permission of the instructor. May be repeated for credit.
M W 12:20–2:15. S. Perkins.
An exploration of costume design and technology on a more advanced level with particular stress upon project work and occasional inclusion of practical design assignments.

Theatre Laboratories

All theatre arts laboratories are offered either term. Theatre Arts 155 is offered fall term; 156 spring term. These courses may be repeated for credit. Acting, directing, and managerial and technical responsibilities in production of theatre and dance are under the supervision of the department staff. These laboratories may also be taken on a noncredit basis.

Theatre Arts 155 and 156 may be added or dropped without penalty at any time during the semester.

Rehearsal and Performance Laboratories

155 Rehearsal and Performance Fall. 1–2 credits; 1 credit per production experience per term up to 2 credits per term. S-U grades only. Limited to students who are assigned roles after tryouts at the department's scheduled auditions, or managerial positions through interviews. Students should add this course only after they have been assigned roles or managerial positions.
T. Rattray.
The study, development, and performance of a role in departmental productions.

156 Rehearsal and Performance Spring. 1–2 credits; 1 credit per production experience per term up to 2 credits per term. S-U grades only.
T. Rattray.
See course description for Theatre Arts 155.

Theatre Design/Technology Laboratories

151 Production Laboratory I Fall or spring. 1–2 credits. May be repeated for credit. Orientation meeting in Willard Straight Theatre at 7:30 p.m. on the first day of instruction. K. Golden and S. Lang.
Practice and instruction in the basic techniques of construction and operation of scenery, costumes, and/or lighting. Instruction is within the Theatre Cornell production organization under the direct supervision of design/technology faculty.

251 Production Laboratory II Fall or spring. 1–3 credits. Prerequisite: Theatre Arts 151 or permission of the instructor. May be repeated for credit.
Orientation meeting in Willard Straight Theatre at 7:30 p.m. on the first day of instruction. K. Golden and D. Fletcher.

Practical production experience which involves specialized instruction and responsibility in positions such as light board operator, wardrobe mistress, set or properties crew head, etc., as well as preparatory work in specific areas of specialized construction. Instruction is within the Theatre Cornell production organization under the supervision of design/technology faculty.

351 Production Laboratory III Fall or spring. 1–3 credits; May be repeated for credit. Prerequisite: Theatre Arts 251 or permission of the instructor.
Orientation meeting in Willard Straight Theatre at 7:30 p.m. on the first day of instruction. K. Golden and J. King.

Practical production experience which requires advanced knowledge and responsibility in positions such as major crew head, assistant to a faculty or graduate designer or technician, or a major design or technical position on a smaller production. Instruction is within the Theatre Cornell production organization under the supervision of design and technology faculty.

451 Production Laboratory IV Fall or spring. 1–4 credits. Prerequisite: Theatre Arts 351 or permission of the instructor. May be repeated for credit.
Orientation meeting in Willard Straight Theatre at 7:30 p.m. on the first day of instruction. K. Golden.
Practical production experience requiring a major responsibility in the full design or technical direction of an aspect of a produced play within the Theatre Cornell production organization under the supervision of design/technology faculty.

Playwriting

348 Playwriting Fall and spring. 4 credits. Prerequisite: permission of instructor.
T 2–4:25. Playwright-in-residence, R. Tavel.
A laboratory for the discussion of student plays. Each student is expected to write two or three one-act plays, or one full-length play.

349 Advanced Playwriting Fall and spring. 4 credits. May be repeated for credit.
T 2–4:25. Playwright-in-residence, R. Tavel.
A continuation of Theatre Arts 348.

Theatre History, Literature, and Theory

240 Introduction to the Theatre Fall or spring. 3 credits.
M W F 11:15. J. Haarstick.
A survey of the elements of drama and theatre intended to develop appreciation and rational enjoyment of the theatre in all its forms. Not a production course.

300 Independent Study Fall or spring. 1–4 credits; no more than 4 credits each semester. May be repeated for credit. Limited to upperclass students. Prerequisite: permission of the department staff member directing the study.
Staff.
Individual study of special topics.

325 Classic and Renaissance Drama (also Comparative Literature 352) Fall. 4 credits.
T R 2:30–3:45. T. Murray.

Readings in world drama from the Greeks to Shakespeare, including dramatists such as Aeschylus, Sophocles, Euripides, Aristophanes, Plautus, Seneca, Calderón, Kyd, Marlowe, Shakespeare, Jonson, and Webster, with emphasis on the Greek and Elizabethan periods.

326 European Drama, 1660 to 1900 (also Comparative Literature 353) Spring. 4 credits.
T R 10:10–11:25. S. Williams.

Readings from major dramatists from Molière to Ibsen, including such authors as Racine, Congreve, Sheridan, Schiller, Goethe, Hugo, Büchner, Gogol, Turgenev, Zola, Hauptmann, and Chekhov.

327 Modern Drama (also Comparative Literature 354) Spring. 4 credits.
M W F 1:25 A. Caputi.

Readings from major dramatists of the twentieth century, including Ibsen, Chekhov, Strindberg, Shaw, Pirandello, Ionesco, Brecht, Beckett, and Pinter.

333 History of the Theatre I Fall. 4 credits.
M W F 11:15. S. Williams.

A survey of the characteristics of primitive theatre and of theatrical styles and production modes in Classical Greece and Rome, medieval Europe, Renaissance England, France, Italy, and Spain.

334 History of the Theatre II Spring. 4 credits.
M W F 11:15. S. Williams.

A survey of theatrical styles and production modes from 1660 to 1914. Among the periods considered are the English Restoration, the eighteenth and nineteenth centuries in England, France and Germany, and the international modernist theatre. The course will conclude with a brief survey of the Oriental Theatre, with particular reference to its influence on European symbolism.

[335 History of the Theatre III Fall. 4 credits. Not offered 1980–81.
S. Williams.

A survey of the modern and contemporary theatre, from expressionism to the present day. Particular emphasis will be placed on the experimental aspects of the modern theatre, on the work of key innovators such as Appia, Craig, Brecht, Piscator, Brook and Grotowski, and on contemporary, experimental theatre groups.]

336 American Drama and Theatre Fall. 4 credits.
T R 12:20–1:35. Staff.

A study of the American theatre and representative American plays with emphasis on drama from O'Neill to the present.

424 Play and Period. Spring. 4 credits.
Prerequisites: permission of instructor, and some upper-level work in literary analysis or theatre history.
T R 2:30–3:45. S. Williams.

An intensive study of the theatrical and cultural background of a play being performed in the department's mainstage season. The course will include a detailed study of the play itself, of the other works of the dramatist and, where relevant, of other plays of the time. Students will be expected to complete a dramaturgical assignment.

[425 Shakespeare: King Lear and The Stages of History (also English 425) Not offered 1980–81.]

434 Theatre and Society Spring. 4 credits.
Prerequisite: permission of the instructor. Students will be expected to have had some upper-level experience in one of the following areas: literary analysis, theatre history, sociology, psychology, history, anthropology, or philosophy.
T R 2:30–3:45. S. Williams and staff.

An examination of the role theatre has played in the social and political life of Western civilization. Topics to be covered will include: the theatre and the church, the theatre as an agent of social change, censorship and the theatre, the theatre and revolution, and theatre and education. Students will be encouraged to use this examination to arrive at their own definitions of the importance of the mimetic instinct in human society.

436 Theory of the Theatre and Drama Fall. 4 credits.
M W F 1:25. Staff.

A study of various theories of dramatic form and the theatrical presentation from Aristotle and Horace to Artaud and Brecht, with emphasis on the romantic and modern period, including Lessing, Hugo, Wagner, Strindberg, Stanislavsky, Appia, Craig, Yeats, Langer, Frye, Burke, Fergusson, and Grotowski.

[442 Ibsen and Chekhov (also Comparative Literature 472) Not offered 1980–81.]

495 Honors Research Tutorial Fall or spring. 1–4 credits. Prerequisites: senior standing and departmental acceptance as an honors candidate.
Staff.
Methods and modes of research for honors project.

496 Honors Thesis Project Fall or spring. 1–4 credits. Prerequisites: senior standing and departmental acceptance as an honors candidate.
Staff.
Preparation and presentation of honors thesis or practicum.

[632 Critical Writing Workshop Not offered 1980–81.]

[633 Seminar in Theatre History Not offered 1980–81.]

636 Seminar in Dramatic Criticism Fall. 4 credits.
R 2:30–5. S. Williams.
Subject for 1980: Contemporary drama.

637 Seminar in Dramatic Theory Spring. 4 credits.
W 2:30–5. Staff.

[638 Seminar in Theory of the Theatre Not offered 1980–81.]

672 Dramatic Literature: Tragedy and Its Near Relatives (also English 672) Spring. 4 credits.
A. Caputi.

[699 Seminar in the Theories of Directing Not offered 1980–81.]

[700 Introduction to Research and Bibliography in Theatre Arts Not offered 1980–81.]

880 Master's Thesis

880.1 Master's Thesis: Design Seminar

880.2 Master's Thesis: Design Graphics

880.3 Master's Thesis

990 Thesis and Special Problems in Drama and the Theatre

Related Courses in Other Departments

Myths of Greece and Rome (Classics 150)

The Greek Experience (Classics 211)

The Roman Experience (Classics 212)

Comedy (Comparative Literature 312)

Shakespeare (English 227)

Shakespeare (English 327)

Seminar in Shakespeare (English 427)

Schiller (German Literature 354)

Dance

200 Introduction to Dance Fall or spring. 3 credits. Concurrent enrollment in a technique class at the appropriate level is required.
T R 4:40–6. J. Desmond.

Basic dance technique, improvisation, and composition readings in dance aesthetics and twentieth-century dance history.

205 Contemporary Composers and Choreographers Spring. 3 credits.

J. Desmond, D. Borden, and M. Monk.
Introduction to some work of choreographers and their collaborative composers from the late 1950s to the present. Included are analysis of work by Cunningham and Cage, Cunningham and Tudor, Meredith Monk, Laura Dean, Lucinda Childs, Philip Glass, and others. Film and video tapes are used. Two papers and choreographic projects in a contemporary style.

210 Beginning Dance Composition and Music Resources (also Physical Education 210) Fall. 4 credits. Prerequisites: intermediate technique level and permission of instructor; for dance majors: Music 141. Concurrent enrollment in a technique class at the appropriate level is required.
T R 4:40–6. Staff.

This course is designed to develop resources in movement and in music as it relates to dance. Students will prepare studies concerned with use of space, time, body design, and dynamics. Various approaches to the structuring of these elements will be the basis for the study of form as it applies to dance and music.

211 Beginning Dance Composition and Music Resources (also Physical Education 211) Spring. 4 credits. Prerequisite: Theatre Arts 210.
Staff.
A continuation of 210.

301 Dance Technique (also Physical Education 301) Fall or spring. 1 credit; may be repeated for up to 4 credits. Credit will be given for enrollment only in intermediate and advanced sections. S-U grades only.
Contact Women's Physical Education for schedule of sections. J. Desmond and M. Bryan.

[307 Asian Dance and Dance Drama (also Asian Studies 307) 3 credits. Not offered 1980–81.]

310 Advanced Dance Composition (also Physical Education 310) Fall. 4 credits. Prerequisite: Theatre Arts 211.
Staff.
Problems in composition for groups and music resources for dancers.

311 Advanced Dance Composition (also Physical Education 311) Spring. 4 credits.
Staff.
Further problems in composition for groups.

312 Physical Analysis of Movement Fall. 3 credits. Hours to be arranged.
J. Morgenroth.

This course is an examination of human movement, with particular attention to dance movement. Readings will be supplemented by laboratory work in movement analysis.

[314 History of Dance] 3 credits. Not offered 1980-81.]

[315 History of Dance] 3 credits. Not offered 1980-81.]

[316 Human Biology for the Performing Arts] 5 credits. Not offered 1980-81.]

318 Historical Dances Spring. 2 credits. Prerequisite: elementary ballet or elementary modern technique.

Staff.

A sampling of the social dances from the Renaissance to the present with emphasis on pinpointing basic differences in movement styles and customs in the various periods. A majority of class time will be spent learning and performing the dances.

410 Individual Problems in Composition (also Women's Physical Education 410) Fall or spring. 3 credits. Prerequisite: Theatre Arts 311.

Staff.

Individual problems in composition.

[418 Seminar in History of Dance] Fall or spring. 3 credits. Prerequisites: Theatre Arts 315 or permission of instructor. Not offered 1980-81.

Staff.

See instructor for description of the particular aspect of history of dance to be investigated.]

Cinema

374 Introduction to Film Analysis: Meaning and Value Fall. 4 credits.

T R 10:10-11:30. G. Perez.

Consideration of the ways films generate meaning and of the ways we attribute meaning and value to films. Discussion ranges over commercial narrative, documentary, and experimental film types.

375 History and Theory of the Commercial Narrative Cinema Fall. 4 credits. Fee for screening expenses, \$5 (this fee is paid in class).

T R 2-4:25. G. Perez.

Within the context of history, the description, interpretation, and evaluation of commercial narrative films as works of art and as objects for mass consumption. Emphases include "the articulation of a cinematic language," "realism," "popular art," and "modernism." Contemporary methods of analysis such as the auteur theory and semiotics are introduced.

[376 History and Theory of Documentary and Experimental Film] Fall. 4 credits. Fee for screening expenses, \$5 (this fee is paid in class). Not offered 1980-81; next offered 1981-82.

T R 2-4:25. D. Fredericksen.

Documentary figures covered include Vertov, Flaherty, Grierson, Ivens, Lorentz, Riefenstahl, Capra, and Jennings. Within the history of experimental film, emphases are the avant-garde of the twenties, the movement toward documentary in the thirties, and American experimental film from the forties to the present.]

377 Fundamentals of 16-mm Filmmaking Fall or spring. 4 credits. Limited to 12 students each semester. Prerequisite: permission of instructor. Fee for maintenance costs, \$10 (this fee is paid in class). The average cost to each student for materials and processing is \$100.

M W F 2-4:25. M. Rivchin.

The mechanics and expressive potential of 16-mm filmmaking, including nonsynchronous sound. Each student makes two short films, and retains ownership of them. No prior filmmaking experience is assumed.

[378 Russian Film of the 1920s and French Film of the 1960s] Spring. 4 credits. Prerequisite: Theatre Arts 375. Fee for screening expenses, \$5 (this fee is paid in class). Not offered 1980-81.

T R 2-4:25. D. Fredericksen.

An intensive treatment of two distinct periods of innovation in film history and theory. Emphasis is on the relationship between theory and practice. Major figures include Eisenstein, Pudovkin, Vertov, Dovzhenko, Godard, Truffaut, Resnais, Robbe-Grillet, Bresson, and Rivette.]

[379 International Documentary Film from 1945 to the Present] Spring. 4 credits. Prerequisite: Theatre Arts 376. Fee for screening expenses, \$5 (this fee is paid in class). Not offered 1980-81; next offered 1981-82.

T R 2-4:25. D. Fredericksen.

Emphases on the contemporary international documentary as a sociopolitical "force," as an ethnographic tool within and without a filmmaker's own culture, and as an artistic form with a distinct history and set of "theoretical" questions. Major figures, structures, and movements covered include Jennings, Rouquier, Leacock, Malle, Rouch, Jolanas, national film boards, "Challenge for Change," "direct cinema," "cinema verité," and "revolutionary" documentary from the Third World.]

475 Seminar in the Cinema I Fall. 4 credits.

W 2:30-5:30. G. Perez.

Topic for fall 1980: The use of point of view in film.

477 Intermediate Film Projects Spring. 4 credits. Limited to 4 students. Prerequisites: Theatre Arts 377 or equivalent, and permission of instructor. Fee for maintenance costs, \$10 (this fee is paid in class). The average cost to each student for materials and processing is \$150; students retain ownership of their films.

Hours to be arranged. M. Rivchin.

The development and completion of individual projects, with emphasis on personal and documentary modes, including preparation of an original script or storyboard; direction; cinematography; sound recording; editing; and follow-through to a composite print.

Inter-University Center for Critical and Film Studies in Paris

Cornell is part of a consortium supporting the center. For course listings and information about participation, contact Professor Fredericksen, 112 Lincoln Hall. Prerequisites for participation in the program are: fluency in French and completion of Theatre Arts 374, 375, and 376.

Ukrainian and Vietnamese

See Modern Languages, Literatures, and Linguistics, p. 92.

Yiddish

See Department of Near Eastern Studies, p. 108.

Special Programs and Interdisciplinary Studies

Africana Studies and Research Center, p. 126.
 Biology and Society, p. 128.
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Medieval Studies, p. 130.
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 Program on Science, Technology, and Society, p. 131.
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Africana Studies and Research Center

131 Swahili Fall. 4 credits. No prerequisites.
 T W 10:10. A. Nanji.
 Beginning Swahili; grammar part 1.

132 Swahili Spring. 4 credits. Prerequisite: Swahili 131 or previous study of the language.
 M W 11:15. A. Nanji.
 Elementary reading and continuation of grammar.

133 Swahili Fall. 4 credits. Prerequisites: Swahili 131 and 132.
 A. Nanji.
 Advanced study in reading and composition.

134 Swahili Spring. 4 credits. Prerequisites: Swahili 131, 132, and 133, or permission of instructor.
 A. Nanji.
 Advanced study in reading and composition.

137 Afro-American Writing and Expression Fall. 4 credits.

T R 10:10. H. Fuller.

Designed to promote clear and effective communication skills, using black-oriented materials as models for writing assignments and oral discussions.

138 Applied Writing Methods on Afro-American Topics Spring. 3 credits.

T R 11:15.

A writing skills course which explores traditional and nontraditional research sources, using Afro-American experiences as the primary subject matter.

171 Infancy, Family, and the Community Fall. 4 credits.

T R 3:10. W. Cross.

Survey of key psychological dimensions of the black experience covering such issues as (1) race and intelligence; (2) black identity; (3) black family structure; (4) black English; (5) black middle class; and (6) nature of black psychology.

172 Teaching and Learning in Black Schools

Spring. 4 credits. Intended for freshmen and sophomores.

T R 3:10. W. Cross.

A course designed for freshmen and sophomores that will be devoted to the history and contemporary issues of black education, such as the struggle for black studies, the development of independent black grammar, and problems of public schools in black communities.

190 Introduction to Modern Political Systems

Fall or spring. 4 credits.

M W 1:25. O. Agyeman.

An analytical interpretation of the sociopolitical and economic systems of sub-Saharan African countries as well as the nationalist struggles in southern Africa.

202 Swahili Literature Fall. 4 credits. Prerequisite: Swahili 134.

A. Nanji.

Students gain mastery over spoken Swahili and are introduced to the predominant Swahili literary forms.

203 History and Politics of Racism and Segregation Fall. 4 credits.

T R 12:20-1:25. C. Mbata.

A cross-cultural study in historical context of the evolution of racist thought and practice in southern Africa and North America.

204 History and Politics of Racism and Segregation

Spring. 4 credits.

T R 12:20-1:25. C. Mbata.

The patterns of racism and segregation are dealt with in a historical context, using southern Africa and North America as case histories. Study is undertaken within a theoretical framework that broadly defines racism and segregation and their implications.

219 Issues in Black Literature

Fall. 4 credits.
An examination of literature written for black children, including an analysis of the literature as it pertains to black life from 1960 to the present. Students write a pamphlet containing their essays, fiction, and poetry, and compile a bibliography of literature for black children.

231 Black Political Thought in the United States

Fall. 3 credits.

M W F 3:10-4. M. Marable.

This is an introductory course that will review and analyze the major political formulations developed and espoused by black people in the struggle for liberation. Such themes as slave resistance, nationalism, Pan-Africanism, emigration, anti-imperialism, socialism, and the political thought of black women will be discussed. Black political thought will be viewed in its development as responses to real conditions of oppression and exploitation.

283 Black Resistance: South Africa and North America

Fall. 4 credits.

C. Mbata.

A study of black political movements in South Africa and North America and their responses to the situations of race relations that formed the contexts of their operations.

285 Black Drama

Spring. 3 credits.

M W 1:25.

This course is intended to serve as an introduction to the history of black drama, and to provide the means through which students can cultivate their interests in dramaturgical criticism and production techniques. Each student in the course will read a number of black plays, write a critical paper on black drama, and participate in the production of a play.

290 The Sociology of the Black Experience

Fall. 3 credits.

M W F 3:10-4. J. Turner.

An introductory course to the sociology of the black experience, and to the field of Afro-American studies. Required for all undergraduate students majoring at the Africana Center.

301 Seminar: Psychological Aspects of the Black Experience

Spring. 4 credits. Prerequisites:

permission of instructor.

W. Cross.

Existing research is used to raise specific questions about new cultural political awareness in the black community. The focus is on individual conversion experiences within the context of social movements. The transformations of political groups (for example, Black Panther Party) and outstanding activists and intellectuals (such as Malcolm X) are used as reference points for analytical discussion of theory.

[302 Social and Psychological Effects of Colonization and Racism

Spring. 4 credits. Staff.

Offered alternate years. Not offered 1980-81.]

[303 Blacks in Communication Media and Film Workshop

Spring. 3 credits. Not offered 1980-81.

The focus is on the general theory of communications, the function of media in an industrialized society, and the social, racial, and class values implied in the communication process. There are group writing projects, a term paper, and the screening of significant American and Third World films.]

344 Neocolonialism and Government in Africa: Problems of Africanization and Development

Fall. 3 credits.

T R 1:25. O. Agyeman.

Designed to study the problems of government in Africa with emphasis on Ghana, Nigeria, Kenya, Uganda, Tanzania, Zambia, and Malawi.

345 Afro-American Perspectives in Experimental Psychology (also Psychology 345)

Spring. 3 or 4 credits. Prerequisite: an introductory course in psychology or AS&RC 171. Offered alternate years.

A. W. Boykin.

346 African Socialism and Nation Building

Spring. 4 credits.

An exploration and critical analysis of the various theories of African socialism as propounded by theorists and practitioners. Those ideas, extending from Nyerere's Ujamaa (for example, traditional social and economic patterns of African society) to Nkrumah's Scientific Socialism (such as the desirability and practicality of the Marxian type of socialism in Africa), are compared.

351 Politics in the Afro-Caribbean World; An Introduction

Fall or spring according to demand. 4 credits.

A study of the social, political, economic, and psychological forces that have shaped Caribbean societies.

352 Pan-Africanism and Contemporary Black Ideologies

Spring. 4 credits.

A historical study of Pan-Africanism that reviews and analyzes the literature and activities of early black Pan-African theorists and movements.

360 Ancient African Nations and Civilizations

Fall. 3 credits.

T R 12:20-1:20. J. Higginson.

An introduction to African history beginning with early civilizations in pre-European Africa.

361 Afro-American History (from African Background to the Twentieth Century)

Fall. 3 credits.

M W F 10:10. M. Marable.

Designed to explore major themes of the black historical experience in America from African origin to the twentieth century. A major concern is the changing status of black people over time and their attempts to cope with bondage, racism, circumcision, and oppression.

370 Afro-American History: The Twentieth Century

Spring. 3 credits.

T R 2:30-3:35. R. Harris.

An exploration of major themes of the black historical experience in America during the twentieth century. The socioeconomic, political, and cultural condition of Afro-Americans is assessed, after their presence in this country for more than three hundred and fifty years.

381 Contemporary African History

Spring. 3 credits.

M W 12:20-1:25. J. Higginson.

A survey of the present problems on the African continent as they appear from 1500 to the present time. Important topics include the impact of the Atlantic slave trade, the European Scramble of 1884, various forms of African resistance to colonial occupation to 1914, and the prospects of protracted social unrest in Africa south of the Zambezi River.

382 Comparative Slave Trade of Africans in the Americas

Spring. 3 credits.

T R 1:25-2:30. J. Higginson.

The focus is on eighteenth- and nineteenth-century slave societies in Virginia and South Carolina in North America and the eighteenth-century slave societies in San Domingue or Haiti and to some extent in Jamaica. The slave society in Cuba during the latter part of the nineteenth century is studied.

400 Political Economy of Ideology and Development in Africa

Spring. 4 credits.

T R 11:15. O. Agyeman.

The course explores the processes of the historical underdevelopment of Africa, drawing upon the assumptions of the "underdevelopment" theory. It then takes up the problems of development by examining the different ideologies and strategies extant and by highlighting the interaction of political and economic forces. Case studies are drawn from Ghana, Kenya, and Tanzania.

[410 Black Politics and the American Political System

Fall. 4 credits. Not offered 1980-81.

The course is designed to engage students in a survey and analysis of the theoretical and empirical basis of black politics in America. It is a sociohistorical investigation and evaluation of the variety of practical political activities among black people in the United States.

420 Social Policy and the Black Community in the Urban Economy

Spring. 4 credits. Offered alternate years.

J. Turner.

422 African Literature

Spring. 4 credits.

The main focus is on the basic themes in the twentieth-century literature produced by Africans south of the Sahara.

[425 Advanced Seminar in Black Theatre

Fall. 4 credits. Not offered 1980-81.

The course involves the study and production of the total black theatre.]

431 History of Afro-American Literature

Fall. 4 credits.

H. Fuller.

An extensive examination of the impact that Afro-American literature has had on describing, explaining, and projecting the Afro-American experience from 1619 to the present.

432 Modern Afro-American Literature

Spring. 4 credits.

H. Fuller.

A study of fiction by black writers, focusing on the political and sociological component that influenced the development and growth of black writing in relationship to literary themes and attitudes current in specific periods and movements from post-World War I to the present.

460 History of African Origins of Major Western Religions

Fall or spring. 4 credits. Prerequisite:

sophomore status or permission of instructor.

Y. ben-Jochannan.

The course is designed to develop an understanding of the basic origins of the philosophical, theological, and magical-religious teachings responsible for Judaism, Christianity, and Islam.

[465 Black Critique: Towards Defining and Developing a Black Aesthetic

Spring. 4 credits.

Not offered 1980-81.

A study of aesthetic, moral, and cultural values and judgments that black people can develop, recognize, and viably respect as black aesthetics.]

475 Black Leaders and Movements in Afro-American History

Spring. 4 credits.

T R 3:35-4:25. R. Harris.

A comprehensive analysis of the personalities, ideas, and activities central to the struggle for Afro-American liberation, ranging from eighteenth-century figures to the present time. Rebellion, emigration, assimilation, nationalism, accommodation, protest, cultural pluralism, separation, integration, and revolution are some of the central issues.

483 Themes in African History

Fall. 4 credits.

M W 1:25-3:20. C. Mbata.

A study of selected themes in African history, making use of work done in related disciplines. Until further notice the selected topic will be "Women in African history."

485 Racism, Social Structure, and Social Analysis Seminar Spring. 4 credits.

W 2-4:25. J. Turner.

An examination of the social structure of American society and the relationship of racial and class categories to social stratification. An analysis of power structures and the social salience of socioeconomic connections of governmental decision makers and the corporate structure is developed.

490 Advanced Reading and Research Seminar in Black History Spring. 4 credits.

M W 1:25. C. Mbata.

Designed to help students acquaint themselves with the available sources of information and materials in black history, as well as make the maximum use of their own inclinations and interests in unearthing the material and creating a body of comprehensible conclusions and generalizations out of it.

Note: May be taken to fulfill requirements for a major in African or Afro-American studies.

495 Political Economy of Black America Spring. 4 credits.

F 12:20-2:15. M. Marable.

An examination of the role that black labor has played in the historical development of United States monopoly, capitalism, and imperialism. Emphasis is on the theory and method of political economy, and a concrete analysis of the exploitation of black people as slave labor, agricultural labor, and proletarian labor.

498-99 Independent Study 498, fall; 499, spring.

Hours to be arranged. Africana Center faculty. For students working on special topics with selected readings, research projects, etc., under the supervision of a member of the Africana Studies and Research Center faculty.

505 Workshop in Teaching About Africa

4 credits. Prerequisites: AS&RC 203 and 204, or AS&RC 360 and 361, or permission of instructor. Offered alternate years.

C. Mbata.

[510 Historiography and Sources: The Development of Afro-American History Fall.

4 credits. Prerequisite: upperclass or graduate standing, or permission of instructor. Not offered 1980-81.

T R 11:15. R. Harris.

Through a critical examination of the approach, methodology, and philosophy of major writers in this field such as James W. C. Pennington, George Washington Williams, W. E. B. DuBois, Carter G. Woodson, John Hope Franklin, Benjamin Quarles, Lerone Bennett, Jr., and Vincent Harding, the evolution of Afro-American history is traced from its origin to the present. The nature and purpose of Afro-American history, especially the role of the black historian in the context of a racist and oppressive society, is analyzed. Attention is given to sources for studying black history, and each participant fashions a conceptual framework for application to the materials and evidence of the black experience in America.]

[515 Comparative Political History of the African Diaspora 4 credits. Prerequisites: upperclass or graduate standing, or two of the following courses:

AS&RC 203, 204, 283, 360, 361, 475, 484, 490. Offered alternate years. Not offered 1980-81.]

[520 Historical Method, Sources and Interpretation Fall. 4 credits. Prerequisites:

upperclass or graduate standing, or two of the

following courses: AS&RC 203, 204, 361, 475, 484, 490.

C. Mbata.

Offered alternate years. Not offered 1980-81.]

[550 Transnational Corporations in Africa and Other Developing Countries Spring. 4 credits.

Prerequisites: upperclass or graduate standing, or permission of instructor. Not offered 1980-81. Examines the role of transnational enterprises as an economic and political factor in the Third World, their relations with the host government and their interaction with both the private and public sectors of the economy of the host country. Special emphasis on Africa and Latin America.]

[551 Political History of Social Development in the Caribbean 4 credits. Offered according to demand. Prerequisite: upperclass or graduate standing or permission of instructor. Not offered 1980-81.]

571 Seminar: Psychological Issues in the Black Community Fall. 4 credits. Prerequisite: permission of instructor.

W. Cross.

A critical examination of existing theory and research on identity development and identity transformation in Afro-American life, including black identity metamorphosis that occurs within the context of social movements. Particular attention is given to (1) the interface between social systems and identity development and maintenance; (2) dual consciousness; (3) functions of identity in daily life; (4) conversion and deconversion within the contexts of the contemporary black movement; (5) the psychohistorical implications of unidimensional theories black self-concept; (6) the relationships among identity, behavior, and ideology.

698-699 Thesis 698, fall; 699, spring. Limited to Africana Studies and Research Center students.

Africana Center faculty.

Biology and Society

Biology and Society I: The Biocultural Perspective (Anthropology 301, Biological Sciences 301, and Biology and Society 301) Fall.

Biology and Society II: Biology, Society, and Human Values (Anthropology 302, Biological Sciences 302, and Biology and Society 302) Spring.

Biomedical Ethics (Biological Sciences 205 and Philosophy 245) Fall.

Environmental Ethics (Biological Sciences 206 and Philosophy 245) Spring.

375 Independent Study Fall or spring. 1-4 credits each item.

Hours to be arranged. Staff.

400 Senior Seminar. Human Fertility in Developing Nations (also Sociology 434) Fall.

4 credits. Prerequisite: Sociology 230.

T 2:30-4:25. J. M. Stycos.

A review of the major literature dealing with the social causation of variation in human fertility. Emphasis will be on international comparisons and on the methodology of field research.

401 Senior Seminar. Biomedical Research, Regulations, and Ethics: A Delicate Balance Fall.

4 credits. Prerequisite: Anthropology 301-302, or Biological Sciences 301-302, or Biology and Society 301-302, or permission of the instructor. Course topic offered alternate years.

T 2:30-4:25. J. Fessenden-Raden.

A study of the "creative" tension between biomedical research and society brought about by Congressional project-specific funding; regulations

on human and animal experimentation, recombinant DNA research, laboratory safety; citizen participation on advisory councils; and citizens' rights to a healthful life. The scientific, economic, philosophical, moral, political, and safety issues will be explored through specific examples.

402 Senior Seminar. Biomedical Research, Regulations, and Ethics: A Delicate Balance

Spring. 4 credits. Prerequisite: Biology and Society 401. Course topic offered alternate years.

T 2:30-4:25. J. Fessenden-Raden.

A case study of a specific area selected during the fall semester. Students participate in research and presentation of materials relevant to their specific backgrounds and interests. Outcome will be a National Academy of Sciences-style report.

403 Senior Seminar in Social Demography (also Sociology 430) Fall. 4 credits. Prerequisite: junior standing or permission of the instructor.

Hours to be arranged. B. Edmonston.

The aim of this course is to give a broad outline of population studies in the context of the social and biological sciences. Emphasis will be placed on substantive relationships and the results of demographic analysis rather than on demographic methods. The course format will be lecture and discussion.

College Scholar Program

The College Scholar Program is described in the *Announcement of Academic Information*.

College Scholar 397 Independent Study Fall or spring. 1-4 credits. Prerequisite: permission of program office.

College Scholar 499 Honors Research Fall or spring. 4-8 credits; a maximum of 8 credits may be earned for honors research. Prerequisite: permission of program director. Each participant must submit a brief proposal approved by the honors committee.

College Scholar 346 The Roots of Greek Civilization (also Near Eastern Studies and Government 352) Fall. 4 credits. Limited enrollment.

T R 12:20. Martin Bernal.

Independent Major Program

The Independent Major Program is described in the *Announcement of Academic Information*.

Independent Major 351 Independent Study Fall or spring. 1-4 credits. Prerequisite: permission of program office.

Independent Major 499 Honors Research Fall or spring. 4-8 credits; a maximum of 8 credits may be earned for honors research. Prerequisite: permission of program director. Each participant must submit a brief proposal approved by the honors committee.

Program of Jewish Studies

101 Jewish Contributions to Western Culture Fall. 3 credits. A Freshman Seminar

T R 2:30-3:45. S. Zipperstein.

A study of the literary evidence illustrating significant influences which Judaism has had upon Western civilization—in the development of biblical monotheism, the birth of Christianity, medieval philosophy, and modern religious existentialism. Pertinent Jewish texts are considered both in their own historical and cultural context and insofar as they had an effect on the predominantly Christian culture of Western society at large.

Related Courses Sponsored by Other Departments

[Tolerance and Intolerance: The Image of the Jew in Western Civilization (Comparative Literature 320) Not offered 1980-81.]

[Literature of the Holocaust. (Comparative Literature 323) Not offered 1980-81.]

[Yiddish Literature in Translation (German 350) Not offered 1980-81.]

[The Shtetl in Modern Yiddish Fiction in English Translation (German 375 and Near Eastern Studies 375) Not offered 1980-81.]

[Topics in Yiddish Literature (German 377 and Near Eastern Studies 377) Not offered 1980-81.]

[The Jewish Problem as Political Problem (Government 371) Not offered 1980-81.]

Jewish Workers in Europe and America, 1789-1948 (ILR 381)

Man and His Environment in Western Religious Thought (Society for the Humanities 415-416)

[The Literature of Ancient Israel I (Near Eastern Studies 221) Not offered 1980-81.]

[The Literature of Ancient Israel II (Near Eastern Studies 222) Not offered 1980-81.]

Freshman Seminar in Biblical Literature: Heroes and Heroines of the Bible (Near Eastern Studies 225)

[Readings in Classical Hebrew Literature (Near Eastern Studies 231-232) Not offered 1980-81.]

The History of Ancient Israel to 450 B.C.E. (Near Eastern Studies 243)

Jews of the Ancient and Muslim Near East: 450 B.C.E.-1204 C.E. (Near Eastern Studies 244)

Jews of the Christian West: 476-1948 (Near Eastern Studies 245)

[Modern Hebrew Literature in English Translation (Near Eastern Studies 260-261) Not offered 1980-81.]

Undergraduate Seminar in Biblical Literature: Prophecy in Ancient Israel (Near Eastern Studies 322)

Independent Study: Biblical Literature (Near Eastern Studies 326)

Seminar in Jewish History: Eastern European Jewry in the Modern Age (Near Eastern Studies 331)

[The Historical Development of Rabbinic Legal Literature (Near Eastern Studies 333) Not offered 1980-81.]

Biblical Interpretation in Rabbinic Literature (Near Eastern Studies 334)

Independent Study: Rabbinic Literature (Near Eastern Studies 339)

The History and Culture of Ancient Mesopotamia (Near Eastern Studies 341)

[The Jewish Community Throughout History (Near Eastern Studies 343) Not offered 1980-81.]

[Age of the Patriarchs (Near Eastern Studies 344) Not offered 1980-81.]

[History of the Ancient Near East in Biblical Times (Near Eastern Studies 345) Not offered 1980-81.]

[Judaism and Christianity in Conflict (Near Eastern Studies 347) Not offered 1980-81.]

[Independent Study: Ancient Israel and the History of the Jewish People (Near Eastern Studies 348) Not offered 1980-81.]

[Seminar in Modern Hebrew Literature: The National Renaissance (Near Eastern Studies 361-362) Not offered 1980-81.]

[Seminar in Modern Hebrew Literature: The Enlightenment (Near Eastern Studies 363-364) Not offered 1980-81.]

[Seminar in Modern Hebrew Literature: The Israeli Short Story (Near Eastern Studies 366) Not offered 1980-81.]

[Seminar in Modern Hebrew Literature: The Early Hebrew Novel (Near Eastern Studies 367)

Folklore in the Ancient Near East (Near Eastern Studies 384)

Latin American Studies

Economics of Agricultural Development (Agricultural Economics 464)

Seminar on Latin American Agricultural Policy (Agricultural Economics 665)

Geography and Appraisal of Soils of the Tropics (Agronomy 401)

Management Systems for Tropical Soils (Agronomy 480)

Livestock Production in Warm Climates (Animal Science 400)

Forages of the Tropics for Livestock Production (Animal Science 403)

The Discovery of America (Anthropology 150)

[The Earliest Civilizations (Anthropology 250) Not offered 1980-81.]

Urban Anthropology (Anthropology 313)

Ethnology of the Andean Region (Anthropology 333)

[Interpretation of the Archaeological Record (Anthropology 352) Not offered 1980-81.]

Archaeology of the Americas I (Anthropology 354)

Archaeology of the Americas II (Anthropology 355)

[Ethnohistory (Anthropology 418) Not offered 1980-81.]

[Indians of Mexico and Central America (Anthropology 432) Not offered 1980-81.]

Andean Thought and Culture (Anthropology 433)

[Investigation of Andean Institutions: Archaeological Strategies (Anthropology 435) Not offered 1980-81.]

Mesoamerican Thought and Culture (Anthropology 456)

Seminar in Archaeology: Settlement Archaeology (Anthropology 494)

[Andean Symbolism (Anthropology 632) Not offered 1980-81.]

Andean Research (Anthropology 633)

Problems in Archaeology: Agricultural Origins (Anthropology 663)

Problems in Archaeology: Early Man in America (Anthropology 664)

Historical Archaeology: Method and Theory (Archaeology 311)

Seminar in Latin American Urban Planning and Development (City and Regional Planning 570)

Workshop in Latin American Urban Planning and Development (City and Regional Planning 571)

Regional Planning and Development in Developing Nations (City and Regional Planning 670)

Seminar in International Planning (City and Regional Planning 671)

Economic History of Latin America (Economics 325/525)

[Cuba: Culture and Revolution (Government 335) Not offered 1980-81.]

[Politics of Latin America (Government 340)

[Latin American Society and Politics (Government 655) Not offered 1980-81.]

[Agrarian Societies in Latin American History (History 347) Not offered 1980-81.]

[Contemporary Brazil (History 348 and Sociology 368) Not offered 1980-81.]

[Seminar in Latin American History (History 649) Not offered 1980-81.]

Special Studies of Problems of Agriculture in the Tropics (International Agriculture 602)

Elementary Portuguese (Portuguese 121-122)

Portuguese Intermediate Composition and Conversation (Portuguese 203-204)

Advanced Composition and Conversation (Portuguese 303-304)

[Portuguese Advanced Readings (Portuguese 305-306) Not offered 1980-81.]

Seminar in Portuguese Linguistics (Portuguese 700)

Quechua Elementary Course (Quechua 131-132)

Quechua Intermediate Course (Quechua 133-134)

Seminar in Quechua Linguistics (Quechua 700)

Introduction to Hispanic Literature (Romance Studies 201)

[Intermediate Spanish Grammar and Composition (Romance Studies 212) Not offered 1980-81.]

[Advanced Spanish Grammar and Composition (Romance Studies 312) Not offered 1980-81.]

Readings in Sixteenth- and Seventeenth-Century Hispanic Literature (Romance Studies 315)

Readings in Modern Hispanic Literature (Romance Studies 316)

**Readings in Spanish-American Literature
(Romance Studies 317)****[Latin American Civilization (Romance Studies 323)** Not offered 1980–81.]**Spanish-American Short Story (Romance Studies 333)****[Form and Formlessness in the Novel of the Generation of 1898 (Romance Studies 389)** Not offered 1980–81.]**[Quixote and the Modern Hispanic Novel (Romance Studies 446)** Not offered 1980–81.]**Hispanic Romanticism (Romance Studies 489)****After the Revolution: Mexico and Cuba (Sociology 367)****[Contemporary Brazil (Sociology 368)** Not offered 1980–81.]**Human Fertility in Developing Nations (Sociology 434)****Research Seminar in Population (Sociology 632)****Latin American Society and Politics (Sociology 655)****[History of the Spanish Language (Spanish 401–402)** Not offered 1980–81.]**Applied Linguistics of Spanish (Spanish 407)****Grammatical Structure of Spanish (Spanish 408)****Hispanic Dialectology (Spanish 601)****Linguistic Structure of Ibero-Romance (Spanish 602)****Contemporary Theories of Spanish Phonology (Spanish 603)****Contemporary Theories of Spanish Grammar (Spanish 604)****Seminar in Hispanic Linguistics (Spanish 700)****Medieval Studies****Freshman Seminars**

Each semester the program in Medieval Studies offers at least three freshman seminars featuring readings from the best works of European literature from the medieval millennium (c. 500–1500 A.D.) and usually some readings as well from modern imitators of medieval styles (e.g., Tennyson, Tolkien, C. S. Lewis, T. H. White). Students should consult the freshman seminar program brochure each term for an up-to-date listing of course topics and section times.

Related Courses

Courses in various aspects of medieval studies are offered each year in numerous cooperating departments, including Classics, comparative literature, English, history, history of art, modern languages and literatures (including German literature, Romance studies, and Russian literature), music, Near Eastern Studies, philosophy, and the Society for the Humanities. An up-to-date listing of courses offered in each term will be made available at the office of the Classics Department (121 Goldwin Smith Hall) as soon as the *Course and Time Roster* is published.

Graduate Seminar**671 The Vikings** Fall. 4 credits.

Hours to be arranged. R. T. Farrell.
This course is meant to function as a meeting place for students from a number of disciplines who wish to explore the complex cultural phenomenon of the Scandinavian impact on Europe in the Middle Ages. All students will be asked to gain a basic understanding of several literary works and texts dealing with the elements of art history, archaeology, and cultural history of the period 400–1100. The course will then have two aspects: the private, supervised research of students, and a series of special seminars by the director and a number of distinguished scholars in the field of Scandinavian studies. Upper-level undergraduates and graduate students will both be welcome in the course.

For further information about the courses offered or about the program for an independent major in Medieval Studies, students should contact the program director, Professor J. J. O'Donnell, 27 Goldwin Smith Hall.

Religious Studies**Anthropology****320 Meaning Across Cultures****417 Structuralism****425 Ritual Structures and Cultural Pluralism****619 Buddhism in Asia****Asian Studies****250 Dimensions of Religious Experience****351 Early Buddhism****352 Mahayana Buddhism****355 Japanese Religions****[453 Zen Buddhism** Not offered 1980–81.]**650 Seminar on Asian Religions****Classics****226 The Genius of Christianity****308 New Testament Greek****368 Medieval Latin****681 Patristic Seminar****Comparative Literature****326 Christianity and Judaism****328 Literature of the Old Testament****421 Old Testament Seminar****426 New Testament Seminar****429 Readings in the New Testament****History****263 The Earlier Middle Ages****264 The High Middle Ages****364 Major Themes in American Religious History****[365 Medieval Culture, 400–1150** Not offered 1980–81.]**366 Medieval Culture, 100–1300****368 Francis of Assisi and the Franciscans****History of Art****215 Introduction to Art History: African Art****240 Introduction to Art History: The Renaissance****250 Introduction to Art History: The Baroque Era****280 Introduction to Art History: Asian Traditions****333 Early Medieval Art and Architecture****341 Flemish Painting****383 The Arts of Early China****483 Chinese Art of the T'ang Dynasty****Near Eastern Studies****[221–222 The Literature of Ancient Israel** Not offered 1980–81.]**225 Freshman Seminar in Biblical Literature: Heroes and Heroines of the Bible****[231–232 Readings in Classical Hebrew Literature** Not offered 1980–81.]**243 The History of Ancient Israel to 450 B.C.E.****244 The Jews of the Ancient and Muslim Near East: 450 B.C.E.–1204 C.E.****245 The News of the Christian West: 476–1948****253 Classics of Islamic Literature****[282 Ancient Near Eastern Literature** Not offered 1980–81.]**311 Advanced Arabic****322 Undergraduate Seminar in Biblical Literature: Prophecy in Ancient Israel****[333 The Historical Development of Rabbinic Legal Literature** Not offered 1980–81.]**334 Biblical Interpretation in Biblical Literature****[343 The Jewish Community Throughout History** Not offered 1980–81.]**[344 Age of the Patriarchs** Not offered 1980–81.]**[345 History of the Ancient Near East in Biblical Times** Not offered 1980–81.]**346 The Roots of Greek Civilization****[347 Judaism and Christianity in Conflict** Not offered 1980–81.]**[374 The Mystics of Islam** Not offered 1980–81.]**376 Seminar on Islamic Law and Society****[442 Seminar in Jewish History: The Medieval Church and the Jews** Not offered 1980–81.]**Jewish Studies****101 Freshman Seminar: Jewish Contributions to Western Culture****Philosophy****213 Existentialism****263 Philosophy of Religion**

Romance Studies

359 Being, God, Mind: Humanistic Revolutions in Western Thought from Plato to Vico

460 Biology and Theology: Approaches to the Origin of Life, Evolution, Heritage, Sexuality, and Death

Society for the Humanities

415-416 Man and His Environment in Western Religious Thought

Natural Resources

407 Religion, Ethics, and the Environment

611 Seminar in Environmental Values

Russian and Soviet Studies

Details regarding the major in Russian and Soviet Studies will be found in the *Announcement of Academic Information*. All courses offered by the Department of Russian Literature and Russian language courses offered by the Division of Modern Languages are relevant, as well as courses relating to Russia, the Soviet Union and Eastern Europe in the Departments of Economics, Government, History, and Music and in the School of Industrial and Labor Relations and the College of Human Ecology.

Program on Science, Technology, and Society

Biology and Society I: The Biocultural Perspective (Anthropology 301 and Biological Sciences 301 and Biology and Society 301)

Biology and Society II: Biology, Society, and Human Values (Anthropology 302 and Biological Sciences 302 and Biology and Society 302)

Biomedical Ethics (Biological Sciences 205 and Philosophy 245) Fall.

Environmental Ethics (Biological Sciences 206 and Philosophy 246)

Senior Seminar in Human Fertility. Developing Nations (Biology and Society 400 and Sociology 434)

Senior Seminar. Biomedical Research, Regulations, and Ethics: A Delicate Balance (Biology and Society 401)

Senior Seminar. Biomedical Research, Regulations, and Ethics: A Delicate Balance (Biology and Society 402)

Senior Seminar. Social Demography (Biology and Society 403 and Sociology 430)

Science, Technology, and Public Policy (B&PA NPA 504 and Government 426)

Impact and Control of Technology Change (City and Regional Planning 540, Economics 302, and Government 302)

Politics of Technical Decisions I (City and Regional Planning 541, Government 628, and B&PA NPA 515)

[Politics of Technical Decisions II (City and Regional Planning 542, Government 629, and B&PA NPA 516) Not offered 1980-81.]

The Computerized Society (Computer Science 305)

Social Implications of Technology (Engineering CEE B305)

[Seminar in Technology Assessment (Engineering CEE B416 and College Scholar 464) Not offered 1980-81.]

Environmental Law (Engineering CEE B615)

Technology, Society, and the Human Condition (Engineering M&AE 302)

Urban Affairs Laboratory (Government 312)

International Law (Government 389)

[Defense Policy and Arms Control (Government 484) Not offered 1980-81.]

International Politics of Energy (Government 490)

Social History of Western Technology (History 380)

[Problems in the History and Philosophy of Biology (History 386 and Philosophy 386) Not offered 1980-81.]

Science, Technology, and Law (Law 797)

Science and Human Nature (Philosophy 286)

Science, Technology, and Social Change (Rural Sociology 424)

Sociology of Science and Technology (Sociology 255)

[Social and Political Studies of Science (Sociology 355 and City and Regional Planning 340) Not offered 1980-81.]

Society for the Humanities

Unlike other courses, the seminars offered by the society begin the *second week* of each semester. The seminars are open to graduate students and suitably qualified undergraduates. Students wishing to attend should telephone the center (256-4725) early in the first week of the term to arrange a short interview with the fellow offering the course. There are no examinations, and it is at the discretion of the fellow whether to require only oral reports, or, in addition, a research paper. Students wishing credit for the course should formally register in their own college. Persons other than those officially enrolled may attend as visitors with permission of the fellow.

101 Freshman Seminar: Science as Literature Fall and spring. 3 credits.

T R 10:10-11:25. J. Lumley.
Robert Ornstein claims that science turns the impossible into the boring. Einstein contends that science, in its purest form, uncovers "the grandeur of reason incarnate in existence." In readings ranging from Darwin to Einstein to Asimov, we shall try to discover how a discipline can be so variously defined and described.

102 Freshman Seminar: Science as Literature Spring. 3 credits.

M W F 9:05. J. Lumley.
Man's rational perception of his place in nature frequently clashes with his emotional need to elevate himself above nature. In the last 350 years science has had the uncomfortable habit of dethroning him as master of the universe. In this course, with readings from Galileo, Darwin, and Freud, we shall follow man's journey from a position of dominance in a geocentric, divinely ordered universe to that of a genetically programmed organism in a decaying biosystem. We shall examine how well, or how completely, he has accommodated his dreams to the new worlds born of science.

381-382 Self, Family, and Polity in Renaissance Times (The Frederick G. Marcham Seminar) Fall and spring. 4 credits each term. Limited to 15 students.

Fall: disc. M W 2:30-3:45. Spring: no class meetings; students will pursue independent work in consultation with the instructors. E. Morris, J. Najemy.

An exploration of the relationships between the problematic notions of selfhood, family, and community, on the one hand, and historical experience, on the other. The course will use and confront the methods of social history and literary analysis, drawing occasionally on anthropology and psychoanalysis. The three principal texts will be: Alberti, *Books on the Family*; Rabelais, *Gargantua and Pantagruel*; Montaigne, *Essays* (all in English translation); additional readings in historical and theoretical works.

413-414 The Applications of Reason: For and Against Civilization 413, fall; 414, spring. 4 credits each term.

T 1:25-3:10. K. Racevskis.
The theme of Reason will be studied in terms of a fundamental contradiction. Reason, as an ideal of the Enlightenment, serves to reconcile man and nature; it can also be seen as a dehumanizing cultural force promoting injustice, violence, and irrationality. Readings will include Rousseau, Nietzsche, Becker, Horkheimer, Gay, Marcuse, Roszak, Wilden, Lacan, Foucault, Baudrillard, Mumford, and Deleuze.

415-416 Man and His Environment in Western Religious Thought 415, fall; 416, spring. 4 credits each term.

M 3:35-5:20. J. Cohen.
A study of Jewish and Christian teaching on the proper relationship between human society and natural environment. Attempting to discern the role of religious thought in fashioning the attitude of Western man towards nature, the seminar will first consider his interpretation (midrash) of the biblical commandment to subdue and rule the earth, as expressed in a variety of sources ranging from exegesis and law to art and mysticism. Then, during the second semester, the seminar will proceed to examine the application of this midrashic understanding in the approaches of Judaism and Christianity to agriculture, urban civilization, and their environmental ramifications.

417-418 Love Books of the Middle Ages 417, fall; 418, spring. 4 credits each term.

M 1:25-3:10. G. Mazzotta.
The seminar will explore the doctrines and theology of nature which lie under the imaginations of love in a number of medieval texts such as *The Art of Courtly Love*, *Lancelot*, *The Book of Good Love*, *Celestina*, *History of my Calamities*, *The Vita Nuova*, *Decameron*, *Romance of the Rose*, and *Trilussa and Criseyde*. The seminar will also advance some formulations on medieval esthetics and literary practice.

419 Culture and Ideology Fall. 4 credits.

W 1:25-3:10. T. Eagleton.
The course will explore various theories of ideology in their relation to the different concepts of "culture," and within the broad frameworks of Marxism, semiotics, and psychoanalysis ask how far these two concerns are identical, incompatible, mutually opposed, or otherwise connected. It will also consider the problem of what is or could be meant by a "revolutionary culture," in the light of actual historical developments and theories of culture and politics in general.

421 The Formal Versus the Formless: A Reading of Contemporary American Poetry Fall. 4 credits.

W 3:35-5:20. D. Lehman.
In delineating the genesis of a poem, Marianne Moore wrote that "Ecstasy affords the occasion and expediency determines the form." What are the complex relations between "ecstatic occasion" and

"expedient form"—between a poet's formal decisions and the "visions and revisions" that inform his works? In the context of this and related questions, we will study such poets as James Merrill and A. R. Ammons, with some attention to their precursors, and with reference to larger issues of form, tradition, and the American sublime.

422 The Tradition of the New in American Poetry Spring. 4 credits.

W 3:35–5:20. D. Lehman.
The spirit of experimentation in contemporary American poetry will be considered as a cultural phenomenon and in the specific literary guises it has taken. We will investigate examples of the prose poem, the sestina and other exotic forms, and we will examine the rationale for various innovative strategies of composition. Particular attention will be given to the career of John Ashbery and to other poets in whose works we may discern the impulse to renew traditions by tampering with them.

423 Architecture, Man, and Nature in the Early Modern Period Fall. 4 credits.

T 3:35–5:20. P. Long.
The Vitruvian tradition, in which the proportions of the properly constructed building were believed to reflect those of the cosmos, developed ideas about that cosmos, and about man as a knower and manipulator of the natural world. This seminar will focus on these and other ideas relevant to the history of science, using the writings of Alberti, Filarete, Francesco di Giorgio, Serlio, and the sixteenth-century commentaries on the *De architectura* of Vitruvius.

424 Leonardo da Vinci as a Philosopher of Nature Spring. 4 credits.

T 3:35–5:20. P. Long.
This seminar will focus on the writings, paintings, drawings, and inventions of Leonardo in an exploration of his beliefs about the natural world. His approach to nature will be studied with reference to the chronological development of his ideas, and will be placed within the context of the scientific, technical, and artistic tradition of his own age.

425–426 The Phenomenon of Iconoclasm 425, fall; 426, spring. 4 credits each term.

R 1:25–3:10. J. Herrin.
An analysis of attitudes towards representations of the sacred and the motives for their destruction from ancient to modern times, concentrating on the two major outbreaks of iconoclasm, in medieval Byzantium and Counter-Reformation Europe. Historical and theological texts in translation and visual materials will be used. Fall: From the ancient world to medieval Byzantium. Spring: From medieval Europe to the French Revolution.

427 The Roots of Narrative Fall. 4 credits.

R 3:35–5:20. R. Harbison.
An attempt to determine whether primitive story material exists and to clarify the relations among myth, fairy tale, and romance; between naive forms and those sophisticated cultural products which try to draw on archaic sources. Texts will include medieval romances in translation, Malory, Sidney's *Arcadia*, Grimm's fairy tales, Lévi-Strauss's retelling of myths, Roheim's reports of schizophrenic fantasy, and short works by Kafka.

428 Primitivism in Nineteenth-Century and Early Twentieth-Century Art and Thought Spring. 4 credits.

R 3:35–5:20. R. Harbison.
A study of various Romantic attempts to undo cultural history. Anti-individual and antisequential themes in an assortment of figures including Blake, the Brothers Grimm, Ruskin, William Morris, Wagner, Debussy, Nietzsche, D. H. Lawrence, and Kandinsky, with opportunities to gauge how translatable ideas are from one art form to another.

429 Nature and Culture: The Window Motif in Pasternak Fall. 4 credits.

T 3:35–5:20; there may be a section for Russian readers. A. Zholkovskiy.
A discussion of Boris Pasternak's poetic universe and the place occupied in it by "window" as a means of communication between the outer world (nature) and the home (culture). The emphasis will be on thematic invariance and on poetic subtleties. Comparisons with invariant motifs of other poets (Pushkin, Mandelstam, Okudzhava).

431–432 Meanings of the Garden in Europe after the Renaissance 431, fall; 432, spring. 4 credits each term.

M 1:25–3:10. E. Dotson.
A study of gardens as an aspect of Renaissance culture, and of the traditions of garden design and iconography developed in Europe from the sixteenth to the eighteenth century. Subjects to be discussed will include concepts of nature expressed in garden design and iconography; the impact of ancient and of non-European cultures on European gardens; the poetry of gardens; and the social and ideological uses of gardens.

433–434 Guided Reading Fall and spring. 2 credits each term.

435–436 Guided Research Fall and spring. 4 credits each term.

Women's Studies

103 Freshman Seminar: Writing as Women (also English 104) Fall. 3 credits.

M W F 10:10. K. Dugas.
Students will confront their experience as girls and women through autobiographical and introspective writing. In seminars and individual conferences we will stress development of a clear, individual writing style. Students will critique each other's papers and will discuss selected readings drawn from works by Adrienne Rich, Colette, Virginia Woolf, Toni Morrison, Lillian Hellman, Doris Lessing, Maxine Hong Kingston, and others.

[105 Freshman Seminar: Feminine and Masculine Ideals in Japanese Culture (also Asian Studies 105)] Fall. 3 credits. K. Brazell. Not offered 1980–81.]

[207 Freshman Seminar: The Family in American History (also History 207)] Spring. 4 credits. M. B. Norton. Not offered 1980–81.]

214 The Biological Basis of Sex Differences (also Biological Sciences 214) Spring. 3 credits.

Prerequisite: one year of introductory biology. M W F 10:10. J. Fortune.
A basis for objective evaluation of sex differences in relation to contemporary life is provided by examination of the structural and functional differences between the sexes. Provides an overview of sex differences and reproductive patterns for the vertebrates and deals more specifically with topics that relate only to mammals or humans.

238 The Historical Development of Women as Professionals, 1800–1980 (also Sociology 238 and HDFS 258) Fall. 3 credits. Students in endowed units must register for Women's Studies or Sociology 238; students in statutory units must register for HDFS 258.

T R 2:30–4. J. Brumberg.
The historical evolution of the female professions in America, including midwifery, nursing, teaching, librarianship, prostitution, social work, and medicine. Lectures, reading and discussion are geared to identifying the cultural patterns which fostered the conception of gender-specific work and the particular historical circumstances which created these different work opportunities. The evolution of

"professionalism" and the consequences of professionalism for women, family structure, and American society is also discussed.

244 Language and the Sexes (also Linguistics 244) Spring. 4 credits. Prerequisites: Linguistics 101, 111, Psychology 215, or permission of instructor. M W F 1:25. S. McConnell-Ginet.

A study of sexual differentiation in language and its significance for sex stereotyping, sexual stratification, socialization, and personal interactions.

248 Major Nineteenth-Century Female Novelists (also English 247) Fall. 4 credits. Open to nonmajors. May be credited toward the English major. M W F 1:25. J. Blackall.

Readings include Austen, *Persuasion*; E. Brontë, *Wuthering Heights*; C. Brontë, *Jane Eyre* and *Villette*; Gaskell, *Mary Barton* or *North and South*; Stowe, *Uncle Tom's Cabin*; Eliot, *The Mill on the Floss*; Chopin, *The Awakening*; and also two imaginative sequels to *Jane Eyre*, James's "The Turn of the Screw" and Jan Rhys's *Wide Sargasso Sea*. The biographical and social circumstances surrounding these works, their critical reception within their own time, and the themes and subject matter that these novelists elected to write about are considered, and the novels are examined as works of fiction.

249 Feminist Issues in Nineteenth- and Twentieth-Century Literature (also English 248) Spring. 4 credits.

M W F 1:25. M. Jacobus.
An introductory course in writing by and about women, exploring the relation between women, literature, and feminism. There will be five main areas of concern: work and home; education and marriage; sexuality; motherhood; and the woman artist or writer herself. Readings will include novels by Charlotte Brontë, Charles Dickens, Elizabeth Gaskell, George Eliot, Thomas Hardy, Virginia Woolf, D. H. Lawrence, Sylvia Plath, Margaret Atwood, and Adrienne Rich, as well as a variety of texts drawn from writers on women and feminism from Mary Wollstonecraft to the present day.

277 Psychology of Sex Roles (also Psychology and Sociology 277) Spring. 3 or 4 credits.

Prerequisite: an introductory psychology course. T R 10:10–11:30. S. Bem.
The question of why and how adult women and men come to differ in their overall life styles, work and family roles, personality patterns, and cognitive abilities, etc. This broad question is examined from five perspectives: (a) the psychoanalytic perspective (b) the biological perspective, (c) the historical and cultural evolutionary perspective; (d) the child development perspective; and (e) the social-psychological and contemporaneous perspective. Each of these perspectives is also brought to bear on more specialized phenomena relating to the psychology of sex roles, including psychological androgyny, women's conflict over achievement, the male sex role, equalitarian marriage relationships, female sexuality, homosexuality, and transsexualism.

305 Psychological Anthropology (also Anthropology 305) Fall. 4 credits

M W F 11:15. B. J. Isbell.
A consideration of problems selected to illustrate the mutual relevance of psychology and anthropology, concentrating on cross-cultural studies of cognitive and social development, with an emphasis on comparisons of socialization of sex roles.

321 The Anthropology of Women (also Anthropology 321) Fall. 4 credits.

M W F 2:30. K. March and D. Holmberg.
An introduction not only to the study of women from an anthropological perspective, but also to anthropological theories of sex and gender from the perspective of women's studies. The course examines various aspects of the position of women—

political, economic, social, ideological, and biological — to emphasize the diversity in gender and sex role definition cross-culturally.

326 Women in American Society, Past and Present (also History 326) Spring. 4 credits.
M W F 9:05. M. B. Norton.

A survey of women's experiences in the American past, emphasizing such topics as the changing nature of housework, the women's rights movement, and the ideology of woman's place.

353 Women and Politics (also Government 353) Spring. 4 credits.

T R 10:10. M. Katzenstein.
This course considers alternative ideologies about the relationship between men and women in the family and in the marketplace; the strategies that women have used to assert claims to equality; and the results of government policies for the status of women in both liberal and revolutionary societies.

422 Special Problems in the Anthropology of Women (also Anthropology 422) Spring. 4 credits.

Prerequisite: Women's Studies 321 (Anthropology 321) or permission of instructor.

Hours to be arranged. K. March.
Each year this seminar focuses upon a particular area of concern within the anthropology of women, building upon the work done in Women's Studies and Anthropology 321. The topic for 1980–81 is women's life histories. This seminar explores the insights provided by biographical and autobiographical materials into both the particularities of individual lives and wider cultural forms.

[426 Undergraduate Seminar in Early American History (also History 426)] Spring. 4 credits.

Prerequisite: permission of instructor. M. B. Norton. Not offered 1980–81.]

462 Dickinson and Whitman (also English 462) Fall. 4 credits.

M W F 1:25. D. Fried.
A study of the poems and selected letters of Emily Dickinson and of Walt Whitman's *Leaves of Grass* and selected prose, considered as individual poetic achievements and as complementary voices in American literature. Topics include the modes of poetic autobiography, the critique of religion, poetics of indirection, and the variety of critical approaches these two idiosyncratic canons have generated.

478 Women and Writing (also English 478) Fall. 4 credits.

M W F 11:15. M. Jacobus.
The course will focus on works by and about women, clustering in four main areas: Romanticism and after (such writers as Mary Wollstonecraft, Mary Shelley, Emily Brontë), Victorians (Charlotte Brontë, Tennyson, Elizabeth Barrett Browning), the New Woman Fiction of the 1890s (Hardy, Olive Schreiner, Gissing), and Modernists (Gertrude Stein, Katherine Mansfield, Virginia Woolf). The aim will be twofold: first, to consider questions about women's writing (the existence of a female literary tradition, the specificity of women's writing, the conditions under which they wrote) and the representation of women and women's issues in prose and poetry; and second, to complement an examination of the sexual and political ideology reproduced in literature with readings from seminal feminist documents and with current theoretical work (in England, America, and France) toward developing a specifically feminist critique.

479 Reading Woman Poets (also English 479) Spring. 4 credits.

T R 12:20. S. Siegel.
An examination of the traditional controversy over whether or not reading, writing, and gender are related to one another. Detailed study of the autobiographical, critical, and poetic writings of Amy Lowell, Hilda Doolittle, Marianne Moore, Sylvia Plath,

and Adrienne Rich. The seminar will consider salient departures from conventional poetic modes and themes and the pressures each poet has felt to be significant in her attempt to shape herself, her aesthetic, and her poetry. Discussion will begin with a specific question which will recur throughout the semester: How would Virginia Woolf have read these poets?

483 Feminism and French Literature (also French 483) Fall. 4 credits. Course taught in French.

M W F 1:25 N. Furman.
The interaction between feminist concerns and literary expression brings to the fore an array of questions at the juncture of history and literature. Some of the topics discussed will be the representation of women in literature, the literary echoes of women's social *revendications*, the inscription of women writers in the literary canon, and feminist challenges to criticism. Authors to be studied include Mme. de Lafayette, Mme. de Stael, George Sand, Colette, Simone de Beauvoir, Marguerite Duras, and Hélène Cixous.

499 Directed Study Fall or spring. Variable credit.

Prerequisite: one course in women's studies and permission of a faculty member of the Women's Studies Executive Board.

Hours to be arranged. Staff.

611 Seminar in Old Icelandic Literature I (also German Literature 611) Fall. 4 credits. Prerequisite:

German 610 or permission of instructor.

Hours to be arranged. J. C. Harris.
'Old Icelandic mythological texts will be studied, with focus on the female figures and the role of women.

[626–627 Seminar in the History of American Women (also History 626–627)] 626, fall; 627, spring. 4 credits. M. B. Norton. Not offered 1980–81.]

656 Seminar in Family Studies: The History of the American Family (also Sociology 656 and HDFS 655) Spring. 3 credits. Students in endowed units must register for Women's Studies or Sociology 656; students in statutory units must register for HDFS 655.

Hours to be arranged. J. Brumberg.
Considers the historical literature on change and variation in American family life and form, from the European background (16th century) to the present. Reading, discussion and papers focus on the social, economic, political and cultural circumstances in the past which affected families and their relations to the larger society.

[685 Seminar in Sex Differences, Sex Roles, and Sexuality (also Psychology and Sociology 685)]

Fall. 4 credits. Prerequisite: permission of instructor. S. Bem. Not offered 1980–81.]

759 Virginia Woolf (also English 759) Spring. 5 credits. Prerequisite: permission of instructor.

T 3:35. S. Siegel.
A detailed study of Woolf's fictional, autobiographic, critical, and feminist writings.

Related Courses in Other Departments

The Family in Modern Society (Human Development and Family Studies 150)

The Family (Human Development and Family Studies 253)

Human Sexuality: A Psychosocial Perspective (Human Development and Family Studies 315)

Contemporary Family Forms in the United States (Human Development and Family Studies 352)

Theories of Adult Interpersonal Relationships (Human Development and Family Studies 358)

Families and Social Policy (Human Development and Family Studies 456)

Contemporary Family Theory and Research (Human Development and Family Studies 650)

Dress: A Reflection of American Women's Roles (Design and Environmental Analysis 245)

Economics of Household Behavior I (Consumer Economics and Housing 626)

Economics of Household Behavior II (Consumer Economics and Housing 627)

Additional courses may be offered in women's studies. Students should contact the Women's Studies Program, 332 Urin Hall (telephone 256-6480), for an updated list of courses each semester.

Division of Biological Sciences

Note: The middle digits of biological sciences course numbers are used to denote courses in specific areas: 0, general; 1 and 5, animal physiology and anatomy; 2 and 9, neurobiology and behavior; 3, biochemistry and cell biology; 4 and 5, botany; 5, 6, and 7, ecology, systematics, and evolution; 8, genetics and development.

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General Courses

101-102 Biological Sciences, Lectures 101, fall; 102, spring. 2 credits each term. Prerequisite: concurrent enrollment in Biological Sciences 103 (fall), or 104 or 208 (spring). 101 is prerequisite to 102, unless written permission is obtained from instructor. May not be taken for credit after Biological Sciences 105-106 or 109-110.

Lecs, M W F 9:05 or 10:10. 2 lecs each week, to accommodate these, students must reserve all 3 days. Prelims: fall, 6:30 p.m. Sept. 30 and Nov. 6; spring, 6:30 p.m. Mar. 5 and Apr. 9. K. K. Adler. Designed both for students who intend to specialize in biological sciences and for those specializing in other subjects, such as the social sciences or humanities, who want to obtain a thorough knowledge of biology as part of their general education. Plant and animal materials are considered together rather than in separate units. The fall semester covers the chemical and cellular basis of life, energy transformations, anatomy, and physiology. The spring semester covers genetics and development, evolution, ecology, behavior, the origin of life, and the diversity of living organisms. Each topic is considered in the light of modern evolutionary theory.

103-104 Biological Sciences, Laboratory 103, fall; 104, spring. 2 credits each term. Prerequisite: concurrent enrollment in Biological Sciences 101 (fall) or 102 (spring), or written permission of instructor. 103 is prerequisite to 104, unless written permission is obtained from instructor. No admittance after second week of classes.

Lab, M T W or R 1:25-4:25, M or W 7:30-10:30 p.m., T R or S 8-11, or F 10:10-1:10. One 3-hour lab each week and a weekly lec section for discs, special lecs, etc. To accommodate weekly lec section, students must reserve M W and F 9:05 or 10:10 since the day of the lec section varies throughout the semester. J. C. Glase, P. R. Ecklund, M. A. Houck, and staff.

A laboratory course emphasizing the methods used by biologists to discover new knowledge. Students

design and perform investigations in biology. In preparation for this, exposure is given to basic biological concepts, research methodologies, relevant data analysis techniques and statistics, instrumentation, and laboratory techniques in all of the major areas of biology. Research projects include investigative design, data analysis, and communication of investigative results and conclusions.

105-106 Introductory Biology 105, fall; 106, spring. 4 credits each term (or 2 credits for transfer or advanced placement students, with permission of instructor). Prerequisite: 105 is prerequisite to 106, unless written permission is obtained from instructor. S-U grades optional, with written permission of instructor. May not be taken for credit after Biological Sciences 101-104 or 109-110.

Lec, M 12:20; 1-hour disc and 2 office hours each week to be arranged at first lec meeting; additional study and lab hours arranged at student's convenience each week. E. R. Loew.

Designed primarily for students who intend to specialize in the biological or other sciences; also open to nonmajors who want a more comprehensive biology course than the one for nonmajors (Biological Sciences 109-110). Recommended for students whose first language is not English. The course is taught in an autotutorial format and students are expected to put in some time *each week* (students can seldom work ahead and there are severe penalties for falling behind). Laboratory work is an integral part of the course.

Course material is divided into required units that must be completed by all students, and elective units that offer a choice of related topics for students who wish to improve their grades. Students are expected to achieve greater than 80 percent mastery of required material. The final exam covers the entire semester's work.

108 Interactive Computing for Students of Biological Sciences Spring 1 credit. Not open to students with prior courses in computing.

Lec, T 1:25; lec every other week. H. C. Howland. An introduction to computing using the interactive language BASIC with a discussion of other algebraic computing languages such as FOCAL and elementary FORTRAN. Students are issued tickets for 10 hours of computing time at the Division of Biological Sciences interactive computing facility. Applications to problems in the biological sciences are emphasized.

109-110 Biology for Nonmajors 109, fall; 110, spring. 3 credits each term. Limited to 600 students. Prerequisite: 109 is prerequisite to 110, unless written permission is obtained from instructor and the student has at least 3 credits of college biology. S-U grades optional. May not be taken after Biological Sciences 101-104 or 105-106. This course may be used to fulfill the distribution requirement in the Colleges of Agriculture and Life Sciences, Arts and Sciences, and Human Ecology but may *not* be used as an introductory course for the major in biological sciences. *Note that this course may not always satisfy the prerequisite for second- and third-level courses in biology.*

Lecs, M W F 9:05 or 11:15; lab, M T W R or F 2-4:25 or T 10:10-12:35. Students do not choose lab sections during course enrollment; lab assignments are made during first week of classes. Each student must attend lab on alternate weeks. Prelims: fall, 6:30 p.m. Sept. 30 and Nov. 6; spring, 6:30 p.m. Mar. 5 and Apr. 16. C. H. McFadden, C. Eberhard.

Students who do not plan to major in biology may take this broad introductory course in modern biology. It is not a course in social biology, but addresses itself to biological principles with academic rigor. The content is designed to appeal to anyone who seeks a comprehensive knowledge of biology as part of a general education. Laboratory

sections enable small groups of students to meet with the course staff and are used for problem-solving experiments, demonstrations, and discussions.

200 Special Studies in Biology Fall or spring. 1–3 credits. Prerequisites: written permission of instructor and of the associate director of the Division of Biological Sciences (a special form for this purpose is available in Stimson 118). S-U grades optional, with permission of instructor.

Hours to be arranged. Staff.
For students who wish to take only a portion of a regular biological sciences course—for example, only the lectures or only the laboratory in a course that includes both. Course 200 will ordinarily be taken only by transfer students who have already had training equivalent to the portion of the regular course that is to be omitted. May not be substituted for 100-level courses.

[201–202 History of Biology (also History 287–288)] 201, fall; 202, spring. 3 credits each term. Prerequisite: one year of introductory biology. 201 is not prerequisite to 202. S-U grades optional. Not offered 1980–81.

Lecs, T R 10:10–11:30. W. B. Provine.
An examination of the history of biology, emphasizing the interaction of biology and culture. Original writings of biologists constitute the bulk of reading assignments. The fall semester covers the period from classical antiquity to 1900. The spring semester is devoted entirely to twentieth-century biology.]

205 Biomedical Ethics (also Philosophy 245) Fall. 3 credits. Primarily for sophomores, juniors, and seniors; permission of instructor required for graduate students.

Lecs, M W F 1:25. S. M. Brown.
Critical analysis of the conceptual framework in which ethical problems in biology and medicine are to be understood, debated, and solved. Problems include experimentation on humans, abortion and euthanasia, genetic diseases and recombinant DNA research, behavior modification, and the right to health care and health care systems. Each of the topics is covered in lectures and assigned readings.

206 Environmental Ethics (also Philosophy 246) Spring. 3 credits. Open to sophomores, juniors, and seniors; permission of instructor required for graduate students. Prerequisite: one year of introductory biology.

Lecs, M W F 1:25. S. M. Brown.
Critical analysis of the conceptual framework in which environmental policies are formulated and judged. Problems include private interest versus the public good; the relation of individual rights to the collective welfare with respect to property, compensation, regulation, and the exercise of eminent domain; moral obligations to the poor and to future generations; the concept of pollution; and the ideas of diversity, balance, and stability in the natural environment.

208 Biological Discovery Laboratory Spring. 2 credits. Limited to 30 students who apply for admission and are recommended by their instructors in Biological Sciences 103. Prerequisite: Biological Sciences 103.

Labs, T R 1:25–4:25. J. M. Fessenden-Raden.
A research-oriented alternative to Biological Sciences 104. Designed to instruct students in the ways that scientists ask questions about living things and design and carry out observations or experiments to answer these questions. Students work individually on extended research problems that they design. Instruction is highly individualized and aimed at improving each student's ability to ask meaningful questions, organize and quantify observations, analyze research data, and relate results to previously reported biological findings. Written research reports are prepared and oral reports presented. Specific research techniques are introduced when needed.

300 Laboratory Methods in Biology Summer, 6-week session. 3 credits. Prerequisite: one year of introductory college biology. Fee, \$5.

Lecs and Labs, M T W R F 1:30–4 for 6 weeks. L. D. Uhler.
For students who intend to teach or follow some phase of biology as a profession. Subjects covered: collection, preservation, and storage of materials; preparation of bird and mammal study skins; injection of circulatory systems with latex; clearing and staining of small vertebrates; and preparation and staining of squashes, smears, whole mounts and sections. No formal exams. Grade is based on required work submitted at the end of the course.

301 Biology and Society I: The Biocultural Perspective (also Anthropology 301 and Biology and Society 301) Fall. 3 or 4 credits (4 credits by arrangement with instructor). Prerequisite: one year of introductory biology. S-U grades optional. This is part of the two-semester core course for the biology and society major and is also available to other students who have fulfilled the necessary prerequisite.

Lecs, M W F 9:05. D. J. Greenwood.
Human biology, behavior, and institutions are viewed as the ongoing products of the interactions between human biological evolution and cultural change. These interactions are documented with reference to the evolution of the capacity for culture; human groups and institutions; language, meaning, and cultural "realities"; and major models of human nature and human institutions.

302 Biology and Society II: Biology, Society, and Ethics (also Anthropology 302 and Biology and Society 302) Spring. 3 or 4 credits (4 credits by arrangement with instructor). Prerequisite: Biological Sciences 301. S-U grades optional. This is the second semester of the two-semester core course for the biology and society major and is also available to other students who have taken 301.

Lecs, M W F 9:05. D. J. Greenwood, S. J. Risch, S. M. Brown.
This course considers the complex intellectual, practical, and ethical issues centering on the relationships between biological and social phenomena. Specific current issues such as pollution, genetic counseling, and recombinant DNA research are considered, and an effort is made to develop viable biocultural ethics for dealing with such problems.

305 Basic Immunology, Lectures (also Veterinary Medicine 315) Fall. 2 credits. Prerequisite: a course in basic microbiology or permission of instructor.

Lecs, T R 9:05. A. J. Winter.
Course material covers current concepts in immunology at an elementary level, with special emphasis on the biological functions of the immune response.

307 Basic Immunology, Laboratory (also Veterinary Medicine 316) Fall. 2 credits. Prerequisite: a course in basic microbiology or permission of instructor. Recommended: concurrent enrollment in Biological Sciences 305.

Labs, T R 10:10–1:10. N. L. Norcross.
Designed to illustrate immunological concepts presented in Biological Sciences 305. Laboratory exercises are selected to familiarize students with basic humoral and cellular immune phenomena and to offer firsthand experience in immunological laboratory techniques.

309 Techniques in Animal Handling and Surgery Intersession. 2 credits. Limited to 12 students, with preference given to students who are registered in an independent research course. Prerequisite: written permission of instructor. S-U grades only. Fee, \$5.

Lecs and labs, M T W R F 9–4:30 for 3 weeks. A. van Tienhoven.

Audiovisual materials and actual experience are used in this minicourse to teach students techniques needed for independent research and honors projects.

498 (403, 404) Teaching Experience Fall or spring. 1–4 credits. Enrollment limited. Prerequisites: previous enrollment in the course to be taught or equivalent, and written permission of instructor. S-U grades optional, with permission of instructor. *Students in the College of Arts and Sciences may not count credits from this course towards the 100 Arts College credits required for graduation.*

Hours to be arranged. Staff.
Designed to give qualified undergraduate students teaching experience through actual involvement in planning and assisting in biology courses. This experience may include supervised participation in a discussion group, assisting in a biology laboratory, assisting in field biology, or tutoring. Biological Sciences courses currently offering such experience include 103–104, 105–106, 109–110, 274, 311, 313, 319, 324, 330, 430, 464, 468, and 475.

499 (409, 419, 429, 439, 449, 469, 489) Undergraduate Research in Biology Fall or spring.

Variable credit. Prerequisite: written permission from the staff member who will supervise the work and assign the grade. S-U grades optional. Any faculty member in the Division of Biological Sciences may act as a supervisor. Faculty supervisors outside the division are acceptable only if a faculty member of the division agrees to take full responsibility for the quality of the work. *This course is divided into multiple sections as printed in the Course and Time Roster and the supplement to the Course and Room Roster. Students must register under supervisor's assigned section number, or Section 01 if supervisor was not assigned a section number.*

Hours to be arranged. Staff.
Practice in planning, conducting, and reporting independent laboratory and library research programs.

Research credits may *not* be used in completion of the following concentration areas: animal physiology and anatomy; biochemistry; botany; cell biology; and ecology, systematics, and evolution.

No more than 4 credits of research may be used in completion of the following concentration areas: genetics and development, and neurobiology and behavior.

600 Introduction to Scanning Electron Microscopy Fall or spring, weeks 1–4. 1 credit. Primarily for graduate students, but open to seniors who can demonstrate a need for the course. Limited to 10 students. Prerequisite: permission of instructor. S-U grades only.

Lec and lab to be arranged. M. V. Parthasarathy, M. K. Hausmann.
The course is a general introduction to the principles and the proper use of the scanning electron microscope. Emphasis is on using the instrument to observe biological specimens and on methods of preparing biological material for scanning electron microscopy.

602 Advanced Electron Microscopy for Biologists I Spring, weeks 1–3. 1 credit. Primarily for graduate students. Limited to 8 students. Prerequisites: Biological Sciences 603 or equivalent, and permission of instructor. S-U grades only.

Lec, T 11:15; disc to be arranged; labs, T R 1:25–4:25. M. V. Parthasarathy.
High-resolution electron microscopy; problems of obtaining high-resolution electron micrographs of biological specimens; visualization of macromolecules.

603 Electron Microscopy for Biologists Fall. 3 credits. Primarily for graduate students, but open to upperclass students. Limited to 12 students, with preference given to students with research projects

requiring electron microscopy. Prerequisites: either Biological Sciences 300, 313, 345, or 347, or equivalent, and written permission of instructor. Registration during course enrollment recommended. S-U grades optional.

Lec, T 11:15; labs, M W 1:25-4:25, T R 1:25-4:25, or W F 8-11. M. V. Parthasarathy.

Principles of electron microscopy; histological techniques for electron microscopy, such as ultrathin sectioning, negative staining, and metal shadowing; and interpretation of results. A brief introduction to scanning electron microscopy is also included.

604 Advanced Electron Microscopy for Biologists II Spring, weeks 4-6. 1 credit. Primarily for graduate students. Limited to 8 students.

Prerequisites: Biological Sciences 603 or equivalent, and permission of instructor. S-U grades only.

Lec, T 11:15; disc to be arranged; labs, T R 1:25-4:25. M. V. Parthasarathy.

Principles of autoradiography at both light microscopy and electron microscopy levels; incorporation of radioactive material into biological specimens for autoradiography; problems of resolution and quantitative aspects of autoradiography.

606 Advanced Electron Microscopy for Biologists III Spring, weeks 7-9. 1 credit. Primarily for graduate students. Limited to 8 students.

Prerequisites: Biological Sciences 603 or equivalent, and permission of instructor. S-U grades only.

Lec, T 11:15; disc to be arranged; labs, T R 1:25-4:25. M. V. Parthasarathy.

Principles of freeze fracturing and freeze substitution techniques; freezing artifacts and interpretation of images.

608 Advanced Electron Microscopy for Biologists IV Spring, weeks 10-14. 1 credit. Primarily for graduate students. Limited to 6 students.

Prerequisites: Biological Sciences 603 or equivalent, and either Biological Sciences 602, 604, or 606. S-U grades only.

Hours to be arranged. M. V. Parthasarathy. Project in biological ultrastructure.

[702 X-Ray Elemental Analysis in Biology] Spring. 1 credit. Limited to 8 students. Prerequisites: Biological Sciences 600 or 603, and permission of instructor. S-U grades only. Offered alternate years. Not offered 1980-81.

Lec and lab to be arranged. M. V. Parthasarathy, M. K. Hausmann.

Principles of x-ray elemental analysis are discussed, with special reference to the energy-dispersive system. Emphasis is on qualitative elemental analysis of biological specimens and preparation of material for such analysis. A brief introduction to quantitative elemental analysis is also given.]

Related Courses in Other Departments

Biology and Society Senior Seminars (Biology and Society 400-403)

Students interested in training in **biophysics** may find the following courses useful:

Bioinstrumentation (Electrical Engineering 621)

Biomechanical Systems — Analysis and Design (Engineering M&AE 565)

General Animal Physiology (Biological Sciences 416, 418)

Mammalian Neurophysiology (Biological Sciences 610)

Membrane Biophysics (Engineering A&EP 615)

Neuroelectric Systems (Biological Sciences 696)

Photosynthesis (Biological Sciences 445)

Physics of Macromolecules (Physics 464)

Physiological Optics (Biological Sciences 695)

Special Topics in Biophysics (Engineering A&EP 614)

The Physics of Life (Engineering A&EP 206)

Vision (Biological Sciences 395)

Animal Physiology and Anatomy

212 (310) Invertebrate Zoology Spring. 3 credits. Limited to 20 students. Prerequisite: one year of introductory biology for majors.

Lecs, T R 11:15; lab, T 2-4:25. A. W. Blackler. An introduction to the structure, function, and development of invertebrate animals of the major phyla, with emphasis on the phylogenetic relationships.

214 Biological Basis of Sex Differences (also Women's Studies 214) Spring. 3 credits.

Prerequisite: one year of introductory biology. S-U grades optional.

Lecs, M W F 10:10. J. E. Fortune.

A basis for objective evaluation of sex differences in relation to contemporary life is provided by examination of the structural and functional differences between the sexes. The course provides an overview of both sex differences and reproductive patterns for the vertebrates and deals more specifically with topics that relate only to mammals or humans.

274 The Vertebrates Spring. 5 credits. Primarily for sophomores; this course is a prerequisite for many advanced courses in vertebrate biology, anatomy, and physiology. Each lab limited to 21 students.

Prerequisite: one year of introductory biology for majors. Fee, \$10. Lec, T R 10:10; labs, M W 1:25-5, M W 7-10 p.m., or T R 1:25-5. Staff.

An introduction to the evolution, classification, comparative anatomy, life history, and behavior of vertebrate animals. Laboratory dissection and demonstration are concerned with structure, classification, systematics, biology of species, and studies of selected aspects of vertebrate life.

311 Introductory Animal Physiology, Lectures (also Veterinary Medicine 346) Fall. 4 credits.

Prerequisites: one year of college biology, chemistry, and mathematics.

Lecs, M W F 11:15; disc to be arranged. D. N. Tapper.

A general course in vertebrate physiology emphasizing the basic characteristics of the circulatory, nervous, pulmonary, renal, and gastrointestinal systems; energy metabolism; endocrinology; and reproductive physiology. Neural and hormonal control of function is emphasized.

312 Anatomy and Behavior of the Gull Summer. 2 credits. Prerequisite: one year of introductory college biology. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H.

For more details and application, consult the SML office, Stimson G14. Estimated cost, \$475. Daily lecs, lec-demonstrations, and labs for 2 weeks. SML faculty.

The gull has been a major subject in the study of animal behavior. In this course the functional anatomy of all gull organ systems is considered and demonstrated, with emphasis on sensory, nervous, digestive, and respiratory systems. The large nesting colonies of two species of gulls on Appledore Island are used to demonstrate territoriality, aggression, mating, and other basic patterns of gull behavior.

313 Histology: The Biology of the Tissues Fall. 4 credits. Prerequisites: one year of introductory biology. Recommended: background in vertebrate anatomy and organic chemistry or biochemistry.

Lecs, T R 11:15; labs, T R 2-4:25. W. A. Wimsatt. Provides the student with a basis for understanding the microscopic, fine-structural, and functional organization of vertebrates, as well as the methods of analytic morphology at the cell and tissue levels. The dynamic interrelations of structure, composition, and function in cells and tissues are stressed.

[315 Ecological Animal Physiology, Lectures

Fall. 3 credits. Prerequisite: one year of introductory biology for majors. Offered alternate years. Not offered 1980-81.

Lecs, M W F 10:10. W. N. McFarland, F. H. Pough. An introductory course for students interested in ecology and physiology. The characteristics of the physical environment that are important to organisms are discussed; and representative physiological, behavioral, and morphological adaptations of vertebrate and invertebrate animals to their environments are analyzed.]

[317 Ecological Animal Physiology, Laboratory

Fall. 1 credit. Limited to 12 students. Prerequisite: concurrent enrollment in Biological Sciences 315. Offered alternate years. Not offered 1980-81.

Lab, W or R 1:25-4:25. W. N. McFarland, F. H. Pough.

Exercises involve measurement of important environmental factors in local habitats; laboratory experiments to familiarize students with the use of physiological methods; and an individual student research project dealing with specific adaptations of organisms to their environment.]

318 Cellular Physiology Summer, 3-week session. 3 credits. Prerequisites: one year of introductory college biology and chemistry; or permission of instructor.

Lecs, M T W R F 9:30-12 for 3 weeks. M. V. Hinkle. A basic course on physiological processes at the cellular level. Particular emphasis is placed on eucaryotic cells and on membrane-related phenomena. Topics include active, passive, and bulk transport across membranes; structure and function of cell organelles; cell growth and proliferation; intercellular communication; excitability; contractility; and specialized cells of the immune, endocrine, and neuromuscular systems. Course may be used as an introduction to organ or medical physiology.

319 Introductory Animal Physiology, Laboratory (also Veterinary Medicine 346) Fall. 1 credit.

Limited to 100 students, with preference given to students concentrating in animal physiology and anatomy. Prerequisite: concurrent or previous enrollment in Biological Sciences 311.

Lab, M T W or R 1:25-4:25. Each student must attend lab on alternate weeks. Each lab section limited to 25 students. D. N. Tapper.

Laboratory sessions consist of demonstrations, instructor-assisted experiments, and student-run experiments covering the nervous, pulmonary, renal, circulatory, and gastrointestinal systems.

351 Biological Rhythms with a Period of 1 Day to 1 Year Fall. 1 credit. Prerequisites: one year of introductory biology and either Mathematics 106, 111, or 113.

Lec, R 12:20. A. van Tienhoven. Theoretical and practical aspects of circadian and circennial rhythms are considered. Selective topics such as the biological clock of plants, insects, and vertebrates are presented. Light is considered as a stimulus and as an entraining agent. The role of rhythms on migration and reproduction is emphasized.

410 Seminar in Anatomy and Physiology Fall or spring. 1 credit. May be repeated for credit only once. Limited to upperclass students. S-U grades only.

Sem to be arranged. Organizational meeting first T of each semester at 7:30 p.m. in Biology Center (Stimson G20). Staff (coordinator: W. Hansel).

411 Motor Physiology Fall. 4 credits.

Prerequisites: Biological Sciences 321 and written permission of instructor. S-U grades optional.

Lecs. M W F 8; disc to be arranged. A. H. Cohen. An examination of the control of movement, primarily in vertebrates, with an emphasis on centrally generated movements. It begins with the sensory and motor components, followed by the known central connections. Finally, spinally generated movements are discussed. Other topics are included such as cerebellar function and respiration.

412 Special Histology: The Biology of the Organs Spring. 4 credits. Limited to 12 students.

Prerequisite: Biological Sciences 313 or written permission of instructor. Offered alternate years.

Lecs, W F 9:05; labs, W F 2-4:25. W. A. Wimsatt. A continuation of Biological Sciences 313. The microscopic and ultrastructural organization of the principal vertebrate organ systems are studied in relation to their development, functional interaction, and special physiological roles. Courses 313 and 412 together present the fundamental aspects of the microscopic and submicroscopic organization of the vertebrate. The organization of the course involves student participation in lecture-seminars and independent project work supplementary to the regular work of the laboratory. The latter enables students to gain practical experience with histological and histochemical preparative techniques.

414 Vertebrate Morphology (also Veterinary Medicine 700) Spring. 3 credits. Prerequisite:

graduate standing, or Biological Sciences 274 or equivalent. (Prerequisite waived for students concentrating in animal physiology and anatomy.) S-U grades optional.

Labs, T R 2-4:25. H. E. Evans.

Student dissections of the dog serve as the basis for a functional consideration of the major component parts of the body and its organ systems. This is followed by a dissection of the cow. Other species (fish to mammal) of interest to members of the class may also be dissected.

416 General Animal Physiology: A Quantitative Approach, Lectures Spring. 3 credits.

Prerequisites: one year of college biology and physics. S-U grades optional.

Lecs, M W F 10:10. H. C. Howland.

The principles of animal physiology are developed through consideration of the functioning of cells, tissues, and organs. Specific topics discussed include respiration, metabolism, circulation, excretion, body mechanics, muscle contraction, nerve action, sensory reception, and central nervous system function. A quantitative, systems-theoretical approach is emphasized.

418 General Animal Physiology, Laboratory

Spring. 2 credits. Prerequisite: concurrent enrollment in Biological Sciences 416 or equivalent.

Lec, 1 hour, to be arranged; lab, M or T 1:25-4:25. H. C. Howland.

Students are introduced to basic techniques utilized in the study of the physiology of animal tissues. Experiments cover topics dealing with respiration, properties of muscle, circulation, activity of nerves, and osmotic phenomena.

452 Comparative Physiology of Reproduction of Vertebrates, Lectures (also Animal Science 452)

Spring. 3 credits. Prerequisite: Animal Science 427 or permission of instructor.

Lecs, M W F 1:25. A. van Tienhoven.

Sex and its manifestations. Neuroendocrinology, endocrinology of reproduction, sexual behavior,

gametogenesis, fertilization, embryonic development, care of the zygote, environment and reproduction, and immunological aspects of reproduction.

454 Comparative Physiology of Reproduction of Vertebrates, Laboratory (also Animal Science 454)

Spring. 2 credits. Prerequisite: concurrent or previous enrollment in Biological Sciences 452 or permission of instructor.

Lab to be arranged. Organizational meeting first F of semester at 2:30. A. van Tienhoven.

The laboratory provides students with an opportunity to independently design and execute experiments with limited objectives.

458 (654-656) Mammalian Physiology Spring. 6 credits. Enrollment limited. Prerequisite: Biological Sciences 311 or 416, or equivalent with written permission of instructor.

Lecs, M W F 8; lab, M or W 1:25-4:25; 4 additional hours to be arranged. K. W. Beyenbach and staff.

Selected topics in mammalian physiology are discussed in the lecture and concurrently studied in the laboratory. Topics are selected from the following: physiology of membranes and epithelia; nerve and muscle; heart and circulation; autonomic, somatic, and sensory nervous systems, respiration, digestion; salt and water balance; acid-base balance; and endocrine regulation.

[610 Mammalian Neurophysiology (also

Veterinary Medicine 753)] Spring. 3 credits. Limited to 16 students. Prerequisites: two years of college biology. Recommended: courses in biochemistry and physics. Offered alternate years. Not offered 1980-81.

Lec and disc, R 10:10; lab, R 1:25-4:25; additional hours to be arranged. E. L. Gasteiger.

Studies include electrical activity of cells; reflexes; decerebrate rigidity; acoustic microphonic response; subcortical stimulation; and evoked and spontaneous cortical activity.]

615 Nutrition and Physiology of Mineral Elements (also Veterinary Medicine 759 and Nutritional Sciences 659)

Fall. 2 credits. Prerequisites: courses in basic physiology, intermediate biochemistry, and general nutrition. Offered alternate years.

Lecs, T R 10:10. R. H. Wasserman, R. Schwartz, D. R. VanCampen.

Lectures on nutritional aspects and physiological, biochemical, and hormonal relationships of the prominent macroelements and microelements, with emphasis on recent developments. Information is included on methodologies of mineral research and the essentiality, requirements, transport, function, homeostasis, interrelationships, and toxicity of various mineral elements.

616 Radiolabels in Biological Research (also Veterinary Medicine 750)

Spring. 4 credits. Prerequisites: courses in animal or plant physiology, or permission of instructor.

Lecs, T R 11:15; lab, T 1:25-5. F. W. Lengemann.

Lectures and laboratories deal with the radioisotope as a tool in biological research. Among the topics considered are the utilization and detection of beta-emitting isotopes, gamma spectrometry, Cerenkov counting, neutron activation, autoradiography, and whole-body counting. Emphasis is placed on liquid scintillation counting, double-label experiments, and C^{14} and H^3 as metabolic tracers. Experiments are designed to present basic principles, using plants and animals as subject material.

617 Applied Electrophysiology (also Veterinary Medicine 652)

Fall. 2 credits. Open to seniors, graduate students, and second-, third-, and fourth-year veterinary students. Prerequisites: physics and two years of college biology; or permission of instructor.

Lec, W 8; lab, W 2-4:25. E. L. Gasteiger, E. R. Loew.

Theory and practice of electrophysiological techniques currently used for study of the nervous and muscular systems in normal and diseased states. Topics include electroencephalography, electromyography, electroretinography, and evoked potentials.

618 Biological Membranes and Nutrient Transfer (also Veterinary Medicine 752)

Spring. 2 credits. Prerequisites: courses in animal or plant physiology, quantitative and organic chemistry, and physics, and permission of instructor. Recommended: courses in cellular physiology and elementary physical chemistry. Offered alternate years.

Lecs, T R 11:15. R. H. Wasserman.

An introduction to elementary biophysical properties of biological membranes; theoretical aspects of permeability and transport; and mechanism of transfer of inorganic and organic substances, primarily across epithelial membranes.

619 Lipids (also Nutritional Sciences 602) Fall. 2 credits. Prerequisite: Biological Sciences 330 or 331.

Lecs, T R 11:15. A. Besadoun.

Advanced course on biochemical, metabolic, and nutritional aspects of lipids. Emphasis on critical analysis of current topics in lipid methodology; lipid absorption; lipoprotein secretion, structure, and catabolism; mechanism of hormonal regulation of lipolysis and fatty acid synthesis; and cholesterol metabolism and atherosclerosis.

[658 Molecular Mechanisms of Hormone Action (also Veterinary Medicine 758)]

Spring. 2 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1980-81.

Lecs, T R 10:10. R. A. Corradino.

An advanced course developed from the current literature on endocrine mechanisms.]

719 Graduate Research in Animal Physiology and Anatomy (also Veterinary Medicine 600)

Fall or spring. Variable credit. Prerequisite: written permission of section chairperson and staff member who will supervise the work and assign the grade. S-U grades optional.

Hours to be arranged. Staff.

Similar to Biological Sciences 499 but intended for graduate students who are working with faculty members on an individual basis.

Related Courses in Other Departments

Advanced Work in Animal Parasitology (Veterinary Medicine 737)

Animal Reproduction and Development (Animal Science 220)

Cellular Neurobiology (Biological Sciences 496)

Developmental Biology (Biological Sciences 385)

Fundamentals of Endocrinology (Animal Science 427)

Insect Morphology (Entomology 322)

Neuroanatomy (Veterinary Medicine 504)

Parasitic Helminthology (Veterinary Medicine 440)

Population Biology of Health and Disease (Veterinary Medicine 330)

Teaching Experience (Biological Sciences 498)

Undergraduate Research in Biology (Biological Sciences 499)

Vertebrate Developmental Anatomy (Biological Sciences 389)

Vision (Biological Sciences 395)

Neurobiology and Behavior

321 Neurobiology and Behavior Fall. 3 credits.

Prerequisite: one year of introductory biology. S-U grades optional, with permission of instructor.

Lecs, M W F 12:20. M. M. Salpeter, T. Eisner, and staff.

A general introduction to the field of neurobiology and behavior. Topics include evolution of behavior, cueing of behavior, animal orientation, social and nonsocial behavior, neuroanatomy, neurophysiology, neurochemistry, neural networks, and memory.

322 Hormones and Behavior (also Psychology 322) Spring. 3 credits. Primarily for upperclass students; permission of instructor required for sophomores. Prerequisites: one year of introductory biology, and Biological Sciences 321 or a course in psychology.

Lecs, T R 10:10–11:30. E. K. Adkins, R. E. Johnston.

The relationship between endocrine and neuroendocrine systems and the behavior of animals, including humans. Major emphasis is on sexual, parental, and aggressive behavior.

324 Biopsychology Laboratory (also Psychology 324) Spring. 3 credits. Limited to 25 upperclass students. Prerequisites: laboratory experience in biology or psychology, Biological Sciences 321 or Psychology 123, and permission of instructor. S-U grades optional.

Labs, T R 1:25–4:25. Staff.

Experiments designed to provide research experience in animal behavior (including learning) and its neural and hormonal mechanisms. A variety of techniques, species, and behavior patterns are included.

[395 Vision (also Engineering A&EP 611)] Fall. 3 credits. Prerequisites: Chemistry 104 or 208; Mathematics 106, 111, or 113; and either Physics 102 or 208; or permission of instructor. Offered alternate years. Not offered 1980–81.

Lecs, M 1:25 and T R 10:10. R. K. Clayton.

A study of the mechanism of seeing that includes biological, physical, and chemical approaches to the subject.]

396 (495) Introduction to Sensory Systems (also Psychology 396) Spring. 3 credits. No auditors. Prerequisites: an introductory course in biology or biopsychology, and a second course in neurobiology and behavior or perception or cognition or biopsychology; students are expected to have elementary knowledge of perception, neurophysiology, and chemistry. S-U grades optional for graduate students only. Offered spring 1981; next offered spring 1983 and each spring term thereafter.

Lecs, T R 9:05; disc to be arranged. B. P. Halpern.

Both those characteristics of sensory systems that are common across living organisms and those sensory properties that represent adaptations of animals to particular habitats or environments are studied. The principles and limitations of major methods used to examine sensory systems are considered. Behavioral (including psychophysical, biophysical, and neurophysiological) and anatomical methods are usually included.

420 Seminar in Neurobiology and Behavior Fall or spring. Variable credit. May be repeated for credit. Primarily for undergraduates. S-U grades optional.

Sem to be arranged. Organizational meetings first M of each semester at 8 p.m. in Caldwell 100. Staff.

In most semesters, at least two seminars on different topics are offered. Topics and instructors are listed in the division's catalog supplement issued at the beginning of the semester.

421 Comparative Vertebrate Ethology Fall. 3 credits. Prerequisites: one year of introductory biology for majors. Biological Sciences 321, and permission of instructor. S-U grades optional.

Lecs, T R 9:05; lab to be arranged. Independent research project required. W. C. Dilger.

A survey of the methods and principles of vertebrate ethology, including such topics as aggression, fear, sex, feeding, and other normal activities. Emphasis is placed on the causation, function, biological significance, and evolution of species-typical behavior. The laboratories are designed to give firsthand knowledge of the material covered in lectures.

421 Comparative Vertebrate Ethology Fall. 3 credits. Prerequisites: one year of introductory biology for majors. Biological Sciences 321, and permission of instructor. S-U grades optional.

Lecs, T R 9:05; lab to be arranged. Independent research project required. W. C. Dilger.

A survey of the methods and principles of vertebrate ethology, including such topics as aggression, fear, sex, feeding, and other normal activities. Emphasis is placed on the causation, function, biological significance, and evolution of species-typical behavior. The laboratories are designed to give firsthand knowledge of the material covered in lectures.

Also offered during the 3-week Summer Session. During the summer, field trips and field projects are substituted for many of the laboratories.

423 Animal Communication Fall. 4 credits. Limited to 32 students. Prerequisites: Biological Sciences 321 and either Physics 102 or 208. Offered alternate years.

Lecs, T R 10:10; lab, T or R 1:25–4:25; other meetings to be arranged. R. R. Capranica, R. R. Hoy.

The functional aspects of biological signals, their physical properties, and the physiological mechanisms underlying their generation and reception. Lectures examine in detail selected biological communication problems from each of the known sensory modalities. Discussion covers signal analysis, transmission properties, and the limitations of each type of communication. Laboratories include behavioral observations under both field and captive conditions, and individual experience with the techniques of signal recording and analysis.

[424 Animal Social Behavior] Spring. 3 credits. May be repeated for credit with permission of instructor. Prerequisite: Biological Sciences 321. S-U grades optional. Not offered 1980–81.

Lecs, T R 10:10–11:30. G. Hausfater.

This course examines animal social behavior and social organization in a phylogenetic perspective. A different taxonomic group serves as the focus of the course each year.]

[427 Vertebrate Social Behavior] Fall. 3 credits. Prerequisites: Biological Sciences 321 and 360, or their equivalents, and written permission of instructor. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1980–81.

Lecs, M W F 10:10; disc to be arranged. S. T. Emlen.

A discussion of vertebrate social behavior, with emphasis on behavioral adaptations to the environment; ecological significance of diverse social systems; advantages of territoriality, coloniality, and nomadism; evolution of cooperative and communal social organizations; feeding and flocking strategies; ecological constraints on monogamous, polygamous, and promiscuous mating systems; and the role of social behavior in population regulation.]

491 Principles of Neurobiology, Laboratory (also Psychology 491) Fall. 4 credits. Limited to 36 students. Prerequisite: Biological Sciences 396 (495) or 496, or written permission of instructor.

Labs, M W or T R 12:20–4:25. B. R. Land and staff.

Laboratory practice with neurobiological preparations and experiments, designed to teach the techniques, experimental designs, and research strategies used to study biophysical and biochemical properties of excitable membranes, sensory receptors, and the central nervous system transformation of afferent activity, as well as the characteristic composition and metabolism of neural tissue. Theoretical content at the level of Junge's *Nerve and Muscle Excitation*.

[494 Neuropharmacology] Spring. 3 credits. Prerequisites: Biological Sciences 321 and either 330 or 331; or written permission of instructor. Not offered 1980–81.

Lecs, M W F 8. Staff.

Deals with drugs that affect the nervous system, both central and peripheral. Emphasis is on mechanisms of drug action whereby basic biochemical processes and neurophysiological and behavioral phenomena

are bridged. Stimulants, anesthetics, hallucinogens, and neurotoxins are discussed, as well as drug addiction, psychopharmacology, endocrine pharmacology, and the biochemical basis of the therapeutic uses of drugs in diseases of the nervous system.]

496 Cellular Neurobiology Spring. 4 credits. Prerequisite: Biological Sciences 321.

Lecs, M W F 10:10; disc to be arranged. R. B. Campenot, M. M. Salpeter.

A one-semester, intensive undergraduate course in neurobiology. The course provides in-depth, current treatment of the basic principles of cellular, chemical, pharmacological, molecular, anatomical, and integrative aspects of neurobiology.

[497 Neurochemistry] Fall. 3 credits. Prerequisites: Biological Sciences 321 and either 330 or 331. Not offered 1980–81.

Lecs and discs, M W F 9:05. Staff.

Special features of the composition and metabolism of neural tissue are discussed. The identification of synaptic transmitters in the nervous system, including their specific localization, biosynthesis and metabolism, release, inactivation, and action on postsynaptic receptors, is considered in detail.]

[623 Chemical Communication (also Chemistry 622)] Fall. 3 credits. Primarily for research-oriented students. Limited to 30 senior and graduate students. Prerequisites: one year of introductory biology for majors or equivalent, course work in biochemistry, and Chemistry 358 or equivalent. Offered alternate years. Not offered 1980–81.

Lecs, M W F 1:25. T. Eisner, J. Meinwald, W. L. Roelofs, and guest speakers.

The production, transmission, and reception of chemical signals in communicative interactions of animals, plants, and microorganisms. Studies of insects are emphasized. Specific topics are treated, with varying emphasis on chemical, biochemical, neurobiological, ecological, and evolutionary principles.]

[624 Behavioral Neurogenetics] Spring. 3 credits. Primarily for research-oriented students. Prerequisites: Biological Sciences 321 and 281. Recommended: course work in developmental biology. S-U grades optional. Offered alternate years. Not offered 1980–81.

Lecs, T R 9:05; disc and demonstration to be arranged. R. R. Hoy.

The study of the neurogenetic basis of behavior in animals, using "simple" behaviors that can be analyzed genetically and neurobiologically. Both vertebrate and invertebrate animals are discussed, although emphasis is on the invertebrates. Lectures and assigned readings draw heavily from journal articles.]

[627 Quantitative Approaches to Animal Behavior] Fall. 3 credits. Primarily for graduate students; written permission of instructor required for undergraduates. Enrollment limited. Prerequisite: Biological Sciences 321 or equivalent. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1980–81.

Lecs and discs, T R 10:10–11:30. G. Hausfater.

This course emphasizes a quantitative approach to research on animal behavior. Lectures, discussions, and readings focus on the formulation of precise, testable hypotheses for behavior research, especially mathematical models, and on the use of systematic sampling techniques in observational research. Basic probability distributions are introduced and used in the analysis of behavior sequences and interaction patterns. Stochastic models of behavior are also discussed.]

[628 Field Methods in Animal Behavior] Spring. 4 credits. Limited to 20 students. Prerequisites: Biological Sciences 321 and either 421 or 427, or their equivalents, and written permission of instructor. Not offered 1980–81.

Lecs and discs, T R 10:10; lab, T 1:25–4:25.

Independent project required. Enrolled students must participate in all aspects of course; no partial credit given. Staff.

A practically oriented course for seniors and first-year graduate students who will be pursuing field studies. Lecture-discussion areas include the scope and design of field behavior projects, sources of variability, and evaluation of relevant publications. Laboratory periods are devoted to introduction, demonstration, and practice of techniques and to individual fieldwork.]

[691 Developmental Neurobiology Fall. 2 credits. Prerequisite: Biological Sciences 496 or permission of instructor. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1980–81.

Lecs and discs, 2 hours each week, to be arranged. R. B. Campenot.

The embryologic development of the nervous system is considered in the light of both historical and current research. Emphasis is on cellular issues, i.e., How do nerve cells differentiate both morphologically and biochemically, and how do they interact to produce a properly wired nervous system?]

[692 Behavioral Neurophysiology, Lectures Fall. 3 credits. Prerequisite: Biological Sciences 496 or permission of instructor. Offered alternate years. Not offered 1980–81.

Lec, M 9:05; discs, 2 hours each week, to be arranged. J. M. Camhi.

The course treats those aspects of the organization of the nervous system that are important in determining the forms of behavior observed. Some special emphasis is given to the nervous system of invertebrates, which serve as models for the more complex organization of vertebrates. Some material is treated from a neuroethological perspective. Readings are original papers in the field.]

[694 Behavioral Neurophysiology, Laboratory Fall. 2 credits. Limited to 10 students. Prerequisite: concurrent enrollment in Biological Sciences 692. Offered alternate years. Not offered 1980–81.

Lab to be arranged. J. M. Camhi.

After learning basic techniques, students work on extended research projects under the direction of J. M. Camhi and the staff of Biological Sciences 491.]

[695 Physiological Optics Fall. 3 credits. Limited to 24 students. Recommended: courses in elementary biology or psychology, and physics, and courses appropriate to particular track (see below). Offered alternate years. Not offered 1980–81.

Lecs, T R 9:05; lab, 3 hours each week, to be arranged. H. C. Howland.

The course is primarily for upperclass students who intend to pursue research or conduct clinical work in vision. Topics include geometrical optics, clinical refraction, measurement of MTF and contrast sensitivity, and the vegetative physiology of the eye relevant to optical quality of the optical image.

Laboratory work is divided into three tracks:

(1) *Clinical Track* for students intending to work in optometry or medicine; (2) *Psychophysical Track* for students intending to conduct research in human or animal vision; and (3) *Engineering Track* for students intending to use or design optical devices for which the human eye is a component in the system.

Grades are based on the student's accomplishments within the chosen track, in view of the background brought to it.]

696 Neuroelectric Systems (also Electrical Engineering 622) Spring. 3 or 4 credits (4 credits with lab). Prerequisite: either Biological Sciences 423 or 496 or Electrical Engineering 301 or 621; written permission of instructor required for lab. Offered alternate years.

Lecs, M W 9:05; disc and demonstration to be arranged; lab to be arranged. R. R. Capranica, M. Kim.

Application of microprocessors for neuroelectric data acquisition and systems analysis. Lectures cover electrical activity of single nerve cells, electrodes and instrumentation techniques, analysis of electrophysiological data, and coding principles in the nervous system, as well as appropriate background material for the use of microprocessors in neurobiology. Laboratory exercises provide experience in the actual use of microprocessors.

720 Seminar in Advanced Topics in Neurobiology and Behavior Fall or spring. Variable credit. May be repeated for credit. Primarily for graduate students; written permission of instructor required for undergraduates. S-U grades optional.

Sem to be arranged. Staff and students. Designed to provide several study groups each semester on specialized topics. A group may meet for whatever period is judged adequate to enable coverage of the selected topics. Ordinarily, topics will be selected and circulated during the preceding semester. Suggestions for topics should be submitted by faculty or students to the chairperson of the Section of Neurobiology and Behavior.

[723 Graduate Seminar in Vertebrate Social Behavior Fall. 2 credits. May be repeated for credit. Enrollment limited. Prerequisites: Biological Sciences 321, 360, and 477, or their equivalents, and written permission of instructor. S-U grades only. Not offered 1980–81.

Sem to be arranged. S. T. Emlen, G. Hausfater. Intended as a graduate-level follow-up to Biological Sciences 424 and 427. An advanced, participation-format seminar dealing with various aspects of the evolution of social organization in vertebrates.]

Related Courses in Other Departments

Biochemistry and Human Behavior (Psychology 361 and Nutritional Sciences 361)

Mammalian Neurophysiology (Biological Sciences 610)

Motor Physiology (Biological Sciences 411)

Teaching Experience (Biological Sciences 496)

Undergraduate Research in Biology (Biological Sciences 499)

Biochemistry and Cell Biology

132 Orientation Lectures in Biochemistry Spring, weeks 1–3. Noncredit. Primarily for freshman, sophomores, and transfer students. S-U grades only (registered students receive an unsatisfactory grade for nonattendance).

Lec, S 10:10–11:30, first 3 Saturdays of semester.

Section chairperson and staff. Lectures illustrate modern research and training in biochemistry and molecular and cell biology.

231 Some Applications of Biochemistry to Medicine and Agriculture Fall. 3 credits. Intended for students who have not previously studied biochemistry and who do not expect to pursue it further. Not recommended for students who have taken organic chemistry. Prerequisite: Chemistry 104 or 208 or equivalent. S-U grades optional.

Lecs, M W F 12:20. J. M. Griffiths.

A brief introductory section relating organic chemistry to biochemistry is given, followed by the biochemical material in the usual one-semester introductory courses. Topics of general interest are also included, such as nutrition, cancer, diseases, and viruses.

330–331 Principles of Biochemistry Introductory biochemistry is offered in two formats: individualized instruction (330) and lectures (331). *Individualized instruction is offered to a maximum of 150 students each semester. Lectures given fall semester only.*

330 Principles of Biochemistry, Individualized Instruction Fall or spring. 4 credits. Prerequisite: Chemistry 253 or equivalent.

Discs, M W F 8 or 10:10; additional hours to be arranged. No formal lecs. Fall: M. Ferger, G. P. Hess, and staff; spring: M. Ferger, R. Wu, and staff.

The focal point for this course is a study center—open mornings, afternoons, and some evenings—where students find materials, get help, participate in discussions, and take exams. Students are required to master a minimum body of core material. The pace at which this material is assimilated is largely self-determined. Students who want to go beyond core material have available a wide range of electives, including discussions of research papers and independent study of a variety of problems and *Scientific American* articles. Grades are determined primarily by the amount of elective work satisfactorily completed and by a final exam.

331 Principles of Biochemistry, Lectures Fall; also offered during Summer Session. 4 credits. Prerequisite: Chemistry 253 or equivalent.

Lecs, M W F S 10:10. B. K. Tye, J. K. Moffat, R. Barker.

Chemistry of biological substances, presented in a lecture format. Course content is similar to that of Biological Sciences 330.

430 Basic Biochemical Methods Fall or spring. 4 credits. Enrollment limited. Prerequisites: Biological Sciences 330 or 331, a lab course in organic chemistry, and permission of instructor.

Lec and disc, F 1:25; labs, M W or T R 12:20–4:25. R. R. Alexander, M. L. Wilkinson, N. B. Wurster. A modular course designed to introduce the student to the biochemical techniques most commonly used in various biological fields. Students select two of the following modules: clinical and nutritional biochemistry, lipids, isolation and characterization of cell components, or nucleic acids. An enzymology module is taken by all students.

432 Survey of Cell Biology Spring. 3 credits. Prerequisite: Biological Sciences 330 or 331 or equivalent.

Lecs, M W F 11:15. J. T. Lis. A survey of material covered in depth in Biological Sciences 433, 438, and 483. The course covers a wide array of topics, including microscopic techniques, membrane activities, cell junctions, organelles, cell movement, cell division, chromosome structure and the control of gene expression, and cellular differentiation.

433 Cell Structure and Physiology Fall. 2 credits. Prerequisite: Biological Sciences 330 or 331 or permission of instructor.

Lecs, T R 12:20. R. E. MacDonald. The functional aspects of cells and their organelles: bioenergetics, transport, movement, growth, nutrition, and structure are examined in detail in free-living cells, differentiated cells, and highly specialized cells. The course attempts to integrate current knowledge about cell biochemistry, structure, and function with the role of the cell in its environment and in its interrelationship with other cells.

434 Laboratory in Cell Biology Spring. 4 credits. Enrollment limited. Prerequisite: written permission of instructor.

Labs, M W 1:25–4:25 or R 9:05–4:25; disc to be arranged. C. M. Resch.

The course provides experience in experimental design and stresses techniques for handling and experimenting with cells of different kinds.

435–436 Undergraduate Biochemistry Seminar 435, fall; 436, spring. 1 credit each term. May be repeated for credit. Enrollment limited, upperclass students only. Prerequisite: Biological Sciences 330 or 331, or written permission of instructor. S-U grades optional, with permission of instructor.

Sem to be arranged. Organizational meeting first T of each semester at 4 p.m. Fall: P. C. Hinkle; spring: J. K. Moffat.

A group of selected papers from the literature are critically evaluated during six or seven two-hour meetings. Fall: ion transport and bioenergetics; spring: three-dimensional structure of macromolecules.

438 Cell Proliferation and Oncogenic Viruses Spring. 2 credits. Prerequisite: Biological Sciences 330 or 331. Recommended: Biological Sciences 281. Lects, T R 12:20. V. M. Vogt.

A description of the growth properties of animal cells in culture, followed by discussions of the changes in cells that are induced by tumor viruses and carcinogens. Topics include macromolecular growth factors, contact inhibition, cell surface properties, cell cytoskeleton, transcription and translation of viral and host genes, and integration of viral DNA into host chromosomes.

[456 Molecular Biology of Yeast Spring. 3 credits. Prerequisites: Biological Sciences 281 and a course in organic chemistry. Not offered 1980–81; first offered spring 1983.

Lects, M W F 9:05. G. R. Fink.
Saccharomyces cerevisiae, a single-celled lower eucaryote, possesses physiological, biochemical, and genetic characteristics that make it an ideal organism for investigating many fundamental aspects of gene expression in eucaryotes. These characteristics will be discussed, together with current research methodologies (tetrad analysis, fine structure mapping, mutant isolation, transformation, and recombinant DNA techniques) and their application in understanding phenomena such as cell division and determination of mating type.]

631 Protein Structure and Function Fall. 2 or 3 credits (3 credits with discussion). Prerequisites: Biological Sciences 330 or 331, Chemistry 288, and either Chemistry 358 or 360; or written permission of instructor. S-U grades optional, with permission of instructor.

Lects, M W 9:05; disc, F 9:05. G. W. Feigenson and staff.
Lectures on protein structure and the nature of enzymatic catalysis. Discussions cover some of these areas in more depth, through recent research papers and advanced lectures.

632 Bioenergetics and Membranes Spring. 2 credits. Prerequisites: Biological Sciences 330 or 331, and either Chemistry 358 or 360; or written permission of instructor. Recommended: physical chemistry.

Lects, T R 11:15. P. C. Hinkle and staff.
Oxidative phosphorylation, photophosphorylation, active transport, muscle contraction, and the structure of biological membranes.

633 Biosynthesis of Macromolecules Fall. 2 credits. Prerequisites: Biological Sciences 330 or 331, and either Chemistry 358 or 360; or written permission of instructor.

Lects, T R 9:05. J. W. Roberts, D. B. Wilson.
DNA, RNA, and protein synthesis; regulation of gene expression; and other topics.

[634 Biochemistry of the Vitamins and Coenzymes (also Nutritional Sciences 634) Spring. 2 credits. Prerequisites: Biological Sciences 330 or 331 or equivalent, and either Chemistry 358 or 360. Offered alternate years. Not offered 1980–81.

Lects, T R 10:10. M. N. Kazarinoff.
The chemical, biochemical, and nutritional aspects of the vitamins and coenzymes.]

635 Metabolic Regulation (also Nutritional Sciences 635) Spring. 2 credits. Prerequisites: Biological Sciences 330 or 331, and either Chemistry 358 or 360; or written permission of instructor. Recommended: physical chemistry.

Lects, T R 9:05. W. L. Dills and staff.
The study of enzymes and the molecular mechanisms of metabolic regulation.

637 Vertebrate Biochemistry (also Veterinary Medicine 525) Fall. 5 credits. Prerequisite: Biological Sciences 330 or 331 or equivalent. S-U grades optional.

Lects, M T W R F 9:05. W. J. Arion, J. F. Wootton.
An intermediate-level biochemistry course correlating metabolic, structural, and functional characteristics of animal tissues. Metabolic integration and regulation are emphasized.

638 Intermediate Biochemical Methods Spring. 4 credits. Primarily for undergraduates majoring in biochemistry and for graduate students with a minor in biochemistry. Prerequisites: Biological Sciences 330 or 331, and permission of instructor. Students must obtain permission of instructor by the last day of the course enrollment period.

Lab, T or R 9:05–4:25. E. B. Keller, L. A. Heppel, and staff.
Selected experiments on proteins, enzymes, DNA, and bioenergetics to illustrate basic biochemical principles. The course emphasizes quantitative aspects and techniques currently used in biochemical research.

731–739 (732–739) Current Topics in Biochemistry Fall or spring. ½ or 1 credit for each topic. May be repeated for credit. (Students registering for ½ credit should *not* fill in the credit-hour column on the optical mark registration form; the computer is programmed to automatically register students for ½ credit.) Prerequisite: Biological Sciences 330 or 331 or equivalent. S-U grades only.

Lectures and seminars on specialized topics.

Fall 1980: five topics are offered.

731 Intracellular Protein Degradation ½ credit. T R 12:20 (6 lecs); Sept. 2–18. M. N. Kazarinoff.

733 Regulation of Membrane Transport in Microorganisms ½ credit. T R 12:20 (6 lecs); Sept. 23–Oct. 9. D. B. Wilson.

735 Unusual Genetic Events ½ credit. W F 12:20 (6 lecs); Oct. 1–17. G. R. Fink.

737 Lipids in Biomembranes 1 credit. W F 10:10 (12 lecs); Oct. 22–Dec. 5. D. B. Zilversmit.

739 Biochemistry of Inborn Errors of Carbohydrate Metabolism ½ credit. T R 12:20 (6 lecs); Nov. 4–20. W. L. Dills.

Spring 1981: four topics are offered.

732 Monosaccharides and Oligosaccharides: Structure-Reactivity Relationships ½ credit. T R 12:20 (6 lecs); Feb. 3–19. R. Barker.

734 Genetic Engineering Applied to Plant Cells ½ credit. T R 12:20 (6 lecs); Feb. 24–Mar. 12. A. A. Szalay.

736 Chloroplast Biogenesis ½ credit. T R 12:20 (6 lecs); Mar. 17–Apr. 9. A. T. Jagendorf.

738 Chemical Carcinogenesis ½ credit. T R 12:20 (6 lecs); Apr. 21–May 7. T. C. Campbell.

830 Biochemistry Seminar Fall or spring. Noncredit. Sem, F 4:15. Staff.

Lectures on current research in biochemistry, presented by distinguished visitors and staff.

831 Advanced Biochemical Methods I Fall. 6 credits. Limited to graduate students majoring in biochemistry.

Labs and discs, 12 hours each week to be arranged. Organizational meeting first T of semester at 10:10. D. B. Wilson and staff.

To learn the basic techniques of biochemical research, each student completes a set of experiments.

832 Advanced Biochemical Methods II Spring. 6 credits. Limited to graduate students majoring in biochemistry. S-U grades only.

Lab to be arranged. Staff (coordinator: J. K. Moffat).

Research in the laboratories of three different professors chosen by the student. Arrangements are made jointly between the field representative and the research adviser.

833 Research Seminar in Biochemistry Fall and spring. 1 credit each term. (Students must register for 2 credits each term, since an "R" grace is given at the end of the fall term.) May be repeated for credit. Required of all graduate students (first-year students excepted) majoring in biochemistry. S-U grades only. Sem, M 7:30–9 p.m. E. Racker.

Related Courses in Other Departments

Lipids (Biological Sciences 619)

Molecular Aspects of Development (Biological Sciences 483)

Molecular Mechanisms of Hormone Action (Biological Sciences 658)

Plant Biochemistry (Biological Sciences 648)

Teaching Experience (Biological Sciences 498)

Undergraduate Research in Biology (Biological Sciences 499)

Botany

241 Plant Biology Fall. 3 credits. Enrollment may be limited, with preference given to sophomores and juniors majoring in agronomy, botany, environmental education, floriculture, horticulture, natural resources, plant sciences, vegetable crops, and wildlife. Prerequisite: one year of introductory biology for majors or equivalent.

Lects, T R 9:05; lab, M T W R or F 1 25–4:25, or M or W 7:30–10:30 p.m. Prelims: 8:40 p.m. Oct. 30, Dec. 4. K. J. Niklas.

Introductory botany for those who plan to specialize in or use some aspect of the plant sciences. Emphasizes structure reproduction, and classification of angiosperms and the history of life on earth. Laboratory emphasizes development of skills in handling plant materials, including identification. First, second, and fourth weeks of laboratory are field trips, starting with the first day of classes. *Those who register for an evening laboratory are still required to attend the afternoon field trips.*

242 Plant Physiology, Lectures Spring. 3 credits. Primarily for undergraduates in agricultural sciences. Prerequisites: one year of introductory biology and introductory chemistry; concurrent enrollment in Biological Sciences 244 or written permission of instructor required for undergraduates.

Lects, M W F 10:10. P. J. Davies.
Plant physiology as applied to plants growing in communities. Examples deal with crop plants or higher plants where possible, though not exclusively. Topics include cell structure and function; plant metabolism, including photosynthesis; soil-plant-water relations; water uptake, transport, and transpiration; irrigation of crops; sugar transport; mineral nutrition of crops; respiration and photosynthesis; light relations in crops; growth and development—hormones, flowering, fruiting, dormancy, and abscission; and chemical control of plant growth.

244 Plant Physiology, Laboratory Spring. 2 credits. Prerequisite: concurrent enrollment in Biological Sciences 242.
Lab, M T W or R 1:25–4:25; disc, M T W or R 12:20. Lab and disc must be on same day. C. Reiss.

246 Plants and Human Affairs Spring. 3 credits. Intended for students in all colleges. S-U grades optional.

Lecs, M W F 8; disc, F 9:05, 10:10, 11:15, or 12:20. Discs are held only 5 times during semester. Students do not choose disc sections during course enrollment; disc assignments are made at the first lec period. D. M. Bates.

A consideration of the role of plants in the cultural evolution of man and the development of civilizations. Emphasis is ethnobotanical. Themes developed include: the ecological constraints placed on evolving man; agricultural origins and the evolution of domesticated plants; the rich array of plants populating the earth and the innovative ways in which man uses them; physiologically active plant substances, including medicinals and hallucinogens; and a biological view of the future prospects for plants and humanity.

247 Poisonous Plants Fall. 2 credits. Offered fall 1980 only.

Lecs, T R to be arranged. J. M. Kingsbury.
A discussion of incidence and conditions of poisoning in man and animals, poisonous principles from plants, and effects of toxic plants on vertebrates.

341 Plant Physiology, Lectures Fall. 3 credits. Prerequisites: one year of introductory biology, organic chemistry, and either concurrent enrollment in Biological Sciences 349 or written permission of instructor.

Lecs, T R 10:10 and M 7:30 p.m. A. T. Jagendorf.
The behavior, growth, transport processes, and environmental response of plants. Topics include membrane properties, solute and water transport, and function of osmotic forces; mineral and organic nutrition; stress resistance; growth and hormonal action; metabolism, including photosynthesis and respiration; and responses to gravity, light, photoperiod, and temperature.

342 (248) Taxonomy of Cultivated Plants (also Floriculture and Ornamental Horticulture 342) Spring. 4 credits. Limited to 28 students. Prerequisite: one year of introductory biology or written permission of instructor. May not be taken for credit after Biological Sciences 343 (346).

Lecs, M W 10:10; labs, M W 2–4:25. J. W. Ingram.
A study of ferns and seed plants, their relationships, and their classification into families and genera, emphasizing cultivated plants. Particular emphasis is placed on gaining proficiency in identifying and distinguishing families and in preparing and using analytical keys. Attention is also given to the economic importance of taxa, to the basic taxonomic literature, and to the elements of nomenclature.

343 (346) Taxonomy of Vascular Plants Fall. 4 credits. Prerequisites: introductory biology and written permission of instructor. May not be taken for credit after Biological Sciences 342 (248).

Lecs and discs, T R 9:05; labs, T R 2–4:25. M. D. Whalen.
An introduction to the classification of ferns and flowering plants, with attention to principles, methods of identification, and literature. Field trips are held during laboratory periods in the first half of the term.

345 Plant Anatomy Fall. 4 credits. Limited to 48 students. Prerequisite: one year of introductory biology or a semester of botany. Not intended for general education. Students in doubt about their level of preparedness or the role of this course in their curricula are encouraged to consult the instructor before registering.

Lecs, T R 8; labs, M W 2–4:25 or T R 10:10–12:35. D. J. Paolillo.

A descriptive course with equal emphasis on development and mature structure. Lecture, laboratory, and reading are integrated in a study guide. The laboratory offers the opportunity to develop the practical skills required to make anatomical diagnoses and to write anatomical descriptions.

346 (343) Field Phycology Summer. 4 credits. Prerequisite: Biological Sciences 364 or general familiarity with marine algae. S-U grades optional. A special 3-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost, \$695.

Daily lecs, labs, and fieldwork for 3 weeks. SML faculty.
An overview of the major marine algal groups, including aspects of anatomy, morphology, development, life histories, physiology, and utilization. Laboratories and fieldwork emphasize relationships between distribution and major environmental parameters and involve student projects.

347 Cytology Fall. 4 credits. Prerequisite: one year of introductory biology for majors. Recommended: Biological Sciences 281.

Lecs, M W 9:05; labs, M W or T R 10:10–12:35. C. H. Uhl.
A study primarily of the structure of cells and their components, and the relation of these to function and heredity. Special attention is given to chromosomes. Both plant and animal materials are used.

348 Phycology Spring. 4 credits. Lec, M W F 10:10; lab, M W or F 2–4:25. J. M. Kingsbury.

An introduction to freshwater and marine algae, including consideration of their ecology as members of the plankton and benthos and their importance to man. The laboratory uses field material and cultures from an extensive living collection to illustrate lecture topics, provide familiarity with algae in the field, and introduce the student to techniques used in isolating, culturing, and studying algae in the laboratory.

349 Plant Physiology, Laboratory Fall. 2 credits. Prerequisite: concurrent enrollment in Biological Sciences 341.

Lab, T W or R 1:25–4:25; disc, T W or R 12:20. Lab and disc must be on same day. C. Reiss.

442 Taxonomy and Evolution of Vascular Plants Spring. 4 credits. Prerequisites: Biological Sciences 342 (248) or 343 (346), and written permission of instructor.

Lecs and discs, T R 9:05; labs, T R 2–4:25. M. D. Whalen.
An interdisciplinary view of broad-scale and species-level evolution in vascular plants, with consideration of morphological, ecological, biogeographic, cytogenetic, and biochemical aspects.

444 Comparative and Developmental Morphology of the Embryophyta Spring. 4 credits. Prerequisite: Biological Sciences 345. Offered alternate years.

Lecs, T R 8; labs, T R 2–4:25. D. J. Paolillo.
The life histories of bryophytes, vascular cryptogams, and seed plants are examined for their developmental attributes and for their bearing on concepts of evolution and group relationships. The course content is designed to develop an awareness of the integration between morphology and other disciplines in biology.

[445 Photosynthesis (also Engineering A&EP 601)] Fall. 3 credits. Prerequisites: Chemistry 104 or 208; Mathematics 106, 111, or 113; and either Physics 102 or 208; or permission of instructor. Offered alternate years. Not offered 1980–81.

Lecs, M 1:25 and T R 10:10. R. K. Clayton.
A detailed study of the process by which plants use light in order to grow; physical and physicochemical aspects of the problem are emphasized.]

[446 Cytogenetics Spring. 3 credits. Prerequisites: Biological Sciences 281 and 347, or their equivalents. Offered alternate years. Not offered 1980–81.

Lecs, M W 9:05; lab, M or W 10:10–12:35. C. H. Uhl.
Deals mainly with the cellular mechanisms of heredity, including recent research in cytology, cytogenetics, and cytotaxonomy.]

[448 Plant Evolution and the Fossil Record Spring. 3 credits. Prerequisite: Biological Sciences 241 or equivalent, or written permission of instructor. Offered alternate years. Not offered 1980–81.

Lecs, T R 9:05; lab, R 12:20–2:15. K. J. Niklas.
An introduction to evolution, surveying major changes in plants from the origin of life to the present. Emphasis is placed on plant form and function, adaptations to particular ecologic settings, and evolutionary theory as it relates to plants.]

642 Topics in Ultrastructure of Plant Cells Spring. 3 credits. Primarily for graduate students, although upperclass students with adequate background are allowed to enroll. No auditors. Prerequisites: Biological Sciences 345 or 347, and written permission of course coordinator. Offered alternate years.

Lecs, M W F 10:10; optional disc, F 1:25 or to be arranged. Staff (coordinator: M. V. Parthasarathy).
An advanced course dealing with organelles in depth, and in breadth where necessary. Topics include salient ultrastructural features of some plant groups and certain specialized cells and processes. Content of the course and staff direction vary to some extent from year to year.

643 Plant Physiology, Advanced Laboratory Techniques Fall. 4 credits. Primarily for graduate students doing work in plant physiology, but open to others if space permits. Prerequisites: organic chemistry, biochemistry, and a course in plant physiology. S-U grades only.

Lab, T or W 8–5; disc, M 4:30–5:30. A. T. Jagendorf and staff.
An introduction to some modern methods in experimental plant biology.

[644 Plant Growth and Development Spring. 3 credits. Prerequisites: Biological Sciences 345 and either 242 or 341, or their equivalents; or written permission of instructor. Offered alternate years. Not offered 1980–81.

Lecs, M W F 9:05. P. J. Davies, D. J. Paolillo.
Explores the changes that occur during plant growth and development and their control: morphological and anatomical changes in apices, tissue differentiation, organ formation, embryo development, gene regulation, hormone action and interaction, the influence of light in development, flowering, fruiting, dormancy, abscission, and senescence.]

[645 (640) Families of Tropical Flowering Plants Fall. 1 credit. Prerequisite: written permission of instructor. S-U grades only. Offered alternate years. Not offered 1980–81

Lec and disc, F 11:15. H. E. Moore.
The families of flowering plants encountered solely or chiefly in tropical regions are considered in lectures, discussions, and demonstrations, with the aim of providing basic points of recognition for, and an understanding of, diversity and relationships in these families for the student venturing into the tropics.]

[646 Families of Tropical Flowering Plants: Field Laboratory Intersession. 3 credits. Limited to 20 students, with preference given to seniors and graduate students from member institutions of the Organization for Tropical Studies. Prerequisite: Biological Sciences 342 (248) or 343 (346) or equivalent. Recommended: Biological Sciences 645 (640). S-U grades only. For more details and application, consult H. E. Moore, Jr., L. H. Bailey Hortorium, 467 Mann Library. Estimated

cost of tuition plus room and board (exclusive of transportation), \$800. Offered alternate years. Not offered 1980-81.

H. E. Moore.

An intensive orientation to families of tropical flowering plants represented in forests of the American tropics. Emphasis on field identification combined with laboratory analysis of available materials in a "whole-biology" context.]

647 Seminar in Systematic Botany Spring. 1 credit. May be repeated for credit. Prerequisite: written permission of course coordinator required for undergraduates. S-U grades optional.

Sem to be arranged. Organizational meeting first F of semester at 1:25. Staff (coordinator: D. M. Bates).

Lectures and discussions led by staff, visitors, and students on topics of current importance to systematic botany. In spring 1981 the topic is phytogeography.

648 Plant Biochemistry Spring. 3 credits. Prerequisites: organic chemistry, biochemistry, and a course in plant physiology. Offered alternate years.

Lecs, M W F 9:05. A. T. Jagendorf, R. E. McCarty, J. F. Thompson.

Selected areas of plant biochemistry are reviewed in the context of the plant life cycle and responses to the environment. Topics include metabolism of lipids, carbohydrates, organic acids, and proteins; nitrogen and sulfur assimilation; respiration; photosynthesis; development and replication of chloroplasts; and cell wall composition and properties. Attention is paid to operation of control mechanisms.

649 Transport of Solutes and Water in Plants Fall. 3 credits. Prerequisite: Biological Sciences 341 or equivalent. Offered alternate years.

Lecs, M W F 10:10. R. M. Spanswick. Transport of ions, water, and organic materials in plants; mechanisms of ion transport; relationships between ion transport and metabolism; ion uptake and transport in higher plants; phloem transport; and water relations of single cells and whole plants.

[651 Quantitative Whole-Plant Physiology Fall. 3 credits. Prerequisites: introductory physics, calculus, and plant physiology. S-U grades only. Offered alternate years. Not offered 1980-81.

Lecs, T R 10:10-11:30. R. M. Spanswick. An exploration of the extent to which physiological processes and their interactions can be formulated in a quantitative manner and integrated to describe various aspects of plant behavior, including growth and yield. Consideration is given to characterization of the plant environment, energy balance, gas exchange, water relations, photosynthesis, respiration, translocation, nutrient supply, and the timing of developmental events.]

[652 Botanical Latin Spring. 1 credit. Prerequisite: written permission of instructor. S-U grades optional. Offered alternate years. Not offered 1980-81.

Lec and disc to be arranged. W. J. Dress. Basic grammar and vocabulary and exercises in writing and reading the Latin of plant taxonomy, as well as applications to botanical nomenclature.]

[654 (640) Plant Nomenclature Spring. 1 credit. Prerequisite: written permission of instructor. Recommended: concurrent enrollment in Biological Sciences 652. S-U grades optional. Offered alternate years. Not offered 1980-81.

Lec and disc to be arranged. W. J. Dress. An analysis of the International Code of Botanical Nomenclature and its application to various plant groups.]

656 Topics in Paleobotany Spring. 1 credit. Prerequisite: Biological Sciences 448 or equivalent background in evolution, or written permission of instructor.

Lab and disc to be arranged. K. J. Niklas.

A series of selected topics designated to provide a background in plant evolution, paleobotanical literature, and evolutionary theory. Among the topics discussed are the origin of a terrestrial flora, the evolution of the seed plants, and the origin and adaptive radiation of the angiosperms.

[657 (640) Literature of Taxonomic Botany Fall. 1 credit. Prerequisite: written permission of instructor. S-U grades optional. Offered alternate years. Not offered 1980-81.

Lec and disc, R 10:10. J. W. Ingram. A survey of the basic reference works in taxonomy from the pre-Linnaean literature drawn on by Linnaeus to contemporary publications, with comments on the peculiarities of the books (when appropriate), on publication dates, typographic devices, and intricacies of bibliographic citation.]

740 Plant Biology Seminar Fall and spring. Noncredit (no official registration). Required of graduate students doing work in plant physiology.

Sem, F 11:15. Staff. Lectures on current research in plant biology, presented by visitors and staff.

749 Graduate Research in Botany Fall or spring. Variable credit. May be repeated for credit. S-U grades optional.

Hours to be arranged. Staff. Similar to Biological Sciences 499 but intended for graduate students who are working with faculty members on an individual basis.

840 Current Topics in Plant Physiology Fall or spring. 2 credits. May be repeated for credit. S-U grades only.

Sem to be arranged. Staff. Seminar reports by graduate students on current literature in experimental plant physiology or related areas.

Related Courses in Other Departments

Advanced Mycology (Plant Pathology 579)

Current Topics in Mycology (Plant Pathology 649)

Introductory Mycology (Plant Pathology 309)

Plant Ecology (Biological Sciences 463, 465)

Plant Ecology Seminar (Biological Sciences 669)

Taxonomy of Fungi (Plant Pathology 599)

Teaching Experience (Biological Sciences 498)

Undergraduate Research in Biology (Biological Sciences 499)

Ecology, Systematics, and Evolution

260 Introductory Ecology Fall or spring. 3 credits. Prerequisite: one year of introductory biology or written permission of instructor.

Lecs, T R 11:15; disc, T or R 1:25, 2:30, or 3:35. Fall: S. J. Risch; spring: P. F. Brussard. An introduction to biological phenomena that occur at the population, community, and ecosystem levels of organization. The relevance of ecological principles to current environmental problems is examined.

274 The Vertebrates Spring. 5 credits. Primarily for sophomores; this course is a prerequisite for many advanced courses in vertebrate biology, anatomy, and physiology. Each lab limited to 21 students. Prerequisite: one year of introductory biology for majors. Fee: \$10.

Lecs, T R 10:10, labs, M W 1:25-5, M W 7-10 p.m., or T R 1:25-5. Staff.

An introduction to the evolution, classification, comparative anatomy, life history, and behavior of vertebrate animals. Laboratory dissection and demonstration are concerned with structure, classification, systematics, biology of species, and studies of selected aspects of vertebrate life.

360 General Ecology Fall or spring. 3 credits. For students concentrating in ecology or a related subject. Not open to freshmen in fall semester. Prerequisite: one year of introductory biology for majors.

Lecs, T R 9:05; disc, W or R 1:25, 2:30, or 3:35. Fall: P. P. Feeny, P. L. Marks; spring: R. B. Root, B. F. Chabot. Principles concerning the interactions between organisms and their environment; influence of competition, predation, and other factors on population size and dispersion; analysis of population structure and growth; processes of speciation; interspecific competition and the niche concept; succession and community concepts; influence of climate and past events on the diversity and stability of communities in different regions of the world; and role of energy flow and biogeochemical cycling in determining the structure and productivity of ecosystems. Modern evolutionary theory is stressed throughout and attention is given to conflicting ecological hypotheses.

362 Chemical Oceanography in the Field Summer. 4 credits. Prerequisites: one year of introductory college chemistry and an introductory marine science course at the college level. S-U grades optional. A special 3-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost, \$695.

Daily lecs, labs, and fieldwork for 3 weeks. SML faculty. A field-oriented course in the chemical oceanography of coastal waters. Lectures, frequent field trips, and laboratory sampling and analysis; includes tests of salinity, temperature, pH, chlorophyll, alkalinity, total CO₂, nutrients, organic material, and suspended materials in coastal waters, with some work on the analysis of coastal sediments.

363 Field Marine Science for Teachers Summer. 1 credit. Primarily for teachers, grades 6 through 12, but open to others. Prerequisite: one year of introductory college biology. S-U grades; letter grades optional, with permission of instructor. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost, \$240.

Daily lecs, labs, and fieldwork for 1 week. SML faculty. Designed to give an overview of living marine organisms (algae, invertebrates, fishes, marine mammals, and shorebirds) and of the environment they inhabit. Fieldwork is emphasized. Occasional lectures and films deal with additional topics, such as coastal zone problems, marine fisheries, economics of marine organisms, and educational resources of the marine environment. The core faculty of marine biologists will be augmented by specialists in science and environmental education.

364 Field Marine Science Summer. 6 credits. Prerequisite: one year of college biology or other supporting subject. S-U grades; letter grades optional, with permission of instructor. A special 4-week course offered twice each summer at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost, \$895.

Daily lecs, labs, and fieldwork for 4 weeks. 3 core faculty assisted by 15 to 25 visiting lecturers, including representatives of governmental agencies and commercial fishermen. SML faculty.

Designed for the student who desires an initial overview of the marine sciences, this course emphasizes living material in natural habitats. Most of the course work is concerned with the biology of intertidal plants and animals, biological oceanography, ichthyology, and fisheries. Attention also is given to introductory physical and chemical oceanography and marine geology. Marine ecology and the effects of human activity on the marine environment are included.

365 Underwater Research Summer. 2 credits. Prerequisites: recognized scuba certification and a medical examination. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost, \$495.

Daily lects and fieldwork for 2 weeks. Team-taught by a diving safety officer, a faculty member, and guest lecturers.

For competent divers only. Covers special problems of research underwater, including random sampling, use of dive tables, underwater instrumentation, special diving equipment, photographic techniques, integration with boat and shore facilities, and emergency procedures. Students are required to conduct a transect study on both soft and hard substrates.

366-370 SEA Semester In cooperation with the Sea Education Association (SEA), the Shoals Marine Laboratory offers a semester-length sequence of courses designed to provide college undergraduates with a thorough academic, scientific, and practical understanding of the sea. This sequence is repeated approximately every 2 months throughout the year. The first half of SEA Semester (the 6-week basic shore component) is spent in Woods Hole, Mass., receiving instruction in the marine and nautical sciences and studying our relationship with the sea. The second half of SEA Semester (the 6-week sea component) is spent at sea aboard R/V *Westward*. Applicants are interviewed in Ithaca before admission. Enrollment is open to men and women judged capable of benefiting from SEA Semester; no specific prior training or study is required. *Cornell students enrolled in the SEA Semester must take the entire sequence.*

For more details and applications, consult the Shoals Marine Laboratory office, Stimson G14. Program costs to be paid in place of regular Cornell tuition and fees: tuition for basic shore component, about \$1,100; tuition plus room and board for sea component, about \$2,400.

Instructors for the SEA Semester include faculty of the SEA, Cornell, Woods Hole Oceanographic Institution, Boston University, and others.

Basic Shore Component (6 weeks)

366 SEA Introduction to Marine Science 3 credits. Prerequisite: a laboratory course in physical or biological science, or equivalent. A survey of the characteristics and processes of the global ocean. Oceanographic concepts are introduced and developed from their bases in biology, physics, chemistry, and geology. Provides a broad background in oceanography with special attention to areas pertinent to the subsequent *Westward* cruise. Guest lecturers from the Woods Hole research community interpret current trends and activities in this rapidly-evolving field. Students are encouraged to develop individual projects to be carried out at sea.

367 SEA Man and the Sea 2 credits. An interdisciplinary consideration of our relationship with the marine environment. Included are the political, economic, social, and cultural results of our use of the sea for recreation, scientific research, food, fuel, minerals, and energy-efficient transportation. Covers the elements of maritime history, law,

literature, and art necessary to appreciate our marine heritage and to understand contemporary maritime affairs. Examples of mariners' journals are studied in preparation for the diary required of each student at sea.

368 SEA Introduction to Nautical Science 3 credits. Prerequisite: college algebra or equivalent. An introduction to the technologies of operation at sea. The concepts of navigation (piloting, celestial, and electronic), naval architecture, ship construction, marine engineering systems, and ship management are taught from their bases in physics and astronomy. Provides the theoretical foundation for the navigation, seamanship, and engineering that the student will employ at sea.

Sea Component (6 weeks)

Courses 369 and 370 take place aboard the R/V *Westward*, a 250-ton steel auxiliary-powered staysail schooner built in 1961. *Westward* normally puts to sea with a ship's company of 34. The professional staff of 9 includes the captain, 3 science watch officers, 3 deck watch officers, an engineer, and a steward. In addition, 1 or more visiting investigators are frequently aboard. Up to 25 students round out the complement.

369 SEA Marine Science Laboratory 4 credits. Prerequisite: Biological Sciences 366. The practice of oceanography at sea. The student is introduced to the oceanic environment, including its biological, physical, chemical, and geological aspects; is instructed in the operation of oceanographic equipment through the taking of samples and measurements; and practices reducing and analyzing data and solving simple problems related to the surrounding oceanic environment. Topics vary with the cruise track but include attention to all of the major subdisciplines of oceanography.

370 SEA Nautical Science Laboratory 4 credits. Prerequisite: Biological Sciences 368. The practice of nautical science at sea. The student is introduced to the technical and psychological problems of operation and existence in the physical environment of the ocean. Instruction and practice are provided in navigation, seamanship, marine engineering, and shipboard operations. Daily lectures build on the theoretical foundation established by the shore course and deal with the practical problems and applications presented by ship operation. During the final two weeks at sea, each student is expected to demonstrate, in succession, competence as navigator, deck watch officer, and engineering watch officer.

[455 (460) Insect Ecology, Lectures (also Entomology 455)] Fall. 2 credits. Prerequisites: Biological Sciences 360 and Entomology 212, or their equivalents. Recommended: concurrent enrollment in Biological Sciences 457. Offered alternate years. Not offered 1980-81.

Lecs, W F 11:15. R. B. Root. Ecological and evolutionary principles are integrated by thorough examination of outstanding investigations. Topics discussed include the factors responsible for the great diversity of insects, adaptive syndromes associated with climate, natural history of arthropod guilds, impact of insects on terrestrial vegetation, population regulation, and the contrast between natural and managed ecosystems.]

[457 (460) Insect Ecology, Laboratory (also Entomology 457)] Fall. 2 credits. Limited to 16 students. Prerequisite: concurrent enrollment in Biological Sciences 455. Offered alternate years. Not offered 1980-81.

Lab, W 1:25-4:25; plus F or S field trips to be arranged during the field season. R. B. Root. Field exercises focus on insect natural history and methods of sampling populations. Laboratories devoted to rearing insects, estimating life-table parameters, and analyzing communities.]

461 Oceanography Fall. 3 credits. Prerequisites: college physics and either Biological Sciences 260 or 360; or written permission of instructor. S-U grades optional.

Lecs, T R 10:10; additional lec, R 12:20, alternating with disc, T or R 1:25. J. P. Barlow. A general introduction to the oceans, with emphasis on physical and chemical processes that interact with marine communities. Discussions use case studies from current literature to illustrate application to problems in biological oceanography. Field techniques and analytical methods are demonstrated.

462 Limnology, Lectures Spring. 3 credits. Prerequisite: Biological Sciences 260 or 360, or written permission of instructor.

Lecs, M W F 11:15. G. E. Likens. A study of the interaction of biological communities and their aquatic environment. The physical, chemical, and biological dynamics of freshwater ecosystems.

463 Plant Ecology, Lectures Fall. 3 credits. Prerequisites: two advanced-level courses in biology, including Biological Sciences 360, or written permission of instructor. Recommended: some taxonomic familiarity with vascular plants and concurrent enrollment in Biological Sciences 465.

Lecs, M W F 11:15. P. L. Marks. Principles of plant-environment interactions in relation to the evolution, distribution, structure, and functioning of plants and plant communities.

464 Limnology, Laboratory Spring. 2 credits. Prerequisite: concurrent or previous enrollment in Biological Sciences 462.

Lab, T W R or F 1:25-4:25; 1 all-day field trip. G. E. Likens. Field trips and laboratories devoted to studies of aquatic ecosystems.

465 Plant Ecology, Laboratory Fall. 1 credit. Prerequisite: concurrent enrollment in Biological Sciences 463 or equivalent background in plant ecology.

Lab, F 12:05-5. P. L. Marks. Laboratory and field exercises in plant ecology. Field studies of plant communities and techniques for the analysis of community data are emphasized.

466 Chemical Ecology Fall. 2 credits. Prerequisites: one year of introductory biology for majors and either Chemistry 253, 358, or 360; or written permission of instructor. S-U grades optional. Offered alternate years.

Lecs, M W 8; occasional lec F 8. R. H. Whittaker, T. Eisner, P. P. Feeny, J. Meinwald, W. L. Roelofs. Ecological and evolutionary significance of chemical interactions of organisms; survey of major classes of natural products with emphasis on appropriate analytical techniques; chemical adaptations for reproduction, defense, habitat selection, dispersal, feeding efficiency, and competition in animals, plants, and microorganisms; choice of adaptive strategy in relation to energy flow; and practical applications of chemical ecology.

468 Systems Ecology Spring. 4 credits. Prerequisites: Biological Sciences 360 and calculus. Recommended: Computer Science 102. S-U grades optional.

Lecs, M W F 10:10; disc, T or R 2:30-4:05. C. A. S. Hall. An introduction to the quantitative study of populations, communities, and ecosystems. Emphasis on the development and validation of computer models based on component interactions and entire systems. Topics covered include relevant ecological principles, system diagramming, rudimentary mathematical techniques, simulation modeling, and the use of analog and digital computers. Format includes student presentations and guest lectures describing individual case

histories in which a variety of methods were used for ecological analysis, simulation, or prediction. Each student is required to develop an original computer model.

[470 Undergraduate Ecology Seminar Fall or spring. 1 or 2 credits. May be repeated for credit. From time to time different seminars are offered. Not offered 1980–81.]

471 Mammalogy Fall. 4 credits. Recommended: Biological Sciences 274 or equivalent. S-U grades optional, with permission of instructor. Fee, \$15.

Lecs, M W F 9:05; lab, M or T 1:25–4:25; 1 weekend field trip required. P. J. Parker.
Lectures on the evolution, classification, distribution, and adaptations of mammals. Laboratory and fieldwork on systematics, ecology, and natural history of mammals of the world, with primary emphasis on the North American fauna. Systematics laboratories held in the museum at Research Park.

472 (472, 474) Herpetology Spring. 4 credits. Recommended: Biological Sciences 274. S-U grades optional, with permission of instructor. Offered alternate years.

Lecs and labs, T R 12:20–4:25; occasional field trips and special projects. F. H. Pough.
Lectures cover various aspects of the biology of amphibians and reptiles, including evolution, zoogeography, ecology, behavior, and physiology. Laboratory parallels lectures and includes taxonomy, functional morphology, and behavior. Field trips include observations of amphibian breeding congregations and analysis of the physical and biological characteristics of microhabitats of local species.

475 Ornithology Fall. 4 credits. Prerequisites: Biological Sciences 274 or equivalent, and written permission of instructor. S-U grades optional, with permission of instructor.

Lecs and labs, T R 12:20–4:25; occasional field trips and special projects. D. R. Gray.
Lectures cover various aspects of the biology of birds, including anatomy, physiology, classification, evolution, migration and orientation, behavior, ecology, and distribution, and are fully integrated with laboratory studies. Laboratory includes studies of external and internal morphology, pterylosis, molts and plumages, specimen identification of birds of New York, and families of birds of the world. Several demonstration periods emphasize hybridization, evolution, adaptive radiation, mimicry, and geographic variation.

476 Biology of Fishes Fall. 4 credits. Prerequisite: Biological Sciences 274, or equivalent experience in vertebrate zoology with written permission of instructor. S-U grades optional, with permission of instructor. Offered alternate years.

Lecs, M W F 9:05; lab to be arranged.
E. B. Brothers.
An introduction to the study of fishes: their structure, classification, evolution, distribution, ecology, physiology, and behavior.

477 Organic Evolution Fall. 4 credits. Prerequisites: Biological Sciences 281 and either 260 or 360; or permission of instructor.

Lecs, T R 11:15; lec or disc, R 12:20; optional sessions to be arranged. P. F. Brussard.
Lectures and class discussions on organic evolution, including the origin of life, genetic mechanisms, the properties of populations, the ways in which adaptation and speciation occur, and the resultant major patterns of organic diversity.

478 Biology of Fishes, Laboratory Fall. 1 credit. Limited to 15 students. Prerequisite: concurrent enrollment in Biological Sciences 476. Offered alternate years.

Lab, M 1:25–4:25; plus irregular hours as required for experiments and some required field trips.
E. B. Brothers, J. B. Heiser.

Laboratory and fieldwork on structure, identification, ecology, physiology, and behavior of fishes, with emphasis on local species.

662 Mathematical Ecology (also Statistics and Biometry 662) Spring. 3 credits. Prerequisites: one year of calculus and a course in statistics. Recommended: a general ecology course. Offered alternate years.

Lecs, M W F 12:20. S. A. Levin, D. L. Solomon.
Mathematical and statistical analysis of populations and communities: theory and methods. Spatial and temporal pattern analysis. Deterministic and stochastic models of population dynamics. Model formulation, parameter estimation, simulation, and analytical techniques.

664 Seminar In Coevolution between Insects and Plants (also Entomology 664) Spring. 2 credits. Intended for seniors and graduate students. Limited to 15 students. Prerequisites: courses in entomology, ecology, evolution, and organic chemistry, and written permission of instructor. S-U grades optional. Offered alternate years.

Sem, 1 evening each week, to be arranged.
P. P. Feeney.
Presentations and discussions by students on the evolution of patterns of interaction between plants and insects, emphasizing critical evaluation of concepts and evidence.

[665 Limnology Seminar Fall. 1 credit. May be repeated for credit. Primarily for graduate students; written permission of instructor required for undergraduates. S-U grades optional. Not offered 1980–81.

Sem to be arranged. G. E. Likens.
A seminar course on advanced limnological topics.]

666 Marine Ecology Spring. 3 credits. Prerequisites: Biological Sciences 260 or 360, and 461; or written permission of instructor. S-U grades optional.

Lecs, M W F 9:05. J. P. Barlow.
An introduction to biological oceanography, including adaptation of organisms to marine environments, organization of pelagic and benthic communities, and dynamics of marine ecosystems, with some special consideration of current research in coastal and estuarine regions.

[667 Topics in Theoretical Ecology Fall. 3 credits. Primarily for graduate students; permission of instructor required for undergraduates. Prerequisite: one year of calculus. Recommended: Biological Sciences 662. S-U grades optional. Offered alternate years. Not offered 1980–81; first offered fall 1981.

Lecs, 3 hours each week, to be arranged.
S. A. Levin.
Current and classical theoretical issues in ecology and evolutionary biology. Biological issues are emphasized, although mathematical models are utilized throughout as tools to address those issues. Lectures cover both standard material and current journal articles.]

[669 Plant Ecology Seminar Fall. 1 credit. May be repeated for credit. Suggested for students majoring or minoring in plant ecology. S-U grades optional. Not offered 1980–81.

Sem to be arranged. B. F. Chabot.
Includes review of current literature, student research, and selected topics of interest to participants.]

670 Graduate Seminar In Vertebrate Biology Fall or spring. 1 credit. May be repeated for credit. Primarily for graduate students; written permission of instructor required for undergraduates.

Sem to be arranged. Vertebrate biology staff.
Seminar presentations and discussions by students on areas of current research in vertebrate biology. Topics vary from semester to semester.

[679 Ichthyology Fall. 5 credits. Enrollment limited. Prerequisites: Biological Sciences 476 and 478; or written permission of instructor. Offered alternate years. Not offered 1980–81.

Lecs, M W 10:10; labs, W F 1:25–5; plus irregular hours as required for experiments and some required field trips. Independent research project or term paper required. E. B. Brothers.
Lectures on advanced topics in fish biology, including systematics, ecology, behavior, life history, and literature. Laboratory studies of the orders, major families, and principal genera and of systematic procedures. Field studies of the ecology and life history of local species.]

760 Special Topics in Evolution and Ecology Fall or spring. 1–3 credits. May be repeated for credit. Enrollment limited. S-U grades optional, with permission of instructor.

Hours to be arranged. Staff.
Independent or group intensive study of special topics of current interest. Content varies and is arranged between student and staff member.

761 Seminar in Population and Community Ecology Fall. 1 credit. May be repeated for credit. Prerequisite: permission of instructor.

Sem, T 4:25. S. A. Levin.

[765 Autecology Fall. 3 or 4 credits (4 credits with term paper). Offered alternate years. Not offered 1980–81.

Lecs, T R 10:10–11:30. B. F. Chabot and staff.
Comparison of the responses and adaptations of organisms to environment in selected ecosystems. Emphasis on similarities and differences in molecular and organismal mechanisms by which plants and animals cope with their environments.]

[766 Population Ecology Spring. 3 or 4 credits (4 credits with term paper). Prerequisite: graduate standing with some background in calculus, statistics, ecology, and evolutionary theory; or written permission of instructor. Offered alternate years. Not offered 1980–81.

Lecs and discs, M W F 9:05. P. F. Brussard, S. A. Levin.
Critical examination of the properties and dynamics of populations. Emphasis on theories of population structure, dynamics, and regulation. Discussion of experimental approaches to analyses of natural populations.]

767 Community Ecology Fall. 3 or 4 credits (4 credits with term paper). Prerequisite: Biological Sciences 360 or equivalent, or written permission of instructor. Offered alternate years.

Lecs, T R 10:10–12:05. R. H. Whittaker and staff.
The structure and dynamics of natural communities; patterning and sampling problems; species diversity; niches and gradient relations; and ordination, classification, succession, climax, and disturbance. Comparative aspects of terrestrial, marine, and freshwater communities are stressed.

768 Ecosystems Spring. 3 or 4 credits (4 credits with term paper). Prerequisite: Biological Sciences 360 or equivalent, or written permission of instructor. Offered alternate years.

Lecs, T R 10:10–12:05. G. E. Likens and staff.
Analysis of ecosystems in terms of energy flow, biogeochemistry, and model systems. Emphasis on the functional properties of ecosystems, from simple systems to the biosphere as a whole

Population Biology of Health and Disease (Veterinary Medicine 330) Spring. 3 or 4 credits (4 credits with either lab exercises or library research).

Lecs, T R 11:15; disc and demonstration, T 2–3:30.
J. H. Whitlock and staff.
An integrative study of the problems of health and disease in populations of humans, plants, and animals. Examples are drawn from the whole symbiotic spectrum. Parasitoses that result in disease are demonstrated to have comparable structures and

functions. These structures and functions are examined as adaptive phenomena from ecological, genetic, sociological, and economic points of view. In the demonstrations, specific diseases or symbioses are presented for discussion either through the medium of motion pictures or by specialists (such as epidemiologists, virologists, plant nematologists, and insect pathologists) from the Cornell staff.

Related Courses in Other Departments

Advanced Insect Taxonomy (Entomology 631, 632, 633, 634)

Advanced Soil Microbiology (Agronomy 606)

Advanced Work in Animal Parasitology (Veterinary Medicine 737)

Bionomics of Freshwater Invertebrates (Entomology 471)

Ecological Animal Physiology (Biological Sciences 315, 317)

Human Paleontology (Anthropology 374)

Insect Biology (Entomology 212)

Insect Pathology (Entomology 453)

Introductory Insect Taxonomy (Entomology 331)

Invertebrate Zoology (Biological Sciences 212)

Microbial Ecology (Agronomy 410 and Microbiology 492)

Parasitic Helminthology (Veterinary Medicine 440)

Phycology (Biological Sciences 348)

Soil Microbiology (Agronomy 406)

Taxonomy and Evolution of Vascular Plants (Biological Sciences 343, 442)

Teaching Experience (Biological Sciences 498)

Undergraduate Research in Biology (Biological Sciences 499)

Vertebrate Social Behavior (Biological Sciences 427)

Genetics and Development

281 Genetics Fall or spring. 5 credits. Not open to freshmen in fall semester. Prerequisite: one year of introductory biology or equivalent. Students who have taken Biological Sciences 282 may register only with written permission of instructor. No admittance after first week of classes.

Lecs, T R 10:10–11:30; lab, M T W or R 2:30–4:25; additional hours to be arranged. Lab sections may also be scheduled T or R 8–9:55, W or F 10:10–12:05, F 2:30–4:25, or S 10:10–12:05, if enrollment requires it. Students do not choose lab sections during course enrollment; lab assignments are made at the end of first lec period. Staff.

A general study of the fundamental principles of genetics in eucaryotes and procaryotes. Discussions of gene transmission, gene action and interaction, gene linkage and recombination, gene structure, gene and chromosome mutations, genetic aspects of differentiation, genes in populations, breeding systems, and extrachromosomal inheritance. In the laboratory students perform experiments with microorganisms and conduct an independent study of inheritance in *Drosophila*.

282 Human Genetics Spring. 3 credits. Each disc section limited to 25 students. Prerequisite: one year of introductory biology or equivalent. Students who

have taken Biological Sciences 281 may register only with written permission of instructor.

Lecs, M W 10:10; disc, R or F 10:10 or 11:15 (1 disc section R 10:10, 2 sections R 11:15, 4 sections F 10:10, and 1 section F 11:15). A. M. Srb.

An introduction to biological heredity through consideration of human genetics. Advances in the science of genetics are having a profound effect on our understanding of ourselves and on our potential for influencing our present and future well-being. The course is intended primarily to contribute to the student's general education in these matters. Although certain aspects of genetics are considered with some rigor, the course is not designed to serve as a prerequisite to advanced courses in genetics.

384 Invertebrate Embryology Summer. 4 credits. Prerequisite: Biological Sciences 364 or a course in invertebrate zoology. S-U grades optional. A special 3-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost, \$495.

Daily lecs, labs, and fieldwork for 3 weeks. SML faculty. A comparative study of aspects of reproduction and early development in selected invertebrates, providing a classical approach to the morphology of the gonads, fertilization, various kinds of cleavage and gastrulation, and the formation of larvae. For each group, students first consider gametes during formation in the gonads, then development of a new individual through fertilization and the formation of the early larval structure.

385 Developmental Biology Fall. 3 credits. Prerequisite: Biological Sciences 281.

Lecs, M W F 11:15. A. W. Blackler. Morphogenetic, cellular, and genetic aspects of the developmental biology of animals.

389 Vertebrate Developmental Anatomy Fall. 2 credits. Limited to 30 students, with preference given to seniors. Prerequisite: concurrent or previous enrollment in Biological Sciences 385.

Lab, W or F 1:25–4:25; additional hours to be arranged. A. W. Blackler.

A course in the morphogenesis of vertebrates, with emphasis on avian and mammalian development.

481 Population Genetics Fall. 3 credits. Prerequisite: Biological Sciences 281 or equivalent. S-U grades optional.

Lecs, M W 10:10. B. Wallace. A study of factors that influence the genetic structure of Mendelian populations and that are involved in race formation and speciation. Four quizzes and an optional term paper determine the final grade.

[483 Molecular Aspects of Development Fall. 3 credits. Prerequisite: Biological Sciences 330 or 331. Not offered 1980–81.

Lecs, M W F 11:15. Staff. An examination of the molecular biology of developing systems. Emphasis on understanding the mechanisms involved in gene expression in developing systems, both at the transcription and translation levels. Specific topics include regulation of RNA synthesis and utilization, nucleo-cytoplasmic interactions, and induction of cell-specific protein synthesis. Examples are discussed from both higher and lower eucaryotic systems.]

[484 Molecular Evolution Spring. 3 credits. Prerequisites: Biological Sciences 281 and organic chemistry. Offered alternate years. Not offered 1980–81.

Lecs, T R 11:15. R. J. MacIntyre. An analysis of evolutionary changes in proteins and nucleic acids, and gene-enzyme variability in natural populations. The role of natural selection in effecting these changes and maintaining genetic variation at the molecular level is critically examined. Theories on the evolution of the genetic code and the construction of phylogenetic trees from biochemical data are discussed.]

485 Microbial Genetics, Lectures Fall. 2 credits. Limited to upperclass and graduate students. Prerequisites: Biological Sciences 281 and Microbiology 290; or written permission of instructor. S-U grades optional.

Lec, W 7:30–9:25 p.m. S. A. Zahler. Genetics of bacteria and their viruses, with emphasis on the mechanisms of genetic phenomena.

486 Immunogenetics (also Animal Science 486) Spring. 3 credits. Enrollment limited. Prerequisites: Biological Sciences 281 or Animal Science 221, and a course in immunology or permission of instructor.

Lecs, M W F 9:05; disc, W or R 12:20. R. R. Diert. The genetic control of a variety of cellular antigens and their use in understanding biological and immunological functions. The genetics of antibody diversity, antigen recognition, immune response, transplantation, and disease resistance are discussed.

487 Microbial Genetics, Laboratory Fall. 3 credits. Primarily for upperclass students. Limited to 20 students. Prerequisites: concurrent or previous enrollment in Biological Sciences 485, Microbiology 291 or equivalent, and written permission of instructor.

Lab, T 1:25–4:25; additional hours to be arranged. S. A. Zahler. Problem solving in bacterial genetics.

[488 Genetics of Lower Eucaryotes Spring. 3 credits. Prerequisites: Biological Sciences 281 and a course in organic chemistry. S-U grades optional. Not offered 1980–81.

Lecs, M W F 9:05. P. J. Bruns, G. R. Fink, A. M. Srb. Genetic aspects of the biology of a few eucaryotic microorganisms — primarily yeast, *Neurospora*, and ciliated protozoa — with emphasis on the use of these organisms as experimental tools. Major topics covered include gene action, control mechanisms, cytoplasmic genetic systems, recombination and conversion, morphogenetic systems, and evolutionary aspects of physiological systems. Extensive appropriate reading in the original literature of genetics is a primary component of the course.]

780 Current Topics in Genetics Fall or spring. 2 credits. May be repeated for credit. Primarily for graduate students, with preference given to majors in the Field of Genetics; written permission of instructor required for undergraduates. Limited to 20 students. No auditors. S-U grades optional, with permission of instructor.

Sem to be arranged. Staff. A seminar course with critical presentation and discussion by students of original research papers in a particular area of current interest. Content of the course and staff direction varies from term to term and will be announced a semester in advance.

Related Courses in Other Departments

Animal Cytogenetics (Animal Science 419)

Behavioral Neurogenetics (Biological Sciences 624)

Current Topics in Biochemistry (Biological Sciences 731–739)

Cytogenetics (Biological Sciences 446)

Cytology (Biological Sciences 347)

Organic Evolution (Biological Sciences 477)

Physiological Genetics of Crop Plants (Plant Breeding 605)

Plant Growth and Development (Biological Sciences 644)

Teaching Experience (Biological Sciences 498)

Undergraduate Research in Biology (Biological Sciences 499)

Graduate School of Business and Public Administration

NCC Common Core Courses

- NCC 500 Managerial Accounting
- NCC 501 Quantitative Methods for Management
- NCC 502 Economic Principles for Management
- NCC 503 Introduction to Computer Programming
- NCC 504 Introduction to Management Information Systems

NBP Business Administration Program Core Courses

- NBP 500 Marketing Management
- NBP 501 Production and Operations Management
- NBP 502 Managerial Finance
- NBP 503 Business Policy
- NBP 504 Introduction to the Business-Government Interface

NBA Business Administration Elective Courses

- NBA 500 Intermediate Accounting
- NBA 501 Advanced Accounting
- NBA 502 Cost Accounting
- NBA 504 Introduction to Taxation Affecting Business and Personal Decision Making
- NBA 505 Auditing
- NBA 506 Financial Information Evaluation
- NBA 507 Federal Income Tax
- NBA 508 Advanced Cost Accounting
- NBA 510 Law of Business Associations
- NBA 511 Advanced Business Law
- NBA 513 An Introduction to Estate Planning
- NBA 514 Financial Policy Decisions
- NBA 516 Investment Management
- NBA 518 Financial Markets and Institutions
- NBA 519 Seminar in Bank Management
- NBA 521 Finance Theory
- NBA 523 Topics in International Financial Management
- NBA 524 Options, Bonds, and Commodities
- NBA 525 Investment Banking

- NBA 541 Marketing Research
- NBA 542 Advertising Management
- NBA 543 Marketing Strategy
- NBA 544 Seminar in Marketing Planning: Topics and Cases
- NBA 545 Management of Marketing Intermediaries
- NBA 546 Marketing Decision Models
- NBA 547 Demand Analysis and Consumer Behavior
- NBA 548 Industrial Marketing
- NBA 550 Special Topics in Marketing Management
- NBA 551 Topics in Consumer Behavior
- NBA 522 Seminar in Current Research in Marketing
- NBA 553 Product Management and Policy
- NBA 554 Advertising Practicum
- NBA 560 Product Management
- NBA 561 Case Studies in Production and Operations Management
- NBA 562 Business Logistics Management
- NBA 563 Strategic Management

NPP Public Administration Program Core Course

- NPP 500 Economic Foundations of Public Policy
- NPP 501 Public Financial Management
- NPP 502 Policy Considerations: The Business-Government Interface
- NPP 503 The Conduct of Public Affairs

NPA Public Administration Elective Courses

- NPA 500 Urban Government Operations
- NPA 504 Science, Technology, and Public Policy
- NPA 507 Integrative Seminar: Education for Public Management Program (Part I)
- NPA 508 Integrative Seminar: Education for Public Management Program (Part II)
- NPA 512 Seminar in Public Systems Analysis
- NPA 515 The Politics of Technical Decisions I
- NPA 516 The Politics of Technical Decisions II
- NPA 520 Legal Process
- NPA 521 Energy and Public Policy

NHP Hospital and Health Services Administration Program Core Courses

- NHP 500 Introduction to Hospital and Medical Care Organization

NHA Hospital and Health Services Administration Program Elective Courses

- NHA 500 Social Psychology of Health Organizations
- NHA 501 Hospital Corporate Planning
- NHA 502 Psychiatric Institutions: Administration and Practice
- NHA 503 Primary Health Care Services: Policy and Planning
- NHA 504 Legal Aspects of Hospital Administration
- NHA 505 Health Services Research and Evaluation
- NHA 506 Health Economics
- NHA 507 Health and Welfare Policy
- NHA 508 Health maintenance Organization Development and Management
- NHA 509 Health Operations Management and Planning
- NHA 510 Seminar in Hospital Governance and Decision Making
- NHA 511 Field Studies in Health Administration and Planning
- NHA 513 Long-Term Care Services: Policy and Planning
- NHA 514 Washington Health Policy Field Seminar
- NHA 515 Orientation to Tertiary Hospital Services
- NHA 516 Selected Topics in the Administration of Teaching Hospitals
- NHA 517 Introduction to Clinical Medicine: The Physician, the Hospital, and the Delivery of Medical Care
- NHA 518 Financial Management of Hospitals
- NHA 519 International Comparisons of Health Services
- NHA 520 Labor Relations in the Health Industry
- NHA 521 State Government Health Policy Seminar

NCE Common Course Electives

- NCE 500 Fund Accounting
- NCE 505 International Trade and Finance
- NCE 507 American Business Operations Abroad

NCE 514 Administration of Agricultural and Rural Development

NCE 520 Security Analysis

NCE 523 Macroeconomics

NCE 524 Economic Evaluation of Capital Investment Projects

NCE 526 Problems and Practices: The Business-Government Interface

NCE 527 American Industry: Economic Analysis and Public Policy

NCE 528 Topics in Managerial Economics

NCE 540 Organizational Theory and Behavior

NCE 541 Personnel Administration and Human Relations

NCE 542 Processes and Techniques in Organizational Development

NCE 543 Organizational Behavior and Administration

NCE 545 Seminar in Organizational Theory

NCE 548 Behavioral Science and Managing

NCE 549 Sociotechnical Issues in Office Automation

NCE 551 Behavioral Decision Theory

NCE 560 Applied Probability

NCE 561 Applied Statistics

NCE 562 Operations Research I

NCE 563 Operations Research II

NCE 564 Applied Multivariate Analysis

NCE 565 Applied Econometrics

NCE 566 Management Science

NCE 569 Introduction to COBOL Programming

NCE 570 Data-Base Systems

NCE 571 Computer Systems Analysis

NCE 580 Seminar in University Administration

NCE 581 Management Writing

NMI and NRE Research

NMI 500-502 Directed Reading and Research

NMI 510 Investment Analysis: Language Model Building Laboratory

NRE 503 Advanced Capital Market Theory

NRE 504 Doctoral Seminar in Accounting

NRE 505 Finance Workshop

NRE 506 Doctoral Seminar in Monetary Economics

NRE 507 Advanced Corporate Finance Theory

NRE 508 Advanced Seminar in Banking and Financial Markets

NRE 942 Social Psychology of Organizing

College of Engineering

Engineering programs offered at Cornell lead to the degrees of Bachelor of Science, Master of Engineering, Master of Science, and Doctor of Philosophy. Descriptions of courses, including both undergraduate and graduate offerings, are given under the appropriate academic areas.

Information about academic programs, admissions and financial aid, and special opportunities for engineering students is given in other publications of the Announcement series: *Academic Information*, *General Information*, *Engineering at Cornell* (for prospective undergraduates), the *Announcement of the Graduate School*, and *Graduate Study in Engineering and Applied Science*.

Division of Basic Studies

The courses available through the Division of Basic Studies include certain engineering courses offered by the various schools and departments of the College of Engineering primarily for undergrad students; these courses are described below. Additional engineering courses that may be taken during the freshman and sophomore years in the Division of Basic Studies are described under the appropriate subject areas. Courses in mathematics, physics, and chemistry are described under the appropriate departments of the College of Arts and Sciences

Engineering Basic Studies

DBS 105 Introduction to Computer Programming Fall or spring. 3 credits. DBS 105 is the same as the mathematical section of Computer Science 100.

2 lecs, 1 rec (optional); evening tests. An introduction to elementary computer programming concepts. Emphasis is on techniques of problem analysis, algorithm and program development. The subject of the course is programming, not a particular programming language. The principal programming language is PL/I; FORTRAN is also introduced and is used for final problems. The course does not presume any previous programming experience. An introduction to numerical computing is included, although no college-level mathematics is presumed. Programming assignments are tested and run on interactive, stand-alone microcomputers.

DBS 106 Engineering Perspectives Fall or spring. 3 credits.

Weekly lecture series for 1 credit plus a supplemental course program for 2 credits. For the course program, each student chooses either (1) two sequential short courses, called minicourses, for 1 credit each, or (2) a 2-credit full-semester engineering course, or (3) a 2-credit full-semester research option under which freshmen work closely with faculty members in ongoing research projects.

Engineering Core Sciences

Group I

OR&IE 213 Systems Analysis and Design Fall. 3 credits. Prerequisite: first-year calculus.

2 lecs, 1 rec. A general introduction to the problems and techniques of systems engineering and operations research. Includes formation and solutions of problems that can be modeled as networks (shortest path, project scheduling, maximum flow), dynamic programs (inventory and distribution), linear resource allocation problems, and games (conflict resolution and voting). Effects of uncertainty on decision making.

OR&IE 260 Introductory Engineering Probability Fall or spring. 3 credits. Prerequisite: first-year calculus.

3 lecs. The basic tools of probability and their use in engineering. 260 may be the last course in probability for some students, or it may be followed by OR&IE 361, Stochastic Processes I, or by OR&IE 370, Statistics. Definition of probability; random variables; probability distributions, density functions, expected values; jointly distributed random variables; distribution such as the binomial, Poisson, and exponential that are important in engineering, and how they arise in practice; limit theorems.

OR&IE 270 Basic Engineering Statistics Fall or spring. 3 credits. Students who intend to enter the upperclass Field Program in Operations Research and Industrial Engineering should take OR&IE 260 instead of this course. Prerequisite: first-year calculus.

2 lecs, 1 rec. At the end of this course a student should command a working knowledge of basic statistics as it applies to engineering work. For many students this will be the only course in statistics. For students who wish to learn more about statistics, a course in probability (OR&IE 260) followed by a course in statistics (OR&IE 370) is recommended.

Com S 211 Computers and Programming Fall or spring. 3 credits. Prerequisite: Computer Science 100 or equivalent programming experience.

2 lecs, 1 lab; 2 evening quizzes. Intermediate programming in PL/I: procedures, block structures, on conditions, recursion. Introduction to basic data structures and program analysis and simulation. Programming assignments for a variety of applications.

Com S 321 Numerical Methods Fall or spring. 4 credits. Prerequisites: Mathematics 293 or 221 and knowledge of FORTRAN equivalent to what is taught in Com S 100.

3 lecs. Students solve representative problems by programming appropriate algorithms and using library programs. Numerical methods for systems of linear equations, interpolation, integration, ordinary differential equations, nonlinear equations, optimization and linear least squares.

Group II

Ele E 210 Introduction to Electrical Systems Fall or spring. 3 credits. Prerequisites: Mathematics 192 and Physics 112.

3 lec-rec. Circuit elements and laws, natural response of linear systems; impedance and pole-zero concepts; complex frequency and phasors; forced response and power systems; transfer function and frequency response; low-frequency terminal characteristics of diodes, triodes, and transistors; linear models of electronic devices; bias circuits and frequency response of amplifiers; operational amplifiers, feedback, and oscillators.

Ele E 230 Introduction to Digital Systems Fall or spring. 3 credits.

2 lecs, 5 lab experiments. Introduction to basic analysis and design techniques and methodology of digital and computer systems. Boolean algebra; integrated circuit components used in digital system implementation; codes and number systems; logic design of combinational circuits; logic design of sequential circuits.

MS&E 261 Introduction to Electrical Properties of Materials Spring. 3 credits.

2 lecs, 1 rec or lab. Electronic structure of atoms, molecules, and crystalline solids. Electrical conductivity and other electrical properties of metals, semiconductors, and

insulators. Semiconductors and their applications in electronic devices. Magnetism and magnetic materials. Introduction to lasers.

A&EP 206 The Physics of Life Fall. 3 credits. Prerequisite: concurrent registration in Physics 213 or permission of instructor.

3 lecs. W. Webb. An in-depth study of four biological topics from a physical point of view. Topics covered are photosynthetic conversion of light into chemical energy, proteins as transport and production machines, membranes, and biophysical aspects of replication. Topics are chosen to illustrate the unity and interdependence of living matter.

A&EP 217 Contemporary Topics in Applied Physics Spring. 3 credits. Prerequisite: Physics 213.

2 lecs, 1 rec-lab. R. A. Buhrman. An introduction to selected applications of modern physics to advanced technology. This course deals with both present and potential approaches to large-scale energy conversion. In particular, the basic physical principles and fundamental limitations of nuclear energy (in terms of both fission and fusion) and of solar energy utilization are presented. One objective of the course will be to give a current view of the present status and future directions of research and development in energy-related fields.

Group III

T&AM202 Mechanics of Solids Fall or spring. 3 credits. Prerequisite: coregistration in Mathematics 293.

2 lecs, 1 rec, 4 labs each semester; evening exams. Principles of statics, force systems, and equilibrium. Frameworks. Mechanics of deformable solids, stress, strain, statically indeterminate problems. Mechanical properties of engineering materials. Axial force, shearing force, bending moment, singularity functions. Plane stress. Mohr's circle. Bending and torsion of bars; buckling and plastic behavior.

T&AM 203 Dynamics Fall or spring. 3 credits. Prerequisite: coregistration in Mathematics 294.

2 lecs, 1 rec, 4 labs each semester; evening exams. Newtonian dynamics of a particle, systems of particles, and a rigid body. Kinematics, motion relative to a moving frame. Impulse, momentum, angular momentum, energy. Rigid body kinematics, angular velocity, moment of momentum and the inertia tensor. Euler equations, the gyroscope.

MS&E 261 Introduction to Mechanical Properties of Materials Fall or spring. 3 credits

2 lecs, 1 rec or lab. The relation of mechanical properties to microscopic structures and defects inside metals and other materials. Deformation or rubber-like polymers. Permanent changes in the shape of crystals caused by the action of stresses. Effect of movement of atoms on the strength of solids at high temperatures. Manipulation of microscopic structure for high strength. Fracture and fatigue failure.

Group IV

Chem 287, 289 Introductory Physical Chemistry and Laboratory Fall. 5 credits. Prerequisites: Chemistry 208 or 216 and Mathematics 191-192.

2 or 3 lecs, 1 rec in 287; 2 labs in 289. A systematic treatment of the fundamental principles of physical chemistry. Essential experimental skills are developed.

Chem 288, 290 Introductory Physical Chemistry and Laboratory Spring. 5 credits. Prerequisite: Chemistry 287 and 289.

288: 2 or 3 lecs, 1 rec. 290: 1 lec, 2 labs. A continuation of Chemistry 287, 289.

Chem 357* Introductory Organic Chemistry Fall. 3 credits. Prerequisite: Chemistry 208 or 216. 3 lecs, optional rec may be offered. A systematic study of the more important classes of carbon compounds: reactions of their functional groups, methods of synthesis, relations, and uses.

Chem 358* Introductory Organic Chemistry Spring. 3 credits. Prerequisite: Chemistry 357. 3 lecs, optional rec may be offered. A continuation of Chemistry 357.

M&AE 221 Thermodynamics Fall or spring. 3 credits. Prerequisites: Mathematics 191–192 and Physics 112. 3 lecs.

The definitions, concepts, and laws of thermodynamics. Applications to ideal and real gases, multiphase pure substances, gaseous mixtures, and gaseous reactions. Heat-engine and heat-pump cycles. An introduction to statistical thermodynamics.

Chem E 111 or 110 Mass and Energy Balances 111, fall; 110, summer. 3 credits. Prerequisites: one year of freshman chemistry. 111 is recommended for students planning to enter the Field Program in Chemical Engineering.

R. G. Thorpe. Engineering problems involving material and energy balances. Batch and continuous reactive systems in the steady and unsteady states. Humidification processes. Chemical Engineering 110 differs from 111 in that it uses *only self-paced audiovisual instruction at the convenience of the student*. A minimum of 70 clock hours of audiovisual instruction is required to master the subject matter. Student performance in 110 is evaluated by nine tests, two preliminary examinations, and a final examination; superior students may earn exemption from the final examination.

Applied and Engineering Physics

206 The Physics of Life Fall. 3 credits. Prerequisite: concurrent registration in Physics 213 or permission of instructor. 3 lecs. A. Lewis.

See description under Division of Basic Studies.

217 Contemporary Topics in Applied Physics Spring. 3 credits. Prerequisite: Physics 213. 2 lecs, 1 rec-lab. R. A. Buhman.

See description under Division of Basic Studies.

303 Introduction to Nuclear Science and Engineering I Fall. 3 credits. Prerequisite: Physics 214 or Mathematics 294. This course and A&EP 304 form a coordinated two-term sequence designed for juniors or seniors from any engineering field who want to prepare for graduate-level nuclear science and engineering courses at Cornell or elsewhere. The sequence can also serve as a terminal introduction to the field. 303 is a reasonably self-contained unit that can be taken by itself by those desiring only one term.

3 lecs. D. D. Clark. Introductory overview of atomic and nuclear physics, nuclear structure, radioactivity, nuclear reactions, interaction of radiation with matter; reactor physics: neutron moderation, neutron diffusion, the steady-state chain reaction, reactor kinetics. At the level of *Introduction to Nuclear Engineering* by Lamarsh.

304 Introduction to Nuclear Science and Engineering II Spring. 3 credits. Prerequisite: A&EP 303.

3 lecs. D. A. Hammer. Reactor engineering: heterogeneous reactors, dynamic behavior and control, heat transfer; overview

of controlled fusion: fuel cycles, reactor configurations, engineering problems; radiation: biological effects, shielding, radiation protection, damage and materials problems; reactor safety, licensing, and siting.

333 Mechanics of Particles and Solid Bodies Fall. 4 credits.

3 lecs, 1 rec. B. Kusse. Newton's laws; coordinate transformations; generalized coordinates and momenta. Lagrangian and Hamiltonian formulation; applications to oscillator, restrained motion, central forces, small vibrations of multiparticle systems, motion of rigid body.

355 Intermediate Electromagnetism Fall. 4 credits. Prerequisites: Physics 214 and 216 and coregistration in Mathematics 421 or T&AM 610, or permission of instructor.

D. Hammer. Topics: vector calculus; electrostatics, magnetostatics, and introduction phenomena; Laplace's equation solutions in Cartesian, cylindrical, and spherical systems; dielectrics, paramagnetic and diamagnetic materials, electric and magnetic forces, energy storage, skin effect, quasistatics. Emphasis on physical concepts and applications.

356 Intermediate Electrodynamics Spring. 4 credits. Prerequisites: A&EP 355, coregistration in Mathematics 422 or T&AM 611, or permission of instructor.

R. V. Lovelace. Development of electromagnetic wave phenomena and radiation. Topics include transmission lines, waveguides, wave properties of dispersive media, radiation and scattering phenomena, reciprocity, physical optics, and special relativity.

361 Introductory Quantum Mechanics Spring. 4 credits. Prerequisites: A&EP 333 or Physics 318; coregistration in Mathematics 422 or T&AM 611 and in A&EP 356 or Physics 326.

3 lecs, 1 rec. V. Kostroun. A first course in the systematic theory of quantum phenomena. Topics include the square well, harmonic oscillator, hydrogen atom, and perturbation theory. At the level of Chapters 4–9 of *Modern Physics and Quantum Mechanics* by Anderson.

363 Electronic Circuits (also Physics 360) Fall or spring. 4 credits. Prerequisite: Physics 208 or 213 or permission of instructor; no previous experience with electronics is assumed.

1 sec, 2 labs. Spring. A. Kuckes. This laboratory course focuses on designing, building, and testing analog, digital, and microprocessor-based circuits that are useful in electronic instrumentation. Analog topics treated include basic circuit concepts, applications of operational amplifiers in linear circuits, oscillators and comparators, transistor circuits, and diodes in power supplies, waveform shaping circuits, and protective circuits. Students also build digital circuits that incorporate Schmidt triggers, comparators, combinatorial and sequential logic using medium-scale integrated circuits. The above circuits are also interfaced to a microprocessor whose architecture, machine instruction set, and programming principles are studied. At level of *Principles of Electronic Instrumentation* by Diefenderfer.

401 Physics of Atomic and Molecular Processes Fall. 3 credits. Prerequisite: A&EP 361, Physics 443, or permission of instructor.

T. A. Cool. An introduction to the basics of contemporary problems in the physics of atomic and molecular processes, including atomic structure, chemical bonding, polarization, radiation resonance processes, and atomic and molecular spectroscopy.

423 Statistical Thermodynamics Spring. 4 credits. For engineering physics seniors; others by permission of instructor. 3 lecs, 1 rec. M. Nelkin.

Quantum statistical basis for equilibrium thermodynamics, canonical and grand canonical ensembles, and partition functions. Quantum and classical ideal gases and paramagnetic systems. Fermi-Dirac, Bose-Einstein, and Maxwell-Boltzmann statistics. Introduction to systems of interacting particles. At the level of *Thermal Physics* by Kittel and *Statistical and Thermal Physics* by Reif.

434 Continuum Physics Fall. 4 credits. Prerequisite: A&EP 333 or equivalent.

R. V. Lovelace. Linear elasticity theory; tensor and vector formalisms; elementary engineering applications, crystal anisotropy, dislocations. Elastic and inelastic waves. Hydrodynamics; Navier-Stokes equations, ideal and viscous fluids, compressible and incompressible flows; elementary applications, lift, drag, convention, surface waves, simple shocks, sound, introduction to linear response theory, dimensional analysis, instabilities and turbulence, subcritical and supercritical flows.

490 Informal Study in Engineering Physics Credit to be arranged.

Laboratory or theoretical work in any branch of engineering physics under the direction of a member of the staff.

[601 Photosynthesis (also Biological Sciences 445)] Fall. 3 credits. Prerequisites: Chemistry 104 or 208, Mathematics 106 or 111, and Physics 102 or 208, or permission of instructor. Offered alternate years. Not offered 1980–81.

R. K. Clayton. A detailed study of the process by which plants use light in order to grow, emphasizing physical and physiochemical aspects.]

606 Introduction to Plasma Physics (also Electrical Engineering 681) Fall. 3 credits. Prerequisites: A&EP 355, 356, or equivalent. Open to fourth-year students at discretion of instructor.

3 lecs. R. N. Sudan. Plasma state; motion of charged particles in fields; collisions, coulomb scattering; transport coefficients, ambipolar diffusion, plasma oscillations and waves; hydromagnetic equations; hydromagnetic stability and microscopic instabilities; test particle in a plasma; elementary applications.

607 Advanced Plasma Physics (also Electrical Engineering 682) Spring. 3 credits. Prerequisite: A&EP 606.

3 lecs. R. N. Sudan. Boltzmann and Vlasov equations; Chew-Goldberger-Low theory; waves in hot plasmas; Landau damping. Micro-instabilities; effects of collisions and Fokker-Planck terms; method of dressed test particles; high-frequency conductivity and fluctuations; neoclassical toroidal diffusion, relativistic beams.

[608 Plasma Astrophysics (also Astronomy 660)] Spring. 2 credits. Not offered 1980–81.

R. V. Lovelace. Selected topics discussed in detail: (a) the solar corona and the solar wind; (b) the propagation of cosmic rays in interplanetary and interstellar space; and (c) the theory of aligned rotating magnetospheres.]

609 Low-Energy Nuclear Physics Fall. 4 credits. Prerequisite: an introductory course in modern physics, including quantum mechanics.

3 lecs. V. Kostroun. The nuclear interaction. Properties of ground and excited states of nuclei; models of nuclear structure; alpha, beta, gamma radioactivity, low-energy nuclear reactions — resonant and nonresonant scattering, absorption, and fission. At the level of *Introduction to Nuclear Physics* by Enge.

[611 Vision (also Biological Sciences 395)] Fall. 3 credits. Prerequisites: Chemistry 104 or 208, Mathematics 106 or 111, Physics 102 or 208, or permission of instructor. Offered alternate years. Not offered 1980-81.

R. K. Clayton.

Study of the mechanisms of seeing, embracing biological, physical, and chemical approaches to the subject.]

612 Nuclear Reactor Theory I Fall. 4 credits.

Prerequisites: a year of advanced calculus and some nuclear physics.

3 lects. K. B. Cady.

Physical theory of fission reactors. Fission and neutron interactions with matter; theory of neutron diffusion; slowing down, and thermalization; calculations of criticality and neutron flux distribution in nuclear reactors. Reactor kinetics. At the level of *Nuclear Reactor Theory* by Lamarsh.

613 Nuclear Reactor Theory II Spring. 3 credits. A continuation of A&EP 612, primarily intended for students planning research in nuclear reactor physics and engineering. Prerequisite: A&EP 612.

3 lects. K. B. Cady.

The Boltzmann linear transport equation, its adjoint, and their approximate solutions are developed and applied to the heterogeneous neutron chain reactor.

614 Special Topics in Biophysics

W. W. Webb

Topics, credits, and schedule to be announced. Seminars on selected topics of current interest in biophysics research.

615 Membrane Biophysics Spring. 3 credits.

W. W. Webb.

Molecular structure and supramolecular organization of cell membranes. Model membranes and membrane models. Molecular mechanisms of membrane transport, electrophysiology and cell-cell interaction. Physical probes of membrane processes. Dynamics of membrane processes, lateral mobility, diffusion, and flow. Some current problems in cell surface function and organization of specialized membrane macrostructures.

619 Molecular Energy Transfer Spring. 3 credits.

T. A. Cool.

Fundamentals of energy transfer by molecular collisions in gases. Energy transfer mechanisms in molecular and chemical lasers. Processes for interconversion of electronic, vibrational, rotational, and translational energy. Intermolecular potential, dispersion forces, multipole moment interactions, repulsive forces.

[622 Electron Optics Spring. 3 credits. Not offered 1980-81.

M. S. Isaacson.

Basic electron optics with emphasis on the fundamental principles of the production and focusing of charged particle beams. Special consideration will be given to the optics appropriate for beam transport and probe forming systems and systems useful in materials characterization. Included will be discussions of the calculation of trajectories in multicomponent optical systems, comprehensive treatments of optical aberrations, and practical considerations of electron optical design.]

633 Nuclear Engineering Fall. 4 credits.

Prerequisite: introductory course in nuclear engineering.

K. B. Cady.

The fundamentals of nuclear reactor engineering; reactor siting and safety, fluid flow and heat transfer, control, and radiation protection.

634 Nuclear Engineering Design Seminar

Spring. 4 credits. Prerequisite: A&EP 633.

K. B. Cady.

A group design study of a selected nuclear system. Emphasis is on safety, siting, and radiation protection in the design of nuclear systems.

[636 Seminar on Thermonuclear Fusion

Reactors Fall. 3 credits. Prerequisite: basic course in plasma physics or nuclear reactor engineering, or permission of instructor. Not offered 1980-81.

Analysis of various technological and engineering problems in design and construction of fusion reactors. Topics include basic reactor schemes, materials, mechanical and heat transfer problems, radiation and safety, superconducting magnets, energy conversion, plasma impurities, and economics.]

638 Intense Pulsed Electron and Ion Beams: Physics and Technology Spring. 2 credits.

Prerequisites: Electrical Engineering 681, 682, and A&EP 606; 607; or equivalent; or permission of instructor.

D. A. Hammer.

Topics include: (1) theoretical aspects of intense electron and ion beams, such as equilibria and stability; (2) technology of intense beam production, such as pulsed-power generator principles, and electron and ion diode operation; and (3) applications of intense beams, such as to controlled fusion, microwave generation, and laser pumping. Extensive discussion of experimental results.

651 Nuclear Measurements Laboratory Spring. 4 credits. Prerequisite: some nuclear physics.

Two 2½-hour afternoon periods plus 1 lec. Staff.

Lectures on interaction of radiation with matter, radiation biology, and nuclear instruments and measurements. Fifteen experiments are available (from which eight are selected) on nuclear physics, radiation instrumentation and measurements, activation analysis, neutron moderation, and reactor physics and engineering; the subcritical reactor assembly and TRIGA reactor are used. At the level of *Nuclear Radiation Detection* by Price and *Radiation Detection and Measurement* by Knoll.

652 Advanced Nuclear and Reactor Laboratory

Spring. 3 credits. Prerequisites: A&EP 651 and 609 or 612. Offered on independent study basis or, with sufficient demand, as a formal course.

Two 2½-hour afternoon periods.

Laboratory experiments and experimental methods in nuclear physics and reactor physics. Ten experiments are available, some using the Zero Power Reactor critical facility.

681-689 Special Topics in Applied Physics

Topics, instructors, and credits to be announced each term. Typical topics include quantum superconducting devices, physics of submicron conductors, nonlinear fluctuators, biophysical processes, molecular fluorescence.

705 Topics in Statistical Physics 3 credits.

Prerequisite: general familiarity with statistical mechanics.

M. S. Nelkin.

Selected topics of current interest in statistical physics. For example, in 1976-77 the subject was the variety of anti-intuitive behavior exhibited by nonlinear macroscopic systems driven far from equilibrium; examples were taken primarily from turbulent fluid flow.

711 Principles of Diffraction (also MS&E 610)

Fall. 3 credits. Offered alternate years.

B. Batterman.

Introduction to diffraction phenomena as applied to solid-state problems. Scattering and absorption of neutrons, electrons, and x-ray beams. Diffraction from two- and three-dimensional periodic lattices. Fourier representation of scattering centers, and the effect of thermal vibrations. Phonon information from diffuse x-ray and neutron scattering and Bragg reflections. Diffraction from almost-periodic structures, surface layers, gases, and amorphous materials. Survey of dynamical diffraction from perfect and imperfect lattices.

751, 752 Project 751, fall; 752, spring. Credit to be arranged.

Informal study under the direction of a member of the University staff. Students are offered some research experience through work on a special problem related to their field of interest.

753 Seminar Topics in Applied Physics Fall or

spring. 1 credit. Primarily for candidates for the M.Eng (Engineering Physics) degree.

The student attends and writes brief summaries on a minimum of thirteen scheduled University seminars and/or colloquia in technical areas close to the student's main interest.

761 Kinetic Theory (also Electrical Engineering

781) Fall. 3 credits. Prerequisites: Physics 561, 562 or permission of instructor. Offered alternate years.

R. L. Liboff.

See Electrical Engineering 781 for course description.

762 Physics of Solid Surfaces (also MS&E 703)

Spring. 3 credits. Lecture course primarily for graduate and qualified upperclass students.

Prerequisite: MS&E 601 or some knowledge of solid-state physics.

An approach to the physics and chemistry of phenomena in metals, semiconductors, and ionic solids related particularly to surface and interfacial effects. Quantum mechanical and kinetic analyses of the interaction of electrons, ions, and molecules with condensed matter. Application and theory of experimental methods in ultrahigh vacuum physics. Materials drawn from research papers and review articles.

Chemical Engineering

101 Nonresident Lectures Fall. Noncredit.

1 lec.

Given by lecturers invited from industry and from selected departments of the University to assist students in their transition from college to industrial life.

110 Mass and Energy Balances Summer. Not

offered during the academic year; available during summer. 3 credits. Prerequisite: one year of freshman chemistry. Chemical Engineering 110 is intended for students who cannot take Chemical Engineering III.

R. G. Thorpe.

Self-paced audiovisual instruction in the material of Chemical Engineering 111. See description under Division of Basic Studies.

111 Mass and Energy Balances Fall. 3 credits.

Prerequisite: one year of freshman chemistry or permission of instructor.

3 lects, 1 computing session. R. G. Thorpe.

See description under Division of Basic Studies.

311 Chemical Engineering Thermodynamics I

Fall. 3 credits.

3 lects, 1 computing session. W. B. Streett.

A study of the first and second laws, with application to batch and flow processes. Thermodynamic properties of fluids; applications of thermodynamics to compressors, power cycles, refrigeration; thermodynamic analysis of processes.

312 Chemical Engineering Thermodynamics II

Spring. 3 credits.

3 lects, 1 computing session. K. E. Gubbins.

Thermodynamics of mixtures; phase equilibria and phase diagrams. Estimation methods. Heat effects; chemical equilibria.

321 Materials Spring. 4 credits. Prerequisite:

MS&E 261 or equivalent, or permission of instructor.

3 lects, 1 lab. G. G. Cocks.

Practical aspects of materials: extractive metallurgy, forming and fabrication of metals, some useful alloys, ceramic materials, refractories, selection of materials.

and behavior of materials under service conditions. Laboratory emphasizes microscopical examination of materials; topics include: optics of the microscope, geometrical and optical crystallography and the physical chemical behavior of materials.

410 Reaction Kinetics and Reactor Design Fall. 3 credits. Prerequisite: Chemical Engineering 430. 3 lecs. R. P. Merrill, J. F. Cocchetto.

A study of chemical reaction kinetics and principles of reactor design for chemical processes.

421 Industrial Organic Chemical Processes Spring. 2 credits. Prerequisite: Chemistry 253 or 357. 2 lecs. J. C. Smith.

Study of commercial manufacturing processes for important organic chemicals.

430 Introduction to Rate Processes Fall. 3 credits. Prerequisites: Chemical Engineering 111 and engineering mathematics sequence.

3 lecs, 1 computing session. C. Cohen. Fundamentals of fluid mechanics and heat transfer; solutions to problems involving viscous flow, heat conduction and convection, friction factors and heat transfer coefficients, macroscopic balances, elementary applications.

431 Analysis of Separation Processes Spring. 3 credits. Prerequisites: Chemical Engineering 430 and familiarity with FORTRAN or PL/I.

3 lecs, 1 computing session. R. G. Thorpe. Analysis of separation processes involving phase equilibria and rate of mass transfer; some use of the digital computer. Phase equilibria; binary, multicomponent, and extractive distillation; liquid-liquid extraction; gas absorption; crystallization.

432 Chemical Engineering Laboratory Fall. 3 credits. Prerequisites: Chemical Engineering 430, 431.

2 lecs, 1 lab. R. L. Von Berg and staff. Laboratory experiments in fluid dynamics, heat and mass transfer, other operations. Correlation and interpretation of data. Technical report writing.

433 Project Laboratory Fall or spring. Credit variable. Prerequisite: Chemical Engineering 432. Special laboratory projects involving bench-scale or pilot-plant equipment.

434 Transport Phenomena Spring. 3 credits. Prerequisites: Chemical Engineering 430 and concurrent registration in 431. Strongly recommended for those interested in graduate study in chemical engineering.

3 lecs. W. L. Olbricht. An introduction to momentum, heat, and mass transport. Development of governing equations. Solutions of problems involving laminar flow of purely viscous liquids, heat transfer, and convective diffusion.

461 Chemical Process Evaluation Fall. 3 credits. P. Harriott.

Study of some important chemical processes, covering raw material sources, analysis of reaction conditions, and product purification.

462 Chemical Process Synthesis Spring. 4 credits. Prerequisite: Chemical Engineering 432. R. L. Von Berg and staff.

A consideration of process and economic alternatives in selected chemical processes; design and assessment.

563 Process Equipment Design and Selection Fall. 3 credits. Prerequisite: Chemical Engineering 430 and 431 or equivalent.

3 lecs. J. C. Smith. Performance, selection, and design of process equipment; storing, transporting, mixing, heating, and separating fluids and solids. Process development and decision.

564 Design of Chemical Reactors and Multiphase Contracting Systems Spring. 3 credits.

3 lecs. P. Harriott. Design, scale-up, and optimization of chemical reactors with allowance for heat and mass transfer, nonideal flow, and catalyst aging. Selection of systems for gas-liquid-solid contacting, including stirred tanks, fluidized beds, and fixed beds.

565 Design Project Spring. 3 or 6 credits. Prerequisites: Chemical Engineering 563, 564. Staff.

Design study and economic evaluation of a chemical processing facility, alternative methods of manufacture, raw material preparation, food processing, waste disposal, or some other aspect of chemical processing.

566 Computer-Aided Process Design Spring. 3 credits. Prerequisite: concurrent registration in 462 or a previous course in process design.

2 lecs, 1 lab. G. F. Scheele. An introduction to the synthesis and use of computer systems for steady-state simulation of chemical processes.

595, 596 Special Projects in Chemical Engineering Fall or spring. Credit variable. Research or studies on special problems in chemical engineering.

611 Phase Equilibria Fall. 3 credits. Prerequisite: physical chemistry.

3 lecs. R. G. Thorpe. A detailed study of the pressure-temperature-composition relations in binary and multicomponent heterogeneous systems where several phases are of variable composition. Prediction of phase data.

621 Petroleum Refining Spring. 3 credits.

Prerequisite: Chemical Engineering 461. 3 lecs. H. F. Wiegandt. A study of processes used to refine petroleum. Recent process developments, including those for selected petrochemicals.

623 Synthetic Fuels Spring. 3 credits.

P. Harriott. Energy resources and projected consumption. Gasification and liquefaction of coal and oil shale. Synthesis of methane, methanol, and hydrogen. Efficiency and economics of fuel production and use.

627 Nuclear and Reactor Engineering Spring.

2 credits. Prerequisite: permission of instructor. 2 lecs. R. L. Von Berg. Fuel processing, isotope separation, radioactive waste disposal, radiation damage, shielding, radiation chemistry.

640 Polymeric Materials Fall. 3 credits.

3 lecs. F. Rodriguez. Chemistry and physics of the formation and characterization of polymers. Principles of fabrication.

641 Physical Polymer Science Spring. 3 credits.

Prerequisite: Chemical Engineering 311, 340, or equivalent. 3 lecs. C. Cohen. Thermodynamic and flow properties of polymer solutions. Phase separation in mixtures. Principal characterization techniques. Viscoelastic and transport properties of bulk polymers. Models of the glass transition. Applications to selected polymer processes.

642 Polymeric Materials Laboratory Spring. 2 or 3 credits. Prerequisite: Chemical Engineering 640.

F. Rodriguez. Experiments in the formation, characterization, fabrication, and testing of polymers.

644 Microbial Engineering Spring. 3 credits. Prerequisites or corequisites: Chemistry 288 and any course in microbiology.

2 lecs, rec. R. K. Finn. An advanced discussion of fermentation as a unit process. Topics include sterilization, aeration, agitation, and continuous fermentation.

[645 Industrial Microorganisms Fall. 2 credits.

Prerequisites: organic chemistry and physical chemistry. Not offered 1980-81. R. K. Finn.

A brief introductory course in microbiology for students with a good background in chemistry.]

646 Controlled Cultivation of Microbial Cells Spring. Variable credit. Prerequisite: Microbiology 291.

R. K. Finn. A projects course. Use of batch and continuous stirred jars to explore the physiology of microorganisms under conditions simulating industrial practice.

647 Wastewater Engineering in the Process Industries Fall. 3 credits. Prerequisites: organic and physical chemistry; Chemical Engineering 430 or equivalent.

R. K. Finn. Introduction to general and legal problems of pollution control, including some descriptive technology. Major emphasis, however, is on the quantitative engineering aspects of design and operation. Both biological and physical chemical methods, as they apply to the treatment of strong and special wastes from the chemical and allied industries, are discussed.

648 Polymer Processes Spring. 3 credits.

Prerequisite: 640 or permission of instructor. 3 lecs. F. Rodriguez. Production and applications of polymers. Discussion of stabilization and degradation, including processes for recycling and disposal of plastics and related products.

651 Numerical Methods in Chemical Engineering Fall. 3 credits.

3 lecs. G. F. Scheele. Solution of single and sets of algebraic equations, polynomial approximations, integration, initial and boundary-value ordinary differential equations, partial differential equations, optimization, statistical design of experiments.

661 Air Pollution Control. Fall. 3 credits.

P. Harriott. Origin of air pollutants, photochemical reactions in the atmosphere. Design of equipment for removal of particulate and gaseous pollutants formed in combustion and chemical processing.

671 Process Control Spring. 3 credits.

Prerequisite: Chemical Engineering 430. 3 lecs. J. F. Cocchetto. Dynamic response of processes and design of control schemes that will maintain output specifications in spite of input disturbances.

672 Process Control Laboratory Spring. 1 credit.

Prerequisite: concurrent registration in Chemical Engineering 671. 1 lab. J. F. Cocchetto. Experiments on controller calibration, dynamics of pneumatic and electronic analogs of process systems, dynamic responses of first and second order open-loop systems, and control of a heat exchanger.

673 Applied Surface Chemistry and Physics

Spring. 2 credits. R. P. Merrill. Topics in the chemistry and physics of solid surfaces and their applications to applied problems such as

catalysis and corrosion. Specific topics differ each year and students may, with permission of the instructor, take more than one offering of the course.

680 Chemical Microscopy Fall. 3 credits. Not offered 1980-81.

1 lec, 2 labs. G. G. Cocks.

The use of the light microscope to investigate chemical problems in biological or nonbiological systems. Topics include: the optics of the microscope, types of microscopes (transmission, reflection, polarizing, interference, phase and dark field), the preparation of specimens, qualitative and quantitative analysis, crystallography, and photomicrography.]

681 Electron Microscopy Fall. 3 credits.

Prerequisite: Chemical Engineering 680 or special permission. Not offered 1980-81.

1 lec, 2 labs. G. G. Cocks.

An introductory course designed to teach the student how to use the electron microscope. Topics include optics of the microscope, the use and maintenance of the microscope, specimen preparative techniques (substrates, particulates, replication, microtomy, electron diffraction, and thinning of metals), photomicrographic techniques, and the interpretation of micrographs.]

682 Advanced Chemical Microscopy Spring.

Variable credit. Prerequisites: Chemical Engineering 680 and permission of instructor.

G. G. Cocks.

This is primarily a projects course and offers the student the opportunity either to learn more about microscopes and their use or to apply the techniques of microscopy to the investigation of topics or problems of special interest.

683 Laboratory in Optical Crystallography Fall.

Credit variable. This is the laboratory for Geological Sciences 355, but is open to students who want to take the laboratory only. Not offered 1980-81.

2 labs; lec as part of 1 lab. G. G. Cocks.

An introduction to geometrical and optical crystallography for mineralogists, with instruction in the use of the polarizing microscope. Topics include the optics of the polarizing microscope, and geometrical and optical crystallography.]

692, 693, 694 Research Project Fall or spring.

3 credits; additional credit by special permission. Prerequisite: Chemical Engineering 430. Research on an original problem in chemical engineering.

711 Advanced Chemical Engineering

Thermodynamics Spring. 3 credits. Prerequisite: Chemical Engineering 312 or equivalent.

3 lecs. K. E. Gubbins.

Application of general thermodynamic methods to advanced problems in chemical engineering. Evaluation, estimation, and correlation of properties: chemical and phase equilibrium.

713 Applied Chemical Kinetics Spring. 3 credits.

Prerequisite: physical chemistry.

R. P. Merrill.

Fundamentals of the kinetics of reacting systems. Collision theory, unimolecular rate theory, transition state theory, and the use of simple statistical models to represent reacting chemical systems are stressed. The application of these concepts to nonideal environments, solvent effects, and reactions on solids is presented with emphasis on catalytic phenomena. The physical chemistry of several industrially important reactive systems are discussed as illustrations.

731 Advanced Transport Phenomena Spring.

3 credits. Prerequisite: Chemical Engineering 434, 751, or equivalent.

3 lecs. C. Cohen.

Viscous laminar flow of Newtonian and Power-Law fluids. Solutions of the Navier-Stokes equations for

selected steady- and unsteady-state problems. An integrated presentation of momentum, mass, and heat transfer. Models of mass and heat transfer.

751 Mathematical Methods of Chemical Engineering Analysis Fall. 3 credits.

3 lecs. W. L. Olbricht.

Application of advanced mathematical techniques to chemical engineering analysis. Linear and nonlinear ordinary differential equations, partial differential equations, vector and tensor analysis.

772 Theory of Molecular Liquids Spring.

3 credits. Prerequisite: 711 or equivalent.

K. E. Gubbins.

Theory of intermolecular forces; and equilibrium statistical mechanics for nonspherical molecules. Distribution functions. Applications to thermodynamics of such fluids using integral equation and perturbation theory techniques. Mixture properties, phase diagrams for mixtures with polar or quadrupolar components. Surface properties.

790 Seminar Fall and spring. 1 credit each term.

General chemical engineering seminar required of all graduate students majoring in the Field of Chemical Engineering.

792 Advanced Seminar in Thermodynamics Fall or spring. 1 credit.

K. E. Gubbins.

A forum for talks by graduate students and faculty members on topics of current interest in thermodynamics and statistical mechanics.

891, 892, 893 Thesis Research Fall or spring.

Thesis research for the M.S. degree in chemical engineering.

991, 992, 993, 994, 995 Thesis Research Fall or

spring.

Thesis research for the Ph.D. degree in chemical engineering.

Civil and Environmental Engineering

The courses in civil and environmental engineering are listed under the following headings:

Environmental Sensing, Measurement, and Evaluation; Public and Environmental Systems Engineering; Fluid Mechanics and Hydrology; Geotechnical Engineering; Environmental Quality Engineering; Transportation; Structural Engineering; Water Resources Planning and Analysis; and Professional Practice.

A. Environmental Sensing, Measurement and Evaluation

A321 Surveying for CEE Facilities Fall, spring (on

demand). 3 credits. Prerequisites: Physics 112, Math 192. Recommended: OR&IE 260 or 270.

2 lecs, 1 lab, evening tests. G. B. Lyon.

This course specifically focuses upon surveying and use of results from surveying operations for planning, design, and construction of civil engineering facilities. Topics include: measurements and data reduction for determination of position, and changes therein, of terrestrial features; measurement quality control; highway curves; earthwork quantities and distribution analysis for minimum construction cost; terrestrial and photogrammetric compilation of topographic maps; use of topographic maps in planning and design; and, selected topics in the acquisition of real estate and the construction of civil and environmental engineering facilities.

A656 Boundary Surveys Spring. 3 credits.

Prerequisite: permission of instructor. May not be offered 1980-81.

3 lecs.

Legal principles governing location of land boundaries. Historical development and methods of original land surveys. Retracement and restoration of property corners. Coordinate systems; mineral land surveys; riparian and littoral rights; environmental presentations; responsibilities of licensed surveyors.

A661 Photogrammetry Fall. 3 credits.

Prerequisite: permission of instructor. May not be offered 1980-81.

2 lecs, 1 lab.

Terrestrial, aerial, and space photogrammetry. Photograph geometry: tilt and relief displacements; parallax distortions; control requirements; flight planning. Zeiss Stereometric Camera. Stereo plotting, relative and absolute orientation; Balplex, Wild Autographs, and Terragraph plotters. Geometry of remote sensors.

A671 Geodesy Spring. 3 credits. Prerequisite:

permission of instructor. May not be offered 1980-81.

3 lecs.

The figure of the earth and the precise determinations of position on or near the earth's surface. Fundamentals of geometric geodesy, physical geodesy, satellite geodesy, and map projections.

A683 Remote Sensing: Environmental

Applications Spring. 3 credits. Prerequisite: permission of instructor.

2 lecs, 1 lab. W. R. Philipson.

Applications of remote sensing in various environmental disciplines. Emphasis is on the use of aircraft and satellite imagery for studying surface features in engineering, planning, agriculture, and natural resource assessments.

A685 Physical Environment Evaluation Fall.

3 credits. Prerequisite: permission of instructor.

2 lec, 1 lab. T. Liang.

Physical environment factors affecting engineering planning decisions: climate, soil and rock conditions, water sources. Evaluation methods: interpretation of meteorological, topographic, geologic, and soil maps, airphotos, and subsurface exploration records.

A687 Image Analysis I: Landforms Fall. 3 credits.

Prerequisite: permission of instructor.

2 lecs, 1 lab. T. Liang.

Analysis and interpretation of aerial photographs for a broad spectrum of soil, rock, and drainage conditions. Specific fields of application are emphasized.

A688 Image Analysis II: Physical Environments

Spring. 3 credits. Prerequisite: CEE A685 or A687.

2 lecs, 1 lab. T. Liang.

Study of physical environments using aerial photographs and other remote sensing methods. Conventional photography, spectral, space, and sequential photography; thermal and radar imageries. Arctic, tropic, arid, and humid climate regions. Project applications.

A691 Project On demand. 1-6 credits.

Staff.

Students may elect to undertake a project in remote sensing and environmental evaluation. The work is supervised by a professor in this subject area.

A692 Research On demand. 1-6 credits.

Staff.

For students who want to study one particular area in depth. The work may take the form of laboratory investigation, field study, theoretical analysis, or development of design procedures.

A694 Special Topics On demand. 1-6 credits.

Staff.

Supervised study in small groups on one or more special topics not covered in the regular courses. Special topics may be of a theoretical or applied nature.

A696 Seminar in Remote Sensing Spring. 1 credit. S-U grades only.
W. R. Philipson.

Presentation and discussion of current research, developments, and applications in remote sensing. Lectures by Cornell staff and invited specialists from government and industry.

A801 Thesis Fall and spring. 1–12 credits. Students must register for credit with the professor at the start of each term. A thesis research topic is selected by the student with the advice of the faculty member in charge, and is pursued either independently or in conjunction with others working on the same topic.

B. Public and Environmental Systems Engineering

B301 Microeconomic Analysis (also Economics 311.5) Fall. 4 credits. Prerequisite: one year of college-level mathematics.

R. E. Schuler.
Intermediate microeconomic analysis similar to Economics 311 but emphasizing mathematical techniques. Theory of households, firms, monopoly and competitive markets, distribution and equilibrium, welfare economics. A liberal elective for engineers.

B302 Economic Analysis of Government (also Economics 308) Spring. 4 credits. Prerequisites: one year of college-level mathematics, plus CEE B301 or Economics 311.

R. E. Schuler.
Analysis of government intervention in a market economy. Public goods, public finance, cost-benefit analysis, environmental regulation, and macroeconomic topics.

B303 Engineering Economics and Management Spring. 3 credits. Aimed at juniors and seniors; not intended for students with substantial background in business economics or methods of operations research.

W. R. Lynn.
Intended to give the student a working familiarity with the principles and main analytical techniques for reaching decisions about alternative engineering projects.

B305 Social Implications of Technology Fall. 3 credits. Approved liberal elective. Not open to freshmen.

W. R. Lynn.
Examines selected issues pertaining to the development, implementation, and assessment of technology. Special emphasis is given to social, political, and economic aspects of current problems that have important technological components.

B416 Seminar in Technology Assessment Spring. 3 credits. Open to graduate students and to upperclass undergraduates with permission of instructor.

N. Orloff.
An interdisciplinary seminar dealing with the social consequences of technological developments and means by which technology can be guided in socially beneficial directions.

B614 Legal Methods Spring. 3 credits. Limited to graduate students and to upperclass undergraduates with permission of instructor.

N. Orloff.
An introduction to the structure and operation of our legal system. Development of legal skills and the ability to do one's own basic legal research.

B615 Environmental Law Fall. 4 credits. Limited to graduate students and to upperclass undergraduates with permission of instructor.

N. Orloff.
An introduction to how the legal system handles environmental problems. Study of federal statutes,

such as the National Environmental Policy Act, the Clean Air Act, and the Clean Water Act; the regulations issued to implement them; and the important judicial decisions that have been handed down under each.

B617 Public Systems Analysis Fall. 3 credits. Prerequisite: CEE B303 or any introductory systems analysis course.

J. R. Stedinger.
An introduction to the philosophy and applications of systems analysis to public sector problems in transportation, natural resources, public health, global planning, and energy-environmental quality issues.

B693 Environmental and Water Resources Systems Analysis Colloquium Fall or spring. 1 credit.

Staff.
Lectures in various topics related to environmental or water resources systems planning and analysis.

B791 Environmental and Water Resources Systems Analysis Design Project On demand. Credit variable. Prerequisite: permission of instructor. May extend over two semesters.

Staff.
Design or feasibility study of environmental or water resources systems, supervised and assisted by one or more faculty advisers; individual or group participation. Final report required.

B792 Environmental and Water Resources Systems Analysis Research On demand. Credit variable. Prerequisite: permission of instructor. Preparation must be suitable to the investigation to be undertaken.

Investigations of particular environmental or water resources systems problems.

B794 Special Topics in Environmental or Water Resources Systems Analysis On demand. Credit variable.

Staff.
Supervised study, by individuals or small groups, of one or more specialized topics not covered in regular courses.

C. Fluid Mechanics and Hydrology

C301 Fluid Mechanics I Fall. 4 credits. Prerequisite: T&AM 203 (may be taken concurrently.)

3 lecs, 1 rec. Staff.
Hydrostatics, the basic equations of fluid flow, potential flow and dynamic pressure forces, viscous flow and shear forces, steady pipe flow, turbulence, dimensional analysis, selection of turbomachinery.

C302 Hydraulic Engineering Spring. 3 credits. Prerequisite: CEE C301.

2 rec, 1 lab, field trips. Staff.
Steady open channel flow, river modeling, unsteady pipe flow, theory of turbomachinery. Laboratory will include a number of experiments in hydraulic and river engineering. Field trips.

[C609 Descriptive Hydrology Spring. 2 credits. Intended for nonengineering majors. Prerequisite: permission of instructor. Not offered 1980–81.

W. H. Brutsaert.
Introduction to hydrology as a description of the hydrologic cycle and the role of water in the natural environment. Topics include precipitation, infiltration, evaporation, ground water, surface runoff, floods, and droughts.]

C615 Fluid Mechanics II Fall. 3 credits. Prerequisite: CEE C301.

3 lecs. Staff.
Introduction to tensor analysis, conservation of mass, momentum and energy from a rigorous point of view. Study of exact solutions of the Navier-Stokes

equations. Asymptotic approximations at low and high Reynolds numbers. Similitude and modeling. Laminar diffusion of momentum, mass, and heat.

[C618 Dynamic Oceanography Fall. 3 credits. Prerequisite: CEE C301. Not offered 1980–81.

P. L. -F. Liu.
The statics and dynamics of oceans and lakes. Currents in homogeneous and stratified bodies of water. Tidal motions. Waves in a stratified ocean.]

C620 Analytical Hydrology Fall. 3 credits. Prerequisite: CEE C301.

W. H. Brutsaert.
Physical and statistical analysis related to hydrologic processes. Hydrometeorology and evaporation. Infiltration and base flow. Surface runoff and channel routing. Linear and nonlinear hydrologic systems analysis. Storage routing and unit hydrograph theory.

[C621 Flow in Porous Media and Ground Water Spring. 3 credits. Prerequisite: CEE C301. Not offered 1980–81.

W. H. Brutsaert.
Fluid mechanics and equations of single-phase and multiphase flow; methods of solution. Aquifer hydraulics, pumping wells; drought flows; infiltration, ground water recharge; land subsidence; sea-water intrusion, miscible displacement; transient seepage in unsaturated materials.]

C622 Engineering Micrometeorology Spring. 3 credits. Prerequisite: CEE C301.

3 lecs. W. H. Brutsaert.
Physical processes in the lower atmospheric environment: turbulent transport in the atmospheric boundary layer; surface-air interaction; disturbed boundary layers; radiation. Applications will include sensible and latent heat transfer from lakes; plant canopy flow and evapotranspiration; turbulent diffusion from chimneys and cooling towers; urban climatology; interaction of wind and structures; snow and ice problems.

[C631 Coastal Engineering I Spring. 3 credits. Prerequisite: CEE C301. Not offered 1980–81.

3 lecs. P. L. -F. Liu.
Linear wave theory, wave generation by wind, analysis of fluid forces on floating and fixed coastal structures, and modification of waves and currents by these structures, coastal processes and coastal sediment motion.]

[C633 Coastal Engineering II Fall. 3 credits. Prerequisite: CEE C631. Not offered 1980–81.

3 lecs. P. L. -F. Liu.
Review of gravity wave theories, applicability of different wave theories to engineering problems, wave energy transmission, tsunamis, boundary value problems in wave hydrodynamics, behavior of submerged and floating bodies, harbor agitations, ship waves.]

C641 Environmental Fluid Mechanics I Fall. 3 credits. Prerequisite: CEE C301.

3 lecs. G. H. Jirka.
Introduction mass and heat transport processes due to pollutant discharges into the environment. Turbulent diffusion equation and its solution for instantaneous and continuous releases. Concept of longitudinal dispersion in shear flow. Applications to pollutant transport prediction in lakes, rivers, estuaries, and coastal zones, as well as the atmosphere. Relative role of hydrodynamic transport to reaction kinetics. Exchange processes for mass and heat at the air-water interface. Convective transport due to density currents. Jet mixing and the design of outfall structures.

C642 Environmental Fluid Mechanics II Spring. 3 credits. Prerequisite: CEE C641 or permission of instructor. Offered alternate years.

3 lecs. G. H. Jirka.
Mechanics of discretely and continuously stratified fluids: internal waves, density currents, blocking,

selective withdrawal, and internal jumps. Interfacial stability and mixing. Observed characteristics of turbulent fluid flow in environmental applications, including interaction with buoyancy. Integral techniques for self-similar flows: jets, plumes, and mixing layers. Experimental approaches to environmental fluid problems.

C643 Unsteady Hydraulics Spring. 3 credits.
Prerequisite: CEE C302 or permission of instructor.
J. A. Liggett.

The physical and mathematical basis for unsteady processes in hydraulic engineering, especially unsteady open channel flow. Water hammer, unsteady sediment transport, long waves on large bodies of water, circulation. Numerical methods of solution.

[C651 Environmental Planning and Operation of Energy Facilities Spring. 3 credits. Mixed lecture/seminar format. Prerequisites: CEE C641 or equivalent. Offered alternate years. Not offered 1980-81.

G. H. Jirka.
Survey of analytical methodologies for predicting and controlling the environmental impacts of individual energy facilities or of energy systems. Estimation of construction and operating impacts: pollutant sources, models for pollutant dispersal, modeling the relationships of pollutant concentration and ecological, health, and socioeconomic damages. Pollutant abatement strategies and transient releases techniques. Models for regional energy facility siting.]

C691 Project On demand. Variable credit.
Hours to be arranged. Staff.

The student may elect a design problem or undertake the design and construction of special equipment in the fields of fluid mechanics, hydraulic engineering, or hydrology.

C693 Hydraulics Seminar Spring. 1 credit. Open to undergraduates and graduates and required of graduate students majoring in hydraulics or hydraulic engineering.
Staff.

Topics of current interest in fluid mechanics, hydraulic engineering, and hydrology.

C694 Special Topics in Hydraulics On demand
Credit variable.
Staff.

Special topics in fluid mechanics, hydraulic engineering, or hydrology.

C744 Experimental and Numerical Methods in Hydraulics and Hydrology On demand. 2 credits.
Staff.

Methods used in planning and conducting laboratory and field experiments and in performing numerical analysis. Specific subject matter varies according to the interests of students and staff.

C792 Research in Hydraulics On demand.
Variable credit.
Staff.

The student may select an area of investigation in fluid mechanics, hydraulic engineering, or hydrology. The work may be either experimental or theoretical in nature. Results should be submitted to the instructor in charge in the form of a research report.

D. Geotechnical Engineering

D301 Introductory Soil Mechanics Spring.
3 credits.
2 lecs, 1 lab/tutorial. T. D. O'Rourke.

Soil as an engineering material. Chemical and physical nature of soil. Engineering properties of soil. Stresses and stress analysis in soil. Introduction to stability, earth pressure, and other design problems. Introduction to laboratory testing.

D606 Foundation Engineering Fall. 3 credits.
Prerequisite: CEE D301.

3 lecs, optional tutorial. F. H. Kulhawy.
Soil exploration, sampling, and in-situ testing techniques. Bearing capacity, stress distribution, and settlement. Design of shallow and deep foundations. Compaction and site preparation. Seepage and dewatering of foundation excavations.

D607 Retaining Structures and Slopes Spring.
3 credits. Prerequisite: CEE D301.

3 lecs, optional tutorial. T. D. O'Rourke,
F. H. Kulhawy.
Earth pressure theories. Design of rigid, flexible, braced, tied back, slurry, and reinforced earth walls. Stability of excavation, cut, and natural slopes.

D631 Highway Engineering (also Agricultural Engineering 491) Fall. 3 credits. Prerequisite: CEE D301 or permission of instructor.

2 lecs, 1 lab. L. H. Irwin.
See Agricultural Engineering 491 for course description.

D632 Bituminous Materials and Pavement Design (also Agricultural Engineering 492) Spring.
3 credits. Prerequisite: CEE D631 or permission of instructor.

2 lecs, 1 lab. L. H. Irwin.
See Agricultural Engineering 492 for course description.

D691 Design Project in Geotechnical Engineering On demand. 1-6 credits.
Students may elect to undertake a design project in geotechnical engineering. The work is supervised by a professor in this subject area.

D693 Seminar in Geotechnical Engineering Fall or spring.
Staff.

Presentation and discussion of topics of current research and practice in geotechnical engineering.

D694 Special Topics in Geotechnical Engineering On demand. 1-6 credits.
Staff.

Supervised study of special topics not covered in the formal courses.

D710 Engineering Behavior of Soils Fall.
3 credits. Prerequisite: CEE D301. Seniors must have permission of instructor.
3 lecs. Staff.

Detailed study of physicochemical nature of soil. Stress states and stress-strain-time behavior. In-depth evaluation of the strength, compressibility, and permeability of natural soils. Study of special deposits such as sensitive, organic, frozen, and man-made soils.

D711 Rock Engineering Fall. 3 credits.
Prerequisite: CEE D301 or permission of instructor.
Recommended: introductory geology.

2 lecs, 1 lab. F. H. Kulhawy.
Geological and engineering classifications of intact rock, discontinuities, and rock masses. Laboratory and field evaluation of properties. Stress states and stress analysis. Design of foundations on and openings in rock masses. Analysis of the stability of rock slopes.

D712 Graduate Soil Mechanics Laboratory Fall.
3 credits. Prerequisite: CEE D710.

T. D. O'Rourke.
Introductory through advanced techniques for laboratory measurement of soil properties. Emphasis on strength, compressibility, and permeability tests. Critical evaluation of laboratory methodology.

[D714 Advanced Foundation Engineering Spring. 3 credits. Prerequisite: CEE D606. Not offered 1980-81.
3 lecs. Staff.

A continuation of CEE D606 with detailed emphasis on special topics in soil-structure interaction. Typical topics include: lateral and pullout loading of deep foundations, pile group behavior, foundations for offshore structures, pile-driving dynamics, foundations for special structures.]

D715 Soil Dynamics Spring. 3 credits.
Prerequisite: permission of instructor.

3 lecs. Staff.
Principles of vibration under harmonic and transient loading. Wave propagation. Dynamic response of soils and its measurement. Analytical models for harmonic, transient, and earthquake loading. Design examples of foundations and embankments.

D717 Embankment Dam Engineering Spring.
2 credits. Prerequisites: CEE D607 and D711, or permission of instructor.

2 lecs. F. H. Kulhawy.
Principles of analysis and design for earth and rockfill dams. Materials, construction methods, internal and external stability, seepage and drainage, performance monitoring, abutment and foundation evaluation. Introduction to tailings dams.

[D718 Case Studies in Geotechnical Engineering Spring. 3 credits. Prerequisites: CEE D606 and D607. Not offered 1980-81.

Staff.
Study of case histories in geotechnical engineering. Critical evaluation of successful and unsuccessful projects. Oral presentations and engineering report evaluation of each case.]

[D719 Tunnel Engineering Spring. 2 credits.
Prerequisites: CEE D607 and D 711. Not offered 1980-81.

2 lecs. F. H. Kulhawy, T. D. O'Rourke.
Principles of analysis and design for earth and rock tunnels. Materials, construction methods, stability and support systems, deformations, and performance monitoring.]

D792 Research and Geotechnical Engineering On demand. 1-6 credits.
Staff.

For the student who wants to pursue a particular geotechnical topic in considerable depth.

E. Environmental Quality Engineering

E301 Environmental Quality Engineering Spring.
3 credits. Prerequisite: CEE C301.

J. J. Bisogni, J. M. Gossett.
Introduction to the engineering aspects of environmental quality control. Emphasis on water quality control concepts, theory, and methods. Elementary analysis and design applicable to water supply and distribution and to wastewater and storm-water collection systems. Introduction to processes underlying water and wastewater treatment. Effects of wastewater on natural waters.

E604 Assimilation of Pollutants in Natural Waters Fall. 3 credits. Prerequisite: CEE E301 or permission of instructor.
3 lecs.

Assimilation and transport of pollutants in the aquatic environment. Emphasis on the physics, chemistry, and biology that form the basis for mathematical description of the assimilation phenomenon in natural waters.

E610 Chemistry of Water and Wastewater Fall.
3 credits. Prerequisite: one year of college chemistry or permission of instructor.

3 lec-recs. J. M. Gossett.
Principles of physical, organic, inorganic, and biological chemistry applicable to the understanding, design, and control of water and wastewater treatment processes and to reactions in receiving waters.

E611 Aquatic Chemistry Spring. 3 credits.

Prerequisite: CEE E610 or Chemistry 287-288.

3 lecs. J. J. Bisogni.

Chemical equilibria in natural aquatic systems, including water and wastewater treatment systems. Chemical thermodynamics, acid-base systems, oxidation-reduction systems, coordination chemistry, solid-liquid-gas interfaces with regard to precipitation, dissolution, and adsorption. Chemical-biological interfaces in natural systems. Emphasis on phenomena, mathematical solution of chemical equilibria, and application to engineering management of water quality.

[E630 Solid Waste Management and Resource Recovery Spring. 3 credits. Limited to seniors and graduate students. Not offered 1980-81.

3 lec-discs.

Sources, nature, and properties of municipal and industrial solid wastes. Mechanical, biological, and thermal processing methods for disposal of solid wastes and for recovery of material and energy from them.]

E633 Environmental Quality Management Fall; spring on demand. 3 credits (4 with approval of instructor). For upperclass or graduate students. May not be offered 1980-81.

2 lec-discs. L. B. Dworsky.

An introduction to environmental quality management; nature, cause, and control of environmental problems; interaction of physical, social, and cultural environments; emphasis on the interdependent social, economic, developmental, and environmental issues confronting society.

[E634 Air Quality Control Spring. 3 credits.

Limited to seniors and graduate students. Not offered 1980-81.

3 lec-discs.

An introduction to air quality and air pollution problems. Sources, characteristics, and effects of specific air pollutants; their dispersion and interactions in the atmosphere. Air quality standards and regulations. Air pollution control methods.]

[E636 Environmental Effects of Energy Conversion Fall. 3 credits. Limited to upperclass and graduate students. Not offered 1980-81.

3 lec-discs.

Characteristics of airborne, waterborne, and solid wastes generated in energy-conversion processes. Estimation of the potential impacts of these wastes on the physical environment. Behavior and fate of these wastes in the environment and their effects on receptors. Regulatory and Engineering aspects of waste control. Emphasis is on wastes and phenomena related to fossil, nuclear, and refuse-derived fuels.]

E638 Sludge Treatment, Utilization, and Disposal Spring. 3 credits. Prerequisites: CEE E301 and E610 or permission of instructor.

R. I. Dick.

An analysis of the quantity and quality of residues produced from wastewater treatment facilities as a function of process design and operation; the alternatives for reclamation or ultimate disposal of residues with assessment of potential environmental impacts and factors influencing the magnitude of those impacts; the fundamental factors influencing performance of treatment processes for altering sludge properties prior to ultimate disposal; and considerations in selection and integration of sludge management processes to approach optional design.

E693 Environmental Quality Engineering Seminar Fall or spring. 1 credit. Required of graduate students majoring or minoring in sanitary engineering. Open to undergraduates who have received permission of the instructor.

Presentation and discussion of current topics and problems in sanitary engineering and environmental quality engineering.

E712 Water Chemistry Laboratory Fall. 1 credit.

Enrollment limited. Prerequisites: CEE E610 (students may enroll concurrently in CEE E610) and permission of instructor.

J. M. Gossett.

Laboratory methods for analysis of pollutants in water and wastewater.

E715 Chemical and Physical Phenomena and Processes Fall. 4 credits. Prerequisite: CEE E610 or permission of instructor.

3 lecs, 1 lab. J. J. Bisogni.

Theoretical and engineering aspects of chemical and physical phenomena and processes applicable to the removal of impurities from water, wastewater, and industrial wastes, and to their transformation in receiving waters. Analysis and design of treatment processes and systems. Residuals control and treatment. Pertinent laboratory studies.

E716 Biological Phenomena and Processes Spring. 4 credits. Prerequisite: CEE E715 or permission of instructor.

3 lecs, 1 lab. J. M. Gossett.

Theoretical and engineering aspects of biological phenomena and processes applicable to the removal of impurities from water, wastewater, and industrial wastes, and to their transformation in receiving waters. Biokinetic analysis and design of biological treatment process. Pertinent laboratory studies.

E791 Design Project in Sanitary Engineering On demand. Variable credit. Prerequisite: CEE E301 or equivalent.

Staff.

The student will elect or be assigned a problem in the design of water or wastewater treatment processes or plants or wastewater disposal systems; or a laboratory project.

E792 Sanitary Engineering Research On demand. Variable credit. Prerequisites will depend on the particular investigation to be undertaken.

Staff.

For the student who wants to study a problem in greater depth than is possible in formal courses. Study may be any combination of literature, laboratory, or computational research.

E794 Special Topics in Sanitary Engineering On demand. Variable credit.

Hours to be arranged. Staff.

Supervised study in special topics not covered in formal courses.

E801 Thesis Fall and spring. 1-12 credits.

Students must register for credit with the professor at the start of each term.

A thesis research topic is selected by the student with the advice of the faculty member in charge, and is pursued either independently or in conjunction with others working on the same topics.

F. Transportation**F301 Introduction to Transportation Engineering** Fall. 3 credits.

A. H. Meyburg.

Introduction to technological, economic, and social aspects of transportation. Emphasis on the form and functioning of transportation systems and their components. Vehicle and system technology, traffic flow and control, terminal operations, supply-demand interactions, system planning and management, and institutional issues.

F621 Urban Transportation Planning Fall. 4 credits.

A. H. Meyburg.

The urban transportation problems: its roots, manifestations, and implications; the systems analysis approach to transportation; the demand and supply side of transportation; the urban transportation planning process and its modeling components;

generation and evaluation of alternatives. A laboratory period is designed for study-team research.

F623 Travel Theory and Applications Spring. 3 credits. Prerequisite: CEE F621 or permission of instructor.

A. H. Meyburg.

This course concentrates on new methods for estimating and predicting travel demand. In particular, it will consider techniques based on a treatment of the individual as an economic or psychological decision-making unit. Theoretical background to the models, empirical estimation, measurement of attributes and practical applications will all be considered. Practical problems and directions of present and future research will be outlined. Survey sampling will be introduced.

F624 Transportation Systems Analysis Fall. 3 credits. Prerequisites: CEE F301, OR&IE 320 or equivalent.

M. A. Turnquist.

Application of operations research and systems analysis techniques to transportation systems, both passenger and freight. Network flows, routing and scheduling, technology selection, and terminal operation.

F625 Transportation Systems Design Spring. 3 credits. Prerequisite: CEE F624.

M. A. Turnquist.

Techniques for design of transportation systems, including networks of fixed facilities and route networks. Time-staging of improvements, use of low-capital cost options, and the role of demonstration projects. Evaluation of alternative designs.

F643 Operations, Design, and Planning of Public Transportation Systems Spring. 3 credits.

G. P. Fisher.

A study of mass transportation of the past and present, innovative forms of mass and individual transportation in urban areas. The financing and organization of mass transportation; the "free transit" versus fares dilemma. Planning for mass transportation: special applications, implementation of plans, planning transportation in new towns.

F645 Freight Transportation Spring 3 credits.

G. P. Fisher.

Transportation planning methodology for interurban and intraurban freight movements. Relationship to the urban transportation planning process. Problem identification, solution strategies, analysis techniques. Freight demand analysis. Alternative technologies in view of energy, efficiency, and environmental impacts.

F646 Transportation Economics Spring. 3 credits. Prerequisite: CEE B301 or equivalent.

M. A. Turnquist.

Economic analysis of freight and passenger transportation systems. Pricing and regulation. Elements of cost-benefit analysis and evaluation of public investment and subsidization. Consideration of national transportation policy.

F791 Transportation Design Project On demand. Variable credit.

Staff.

Design or feasibility study of transportation systems, supervised by one or more faculty advisers. Individual or group participation.

F792 Transportation Research On demand. Variable credit.

Staff.

In-depth investigation of a particular transportation planning or engineering problem mutually agreed upon between the student and one or more faculty members.

F793 Transportation Colloquium Fall or spring. 1 credit.
Lectures in various topics related to transportation planning and analysis.

F794 Special Topics in Transportation Fall or spring. Variable credit.
Staff.

Consideration of subject matter not covered in depth in regular courses. Topic(s) will vary from year to year, but may include terminal operations, airport planning and design, traffic flow theory, marine transportation, etc.

See also:

D631 Highway Engineering (Agricultural Engineering 491) [See description under Agricultural Engineering 491.]

G. Structural Engineering

G301 Structural Engineering I Fall. 4 credits.
Prerequisite: T&AM 202.

3 lecs, one 2-hour lab; evening exams. P. Gergely. Fundamental concepts of structural engineering. Behavior, analysis, design, structural planning. Loads, structural form, statically determinate analysis, approximate analysis of indeterminate systems. Behavior and design of steel and concrete members.

G302 Structural Engineering II Spring. 4 credits.
Prerequisite: CEE G301.

3 lecs, one 2-hour lab; evening exams. W. McGuire. Fundamentals of statically indeterminate structures. Moment-area and virtual work methods of displacement computation. Matrix flexibility and stiffness and moment distribution analysis methods. Plastic analysis of steel frames. Computer applications to practical structures.

G303 Structural Engineering III Fall. 4 credits.
Prerequisites: CEE G302 or permission of instructor; CEE G351 is also required, but may be taken concurrently.

Evening exams. T. Peköz. Continues the study of the behavior and design of steel and concrete. Structural elements, connections, and systems.

G304 Structural Engineering IV Spring. 4 credits.
Prerequisite: CEE G303.

M. D. Grigoriu. Intended to develop an understanding of the structural design process. Comprehensive design project. Lectures on preliminary design, composite construction, prestressed concrete, and various structural systems such as bridges, roofs, and tall buildings.

G305 Structural Behavior Laboratory Spring. 2 credits. Prerequisite (may be taken concurrently instead): CEE G302.

R. N. White. A lab course on behavior of structures, utilizing small-scale models. Elastic, inelastic, and nonlinear behavior of structural components and systems. Projects.

G351 Engineering Materials Fall. 3 credits.
2 lecs, 1 lab. F. O. Slate.

Engineering properties of concrete, steel, wood, and other structural materials. Design characteristics and significance of test results of materials used in engineering works. Extensive laboratory testing and report writing.

G608 Timber Engineering Spring. 1 credit.
Prerequisite: CEE G303.

R. N. White. Structural properties of timber. Timber tension members, beams, and beam-columns. Glued-laminated timber design. Connection behavior and design. Special timber structural systems.

G610 Fundamentals of Structural Mechanics

Fall. 3 credits. Prerequisite (may be taken concurrently instead): CEE G303.

Staff. Theory of elasticity, energy principles, plate flexure, failure theories, inelastic stress-strain relationships, stress concentration, introduction to fracture, fatigue.

G612 Advanced Structural Analysis Fall.

3 credits. Prerequisites: CEE G302 and computer programming.

A. R. Ingraffea. Direct stiffness and flexibility methods in matrix formulation, use of standard analysis programs, error detection, substructuring, and special analysis procedures.

G614 Structural Model Analysis and Experimental Methods Fall. 3 credits.

2 lecs, 1 lab. R. N. White. Dimensional analysis and similitude. Model materials, fabrication, loading, and instrumentation techniques. Experimental stress analysis.

G652 Advanced Plain Concrete Spring. 3 credits.
Prerequisite: CEE G351 or equivalent.

2 lecs, conferences. F. O. Slate. Topics such as history of cementing materials, air entrainment, light-weight aggregates, petrography, durability, chemical reactions, properties of aggregates, and construction. Relationships among internal structure, physical properties, chemical properties, and mechanical properties.

[G653 Structure and Properties of Materials

Spring. 3 credits. Limited to graduate students in engineering or physical sciences, or undergraduates by permission of instructor. Offered alternate years. Not offered 1980-81.

2 lecs, conferences. F. O. Slate. Internal structure from amorphous to crystalline state. Forces holding matter together versus forces causing deformation and failure. Correlation of internal structures with physical and mechanical properties. Applications to various engineering materials.]

G654 Low-cost Housing Primarily for Developing Nations Spring. 3 credits. Offered alternate years.

2 lecs, conferences. F. O. Slate. A multidisciplinary course. Students study intensively, usually in their own discipline, for a term project, while also being introduced to problems and approaches of other disciplines. Engineers investigate the technological aspects of the subject and other aspects that influence technological decisions, such as cultural and economic factors.

[G655 Low-cost Housing for Developing Nations — Workshop for Physical Planning, Site Selection, and Design Spring. A mixed class of advanced civil engineering and architecture students. Offered alternate years. Not offered 1980-81.

F. O. Slate. Discussions and workshops on physical planning, site selection, choice of materials, and detailed design of individual structures and groupings.]

G693 Structural Engineering Seminar Fall or spring. 1 credit. Limited to qualified seniors and graduate students.

Staff. Presentation of topics of current interest in the field of structures.

G709 Engineering Fracture Mechanics Spring. 3 credits. Prerequisite: CEE G713 or permission of instructor. Offered alternate years. Will be offered 1980-81.

2 lecs, 1 lab. A. R. Ingraffea. Fundamentals of fracture mechanics theory. Energy and stress-intensity approaches to fracture. Mixed-mode fracture. Fatigue crack propagation. Finite and boundary element methods in fracture mechanics. Introduction to elastic-plastic fracture mechanics. Laboratory techniques for fracture toughness testing of metals, concrete, and rock.

G711 Stability: Theory and Design Spring. 3 credits.

T. Peköz. Analysis of elastic and plastic stability. Determination of buckling loads and postbuckling behavior of columns. Solid and open web columns with variable cross section. Beam columns. Frame buckling. Torsional-flexural buckling. Lateral buckling of beams. Buckling loads and postbuckling behavior of plates, shear webs, and shells. Critical discussion of current design specification.

G713 Finite Element Analysis Spring. 3 credits.
Prerequisites: CEE G610 and G612.

J. F. Abel. Theoretical and conceptual bases for finite elements in structural mechanics. Development of element relationships and system solution techniques for analysis of bars, beams, planar structures, solids, plates, and shells.

G715 Structural Reliability and Safety Fall. 3 credits. Prerequisite: CEE G303. Offered alternate years.

M. D. Grigoriu. Probabilistic models for loads, load combinations, and strength of members and structural systems. Structural reliability. Design-code provisions for safety.

G716 Prestressed Concrete Structures Fall. 3 credits. Prerequisite: CEE G303. Recommended: CEE G304.

3 lecs. A. H. Nilson. Behavior, analysis, design of pretensioned and posttensioned prestressed concrete structures. Partial prestressing. Strength, serviceability, structural efficiency of beams, slabs, tension and compression members, frameworks, bridges.

G717 Advanced Reinforced Concrete Spring. 3 credits. Prerequisite: CEE G303. Recommended: CEE G304.

3 lecs. A. H. Nilson. Behavior, analysis, design of reinforced concrete structures. Strength, safety, serviceability, structural efficiency. Beams, columns, slabs, frameworks, composite members, ground-supported slabs, shear walls, deep beams, folded plates.

G718 Advanced Design of Metal Structures Fall. 3 credits. Prerequisite: CEE G303.

W. McGuire. Behavior and design, with emphasis on connections, plate girders, and cold-formed steel structures. Torsion of steel members. Fatigue and fracture.

G719 Advanced Behavior of Metal Structures Spring. 3 credits. Prerequisite: CEE G303.

W. McGuire. Behavior of beams, beam-columns, and single and multistory frames. Analysis and design of tall building systems. Cable-supported structures.

G720 Shell Theory and Design Spring. 3 credits.
P. Gergely.

Fundamentals of practical shell theory. Differential geometry of surfaces; membrane and bending theory of shells; analysis and design of cylindrical shells, polygonal domes, and paraboloids.

G722 Structural Design for Dynamic Loads Spring. 3 credits.

P. Gergely. Analysis, design, and behavior of structures subjected to dynamic effects, with emphasis on earthquake-resistant design.

[G732 Optimum Structural Design Fall. 3 credits. Offered alternate years. Not offered 1980-81. Design of minimum weight or cost structures. Includes full-stressed design, classical, minimization procedures, and mathematical programming methods.]

[G733 Numerical Methods in Structural Engineering] Fall. 3 credits. Prerequisites: CEE G610 and G612. Offered alternate years. Not offered 1980-81.

J. F. Abel.

Numerical techniques for structural and geotechnical engineering, such as residual, variational, finite-difference, and finite-element methods. Selected numerical analysis topics and solution algorithms with emphasis on linear equations and eigenvalue problems.]

[G734 Advanced Topics in Finite Element Analysis] Fall. 3 credits. Prerequisite: G713. Offered alternate years. Not offered 1980-81.

J. F. Abel.

Lectures and colloquia on selected advanced topics and research in progress, including dynamics, nonlinear analysis, shells, fracture mechanics, fluid dynamics, and computer graphics.]

G757 Civil and Environmental Engineering Materials Project On demand. 1-3 credits.

F. O. Slate.

Individual projects or reading and study assignments involving engineering materials.

G791 Design Project in Structural Engineering Fall or Spring. Variable credit.

Students may elect to undertake a design project in structural engineering. The work is supervised by a professor in this subject area.

G792 Research in Structural Engineering On demand. Variable credit.

Hours to be arranged. Staff.

Pursuit of a branch of structural engineering further than can be done in regular courses. Theoretical or experimental investigation of suitable problems.

G794 Special Topics in Structural Engineering On demand. Variable credit.

Hours to be arranged. Staff.

Individually supervised study or independent design or research in specialized topics not covered in regular courses.

G801 Thesis Fall and Spring. 1-12 credits.

Students must register for credit with the professor at the start of each term.

A thesis research topic is selected by the student with the advice of the faculty member in charge, and is pursued either independently or in conjunction with others working on the same topic.

H. Water Resources Planning and Analysis

H615 Water Resources Problems and Policies

Fall. 3 credits. Intended primarily for graduate engineering and nonengineering students but open to qualified upperclass students. Prerequisite: permission of instructor.

Lec-disc. L. B. Dworsky.

Historical and contemporary perspectives of water problems, organization, and public policies.

H624 Stochastic Hydrologic Modeling Fall. 3 credits. Prerequisite: OR&IE 260.

J. R. Stedinger.

Develops statistical techniques in time and frequency domain used to analyze and model stochastic processes. Lectures examine Box-Jenkins, fractional-Brownian noise and other steamflow models, drought and flood frequency estimation, parameter estimation in dynamic systems, and analysis of simulation output.

H626 Water Quality Modeling Spring. 3 credits. Prerequisites: CEE B303 or Agricultural Engineering 475; CEE C651 or CEE E604 recommended.

D. P. Loucks.

Predictive models of the behavior of biological and chemical substances in bodies of water and in surface runoff. Regional management of water quality.

H628 Water Resources Systems Planning I Fall. 3 credits. Prerequisite: CEE B303 or equivalent.

D. P. Loucks.

Application of deterministic optimization and simulation techniques in water resources planning. River-basin modeling, including irrigation planning and operation, hydropower capacity development, flow augmentation, and flood control and protection.

H629 Water Resource Systems Planning II

Spring. 3 credits. Prerequisites: CEE H628 and H624 or permission of instructor.

D. P. Loucks.

Optimization and simulation methods for water resource planning under hydrological, technological, and political uncertainty. Concepts of system reliability, vulnerability, resilience, stability, and robustness.

K. Professional Practice

K301 Numerical Solutions to Civil Engineering Problems Fall. 3 credits.

Introduction to numerical and computer methods through consideration of typical problems drawn from a number of disciplines within civil and environmental engineering. Topics include computer use, computer programming, data handling, numerical analysis, and the role of computing in the civil engineering profession.

K510 Civil and Environmental Engineering Design Project I

Fall. 3 credits. Required for students in the M.Eng.(Civil) program.

School faculty and visiting engineers.

Design of major civil engineering project. Planning and preliminary design in fall term; final design in January intersession (CEE K511).

K511 Civil and Environmental Engineering Design Project II

Spring (work done during January intersession). 3 credits. Required for students in the M.Eng.(Civil) program. Prerequisite: CEE K510.

School faculty and visiting engineers.

A continuation of CEE K510.

K521 Professional Practice in Engineering

Spring. 3 credits. Required for and limited to students in the M.Eng.(Civil) program.

W. R. Lynn.

Introduction to nontechnical aspects of engineering practice: legal, financial, social, and ethical aspects; personnel management; communications; professional organizations.

See also:

CEE B614 Legal Methods 3 credits.

K531 Engineering Ethics Fall or Spring. 3 credits. May not be offered 1980-81.

Introduction to ethical issues arising in the discharge of the professional engineer's obligations to clients and to the public. Systematic analysis of the implications of these issues in realistic engineering situations. Topics selected from the literature and from the experience of engineers and of students.

K601 Numerical Solutions to Civil Engineering Problems Fall. 3 credits.

Introduction to numerical and computer methods through consideration of typical problems drawn from a number of disciplines within civil and environmental engineering. Topics include computer use, computer programming, data handling, numerical analysis at the graduate level, and the role of computing in the civil engineering profession.

Computer Science

The Department of Computer Science is organized as an intercollege department in the College of Arts and Sciences and the College of Engineering.

100 Introduction to Computer Programming Fall or Spring. 3 credits. S-U grades optional. Students who plan to take both Computer Science 101 and 100 must take 101 first.

2 lecs, 1 rec (optional), 3 evening exams, final.

An introduction to elementary computer programming concepts. Emphasis is on techniques of problem analysis, algorithm and program development. The subject of the course is programming, not a particular programming language. The principal programming language is PL/I; FORTRAN is introduced and used for final problems. The course does not presume previous programming experience. An introduction to numerical computing is included, although no college-level mathematics is presumed. Programming assignments are tested and run on interactive, stand-alone microcomputers.

101 The Computer Age Spring. 3 credits. S-U grades optional. Credit cannot be granted for both Computer Science 100 and 101 unless 101 is taken first.

2 lecs, 1 rec.

Introduction to computer science and programming for students in nontechnical areas. Topics include the history of computation; microtechnology; the retrieval and transmission of information; scientific computing; computer graphics, art, and music; robotics, natural language processing, and machine intelligence. Students become acquainted with the notion of an algorithm by writing several PL/C programs. The amount of programming is about half of that taught in Computer Science 100. Each student writes a term paper on some aspect of computing. The aims of the course are to make the student an intelligent consumer of what the computer has to offer and to develop an appreciation of algorithmic thinking.

102 Introduction to FORTRAN Programming Fall

or Spring, weeks 1-5 only. 1 credit. S-U grades optional. Credit will not be granted for both Computer Science 100 and 102 unless 102 is taken first. Elementary programming concepts. Laboratory problems using FORTRAN IV language.

103 Introduction to PASCAL Fall or Spring, weeks

6-9 only. 1 credit. Prerequisite: Computer Science 100 or equivalent programming experience. S-U grades optional.

Variables; data types and type definitions; scalar, set, array, and record types; language constructs for systematic programming; files; procedures and functions. Several programming assignments.

104 Introduction to APL Programming Fall or

Spring, weeks 2-5 only. 1 credit. Prerequisite: Computer Science 100 or equivalent programming experience. S-U grades optional.

Introduction to interactive terminal computing using the APL language.

107 Introduction to Interactive Computing with CMS

Fall or Spring, weeks 2-5 only. 1 credit.

Prerequisite: Computer Science 100 or equivalent programming experience. S-U grades only.

Concepts of interactive computing, using the editor, data management, utility commands, remote job submission, interactive language processors, and the EXEC facility.

108 Introduction to Statistical Packages Fall or

Spring, weeks 10-13 only. 1 credit. S-U grades only. Discussion of the wide range of procedures and data transformation facilities provided by statistical program packages. Topics covered include data preparation and formatting, program control cards, JCL, and hints for debugging.

109 Multistep Job Processing and JCL Fall or

Spring, weeks 6-9 only. 1 credit. Prerequisite: Computer Science 100 or equivalent programming experience. S-U grades only.

Outline of HASP and OS systems currently implemented. Topics include job control language for

using tapes, disks, catalogued procedures and symbolic parameters, and HASP commands for special processing.

211 Computers and Programming Fall or spring. 3 credits. Prerequisite: Computer Science 100 or equivalent programming experience.
2 lects, 1 lab.

Intermediate programming in PL/I: procedures, block structures, on conditions, recursion. Introduction to data structures and program analysis and simulation. Programming assignments for a variety of applications.

280 Discrete Structures Fall. 4 credits. Prerequisite: Computer Science 211 or permission of instructor.
3 lects.

Mathematical aspects of programming and computing. Induction, logical proof, and discrete structures used in programs. Introducing recursive functions, relations, homomorphisms, partially ordered sets, the predicate calculus, and concepts from automata and computability theory.

305 Social Issues in Computing Fall. 3 credits. Prerequisite: Computer Science 100 or 101 or permission of instructor.
2 lec-sem.

The economic, political, legal, and cultural impact of computers and computer-related technology. The role of computers in coordinating diversity and reducing disorder. Effect of computers on the individual. Data banks and privacy. Machine creativity and machine intelligence.

314 Introduction to Computer Systems and Organization Fall or spring. 4 credits. Prerequisite: Computer Science 211 or equivalent.
2 lects, 1 lab.

Logical structure of digital computers: representation of information, addressing mechanisms, storage and peripheral hardware, the input-output channel.

321 Numerical Methods Fall or spring. 4 credits. Prerequisites: Mathematics 221 or 293, and knowledge of FORTRAN equivalent to what is taught in Computer Science 100.
3 lects.

Students solve representative problems by programming appropriate algorithms and using library programs. Numerical methods for systems of linear equations, interpolation, integration, ordinary differential equations, nonlinear equations, optimization, and linear least squares.

410 Data Structures Fall. 4 credits. Prerequisite or corequisite: Computer Science 314.
2 lects.

Lists, trees, graphs, arrays, and other forms of data structure and their implementation. Relation between language and data structure (e.g., introduction to LISP). Dynamic storage allocation and memory management. Searching and sorting methods.

414 Systems Programming and Operating Systems Spring. 4 credits. Prerequisite: Computer Science 314 or permission of instructor.
3 lects.

The logical design of systems programs with emphasis on multiprogrammed operating systems. Input-output methods, process synchronization, memory management, sharing, file systems. Case studies. Project to implement a small system.

417-418 Interactive Computer Graphics (also Architecture 334) 417, fall; 418, spring. 4 credits each term. Enrollment limited for 1980-81. Prerequisite: Computer Science 314.
2 lects, 1 lab.

Introduction to the software and hardware concepts of interactive computer graphics. Topics include input methods, graphic data structures, geometric modeling, surface description methods, hidden-line/hidden-surface algorithms, image processing, color perception, and realistic image

synthesis. Examples of computer-aided design applications will be presented. Assignments will consist of hands-on experience on storage tube, vector refresh, and color raster displays.

432 Introduction to Simulation and Database Systems (also OR&IE 383) Spring. 4 credits. Prerequisite: Computer Science 211. Students who want to take only the second half of this course should register in Computer Science 434.
2 lects, 1 rec.

First half of course is concerned with discrete-event simulation: problems of modeling, programming, and experimental investigation. Balance of course is introduction to modern database systems: basic models of file organization and access strategies, and problems of file maintenance and information retrieval. Both sections involve substantial programming exercises.

434 Introduction to Database Systems Spring. 2 credits. Prerequisite: Computer Science 211 or equivalent, weeks 7-14 only. Students who want to take only the database portion of Computer Science 432 register in Computer Science 434.
2 lects, 1 rec.
For course description, see above.

481-482 Introduction to Theory of Computing I and II 481, fall; 482, spring. 4 credits each term. Prerequisites: Computer Science 211 or equivalent mathematics, or permission of instructor.
3 lects.

Introduction to modern theory of computing. Covers automata theory, formal languages, effective computability, computational complexity, analysis of algorithms.

490 Independent Reading and Research Fall or spring. 1-4 credits. Independent reading and research for undergraduates.

600 Computer Science and Programming Fall. 1 credit. Prerequisite: graduate standing in computer science or permission of instructor. Introduction to practical, modern ideas in programming methodology. Covers style and organization of programs, basic techniques for presenting proofs of correctness of programs, the use of a "calculus" for the derivation of programs.

611 Advanced Programming Languages Fall. 4 credits. Prerequisite: Computer Science 410 or equivalent.
3 lects.

Formal specification of programming languages, including LISP, ALGOL 60, and PL/I. Principles of structure and design and recent developments in programming languages, including ALGOL 68. Introduction to program schemata and semantics and their application in classifying and comparing programming languages.

612 Translator Writing Spring. 4 credits. Prerequisite: Computer Science 410 and 481 or permission of instructor.
3 lects.

Discussion of the models and techniques used in the design and implementation of compilers. Topics include lexical analysis in translators, compilation of arithmetic expressions and simple statements, specifications of syntax, algorithms for syntactic analysis, code generation and optimization techniques, bootstrapping methods, translator writing systems.

613 Concurrent Programming and Operating Systems Principles Fall. 4 credits. Prerequisites: Computer Science 410 and 414 or permission of instructor.
3 lects.

Advanced techniques and models of concurrent systems. Synchronization of concurrent processes. Parallel programming languages. Deadlock. Verification.

[615 Machine Organization Spring. 4 credits. Prerequisite: Computer Science 314 or permission of instructor. Not offered 1980-81.]
3 lects.

[618 Picture Processing Spring. 4 credits. Prerequisite: Computer Science 611 or permission of instructor. Not offered 1980-81.]
3 lects.

621-622 Numerical Analysis 621, fall; 622, spring. 4 credits each term. Prerequisites: a course in mathematics beyond freshman-sophomore calculus, such as Mathematics 411, 421, or 431; working knowledge of FORTRAN.
3 lects.

The analysis and implementation of algorithms for the numerical solution of basic mathematical problems. Emphasis is placed on the estimation of error, the analysis of stability, and how to design efficient and reliable numerical algorithms. During both terms the student solves representation problems by writing original programs and by making use of high quality, state-of-the-art software. Fall term: direct methods for linear equations, interpolation, least squares and polynomial approximation, nonlinear equations, and optimization. Spring term: Quadrature, ordinary and partial differential equations, methods for sparse systems of linear equations, eigenvalue problems.

623 Short Course on Linear and Nonlinear Least Squares 2 credits. Fall, weeks 1-6 only. Prerequisite: knowledge of Computer Science 321 or permission of instructor.

Topics include: orthogonal matrix methods for the least squares (LS) problem, using LINPACK to solve the LS problem, the Lawson-Hanson codes, variable projection methods for fitting sums of exponentials, and software for general nonlinear least squares problems.

624 Short Course on Spline Approximation 2 credits. Fall, weeks 7-12 only. Prerequisite: knowledge of Computer Science 321 or permission of instructor.

Practical introduction to curve and surface fitting with splines. Topics include: interpolation with cubic splines, parabolic spline interpolation, B-splines, smoothing, and splines under tension. The deBoor spline package is extensively used.

632 Data Base Systems Fall. 4 credits. Prerequisites: Computer Science 410, and either 432 or permission of instructor.
2 lects.

Review of hierarchical network and relational data base models. Principal data base systems and query languages. Hardware for data base processing. Implementation and optimization questions. Data integrity and protection for distributed systems. Relational data base theory.

635 Information Organization and Retrieval Spring. 4 credits. Prerequisite: Computer Science 410 or equivalent.
2 lects.

Introduction to information retrieval. File organization and search algorithms. Statistical analysis and automatic classification of information. Structural language analysis. Dictionary techniques. Interactive retrieval. Questioning and answering and database retrieval. Evaluation of retrieval effectiveness.

681 Theory of Algorithms and Computing I Fall. 4 credits. Prerequisite: Computer Science 482 or permission of instructor.
3 lects.

Computational models, measures of complexity, analysis of algorithms, arithmetic complexity, lower bounds, reducibilities, polynomial complete problems.

682 Theory of Algorithms and Computing II Spring. 4 credits. Prerequisite: Computer Science 481 or permission of instructor.
3 lects.

Advanced treatment of theory of computation, computational complexity theory, and other topics in computing theory.

709 Computer Science Graduate Seminar Fall or spring. 1 credit. For graduate students interested in computer science.

1 sem. Staff, visitors, and students.
A weekly meeting for the discussion and study of important topics in the field.

711 Theory of Programming Languages Spring. 4 credits. Prerequisites: Computer Science 611 and 481. Offered alternate years.

2 lecs.
Advanced topics in formal semantics. Topics may include mathematical semantics, program verification systems, application of formal semantics to language design, variable-free languages, correctness of implementations.

[712 Theoretical Aspects of Compiler Construction Spring. 4 credits. Prerequisites: Computer Science 612 and 481. Offered alternate years. Not offered 1980-81.

2 lecs.
Formal methods of syntactic analysis, including precedence, bounded context, and LR techniques. General parsing methods and their time-spaced complexity. Noncanonical parsing techniques. Formal methods of object code optimization.]

713 Seminar in Operating Systems Fall or spring. 4 credits. Prerequisite: Computer Science 613 or permission of instructor.

1 sem.
Discussion of contemporary issues in operating systems.

719 Seminar in Programming Fall or spring. 4 credits. Prerequisite: Computer Science 611 or permission of instructor.

1 sem.

721 Advanced Numerical Analysis Fall. 4 credits. Prerequisite: Computer Science 621 or 622 or permission of instructor. Alternates with Computer Science 722.

Topics are chosen at instructor's discretion. Sample topics include matrix computations, numerical optimization, numerical solution of ordinary differential equations and integral equations, and numerical approximation.

722 Advanced Numerical Analysis Spring. 4 credits. Alternates with Computer Science 721. See 721 description, above.

[723 Numerical Solution of Ordinary Differential Equations and Integral Equations Fall. 4 credits. Prerequisite: Computer Science 622 or permission of instructor. Not offered 1980-81.]

[725 Numerical Solution of Partial Differential Equations Spring. 4 credits. Prerequisite: Computer Science 622 or permission of instructor. Not offered 1980-81.

Hours to be arranged.
General classification, solution by method of characteristics, finite-difference methods for hyperbolic and elliptic equations, parabolic equations in two dimensions, direct solution of elliptic finite-difference equations, iterative methods for the solution of elliptic equations, block methods for large systems, singularities in elliptic equations, stability in relation to initial value problems, and nonlinear discretization algorithms.]

727 Matrix Computations Fall. 4 credits. Prerequisite: Computer Science 621 or permission of instructor.

Algorithms for special linear systems, least squares, and generalized eigenvalue problems. Iterative and Lanczos techniques for sparse versions of these problems. Applications in statistics and control theory are discussed.

729 Seminar in Numerical Analysis Fall or spring. 4 credits. Prerequisite: permission of instructor.

[733 Selected Topics in Information Processing (also OR&IE 789) Not offered 1980-81.]

734 Seminar in File Processing Fall. Credit and hours to be arranged. Prerequisite: Computer Science 733.

739 Seminar in Information Organization and Retrieval Fall or spring. 4 credits. Prerequisite: Computer Science 635.

[781 Advanced Theory of Computing Fall. 4 credits. Prerequisites: Computer Science 681 and 682, or permission of instructor. Alternates with Computer Science 782. Not offered 1980-81. At instructor's discretion, advanced topics, possibly including automata, computability, computational complexity, program schemata, semantics, and analysis of algorithms.]

782 Advanced Theory of Computing Spring. 4 credits. Alternates with Computer Science 781.

789 Seminar in Automata Theory Fall or spring. 4 credits. Prerequisite: permission of instructor.

1 sem.

790 Special Investigations In Computer Science Fall or spring. Prerequisite: permission of a computer science adviser.
Independent research.

890 Special Investigations In Computer Science Fall or spring. Prerequisite: permission of a computer science adviser.
Master's degree research.

990 Special Investigations In Computer Science Fall or spring. Prerequisite: permission of a computer science adviser.
Doctoral research.

Electrical Engineering

210 Introduction to Electrical Systems Fall or spring. 3 credits. Prerequisites: Mathematics 192 and Physics 112.

3 lec-recs.

Circuit elements and laws; natural response of linear systems; impedance and pole-zero concepts; complex frequency and phasors; forced response and power systems; transfer function and frequency response; low-frequency terminal characteristics of diodes, triodes, and transistors; linear models of electronic devices; bias circuits and frequency response of amplifiers; operational amplifiers, feedback, and oscillators.

230 Introduction to Digital Systems Fall or spring. 3 credits.

2 lecs, 5 lab experiments.

Introduction to basic analysis and design techniques and methodology of digital and computer systems. Boolean algebra; integrated circuit components used in digital system implementation; codes and number systems; logic design of combinational circuits; logic design of sequential circuits.

301 Electrical Signals and Systems I Fall. 4 credits. Prerequisites: Electrical Engineering 210 and Mathematics 294 or equivalents.

3 lecs, 1 rec-computing session.

Formulation of circuit equations, steady-state response. Laplace transform and applications. System functions. State description of linear systems. Natural modes, initial conditions, forced response. Two-port circuit descriptions. Models for active circuits.

302 Electrical Signals and Systems II Spring. 4 credits. Prerequisite: Electrical Engineering 301.

3 lecs, 1 rec-computing session.

Single-sided and bilateral Laplace transforms. Applications of complex functions and contour integration to system response. Stability criteria. Transmission line transients. Fourier series and integrals. Discrete and Fast Fourier transforms. Sampling.

303 Electromagnetic Theory I Fall. 4 credits. Prerequisites: Physics 214 and Mathematics 294.

3 lecs, 1 rec-computing session.

Foundation of electromagnetic theory. Topics include Maxwell's equations; boundary conditions and the Laplace equation; plane waves, wave propagation and reflection at boundaries, the Poynting theorem; guided TEM, TM, and TE waves, impedance transformation, and matching. Introduction to simple antenna systems.

304 Electromagnetic Theory II Spring. 4 credits. Prerequisites: Electrical Engineering 301 and 303.

3 lecs, 1 rec-computing session.

Fundamentals of electromagnetic theory with emphasis on wave propagation and guidance, radiating systems, and the effects of the medium on transmission. Topics include retarded potentials; relation of radiation fields to source distributions, antenna gain concepts and techniques in antenna design; wave guide systems, separation of variables, cavities, and losses; propagation in inhomogeneous and anisotropic media, complex permittivity, plasma and magnetic field effects.

306 Fundamentals of Quantum and Solid-State Electronics Spring. 4 credits. Prerequisites: Physics 241, Mathematics 294, and coregistration in 303.

3 lecs, 1 rec-computing session.

Introductory quantum mechanics and solid-state physics necessary for understanding lasers and modern solid-state electronic devices. Quantum mechanics is presented in terms of wave functions, operators, and solutions of Schrodinger's equation. Topics include the formalism and methods of quantum mechanics, the hydrogen atom, the structure of simple solids, energy bands, Fermi-Dirac statistics, and the basic physics of semiconductors. Applications studied include a simple metal, thermionic emission and the p-n junction.

310 Probability and Random Signals Spring. 4 credits.

3 lecs, 1 rec-computing session.

Introduction to modeling random phenomena and signals and applications of these models. Topics include: concepts of probability, conditional probability, independence, random variables, expectation and random processes. Applications to problems of inference, estimation, and linear system response in communications, computers, control, and pattern classification.

315 Electrical Laboratory I Fall. 4 credits. Prerequisites: Electrical Engineering 210 and coregistration 301.

2 lecs, 2 labs.

Basic electrical and electronic instrumentation and measurements involving circuits and fields of both active and passive elements; an experimental introduction to solid-state theory and devices.

316 Electrical Laboratory II Spring. 4 credits. Prerequisites: Electrical Engineering 303 and 315.

2 lecs, 2 labs.

Laboratory studies of solid-state phenomena and devices; experiments illustrating the use of the digital computer in electrical engineering; laboratory studies of high-frequency phenomena and devices; and introduction to ac and dc machinery.

407 Quantum Mechanics and Applications Fall. 4 credits. Prerequisite: Electrical Engineering 306.

3 lecs, 1 rec-computing session. R. Liboff.
Review of basic classical and quantum mechanical relations. Harmonic oscillator. Annihilation and creation operation. WKB technique. Superposition principle. Addition of angular momentum. Ladder operators. Clebsch-Gordon coefficients. Radiation from an atom. Selection rules. Pauli principle. Spin-orbit coupling. Spin states. Helium atom and hydrogen molecule. Magnetic resonance. Perturbation theory. The Born approximation. Nearly-free-electron model. Planck radiation law.

430 Introduction to Lasers and Optical Electronics Spring. 4 credits. Prerequisite:

Electrical Engineering 306 or equivalent (such as Physics 443).

2 lecs, 1 lec-rec, 1 lab.
An introduction to stimulated emission devices such as masers, lasers, and optical devices based on linear and nonlinear responses to coherent fields. Material discussed, based on quantum mechanical results, employs phenomenological theories and stresses applications to modern devices. Discussions of applications include the operating principles of a variety of important lasers, crystal optics with application to electro-optic and acousto-optic modulators, and an introduction to integrated optics. Labs present an opportunity to work with a variety of the lasers and processes discussed in lectures.

480 Thermal and Statistical Physics for Engineers Spring 3 credits. Prerequisite: Physics 214.

R. Liboff.
Thermodynamic principles. Elementary theory of transport coefficients. Central-limit theorem, Random walk. Electrical noise. Quantum and classical statistics. Black body radiation. Thermal properties of solids. Elementary descriptions of the p-n junction, shock waves, superfluidity, superconductivity, and the laser.

531-532 Electronic Circuit Design 531, fall; 532, spring. Fall, 4 credits; spring, 3 or 4 credits.

Prerequisites: Electrical Engineering 230 and 316.
3 lecs, 1 optional lab. N. H. Bryant.
Design techniques for circuits used in electronic instrumentation. A variety of circuits that employ discrete components, operational amplifiers, I-C timers, and logic circuitry are considered. Emphasis is placed on designing for specified function rather than on detailed analyses. At the level of *Electronics for Scientists* by Malmstadt et al.

591-592 Senior Project 591, fall; 592, spring. 3 credits.

Individual study, analysis, and, usually, experimental tests in connection with a special engineering problem chosen by the student after consultation with the faculty member directing the project. An engineering report on the project is required.

621 Bioinstrumentation Fall. 3 credits (4 credits with lab). Prerequisites: Electrical Engineering 301 and 316.

3 lecs, 1 lab. W. J. Heetderks.
The acquisition and processing of biological signals. Topics include electrodes, ion selective electrodes, temperature transducers, pressure transducers, force transducers, force transducers, displacement transducers, operational amplifiers, instrumentation amplifiers, analog signal processing, D/A and A/D conversion, and digital processing with minicomputers and microprocessors.

622 Neuroelectric Systems (also Biological Sciences 696) Spring. 3 (4 credits with lab).

Prerequisite: either Electrical Engineering 301 or 621, or Biological Sciences 423 or 496; written permission of instructor required for lab. Offered alternate years. Disc and demonstration to be arranged; lab to be arranged. M. Kim, R. Capranica.

Application of microprocessors for neuroelectric data acquisition and systems analysis. Lectures will cover electrical activity of single nerve cells, electrodes and instrumentation techniques, analysis of electrophysiological data, and coding principles in the nervous system, as well as appropriate background material for the use of microprocessors in neurobiology. Laboratory exercises will provide experience in the actual use of microprocessors.

623 Active and Digital Network Design Fall. 3 credits (4 credits with lab). Prerequisite: Electrical Engineering 301.

3 lecs, 1 lab. W. H. Ku.
Design of passive filters and matching networks. Active filter design using operational amplifiers. Design of transistor amplifiers. Digital signal processing. Z-transform and discrete Fourier transform (DFT). Design of nonrecursive and recursive digital filters. Fast Fourier transform (FFT) algorithms.

624 Computer Methods In Electrical Engineering Spring. 4 credits. Prerequisite:

Electrical Engineering 301.
Modern techniques for solving electrical engineering problems on the digital computer. Emphasis on efficiency and numerical stability rather than on theoretical implications. Solution of linear and nonlinear algebraic equations; integration; solution of ordinary differential equations; random number generators. Applications to power systems, control systems, communication systems, and circuit design.

626 Advanced Digital Signal Processing Spring. 3 credits (4 credits with lab). Prerequisites: Electrical Engineering 623 or permission of instructor.

3 lecs, 1 lab.
Topics include FIR and IIR filter design; the DFT, FFT, and CZT; spectral analysis; data compression; adaptive filters, and speech synthesis. Laboratory involves design of filters using minicomputer-based design tools and implementation of real-time digital filters with microprocessor-based filter systems. At the level of Rabiner and Gold, *Theory and Application of Digital Signal Processing*.

627 Fundamentals of Linear Networks Fall. 4 credits. Prerequisite: Electrical Engineering 302.

3 lecs.
Scattering and generalized network formalisms with applications. Nonreciprocal and active network properties. Applications of Tellegen's theorem. Passive and active network invariants applied to gain and stability problems.

628 Network Theory and Applications Spring. 4 credits. Prerequisite: Electrical Engineering 302.

3 lecs.
Circuit properties in complex frequency domain. Realizability theory. Insertion loss design of lumped and microwave filters, equalizers, and linear phase structures. Gain bandwidth theory for broadband matching and wideband amplifiers.

630 Physical Electronics of Solids Fall. 4 credits. Prerequisites: Electrical Engineering 306 and 304 or 407 or permission of instructor.

3 lecs, 1 rec.
Topics include crystal symmetry and effects on device processing and operation; lattice vibrations; energy bands and their effects on device design and operation; hot-electron effects; transport of electrons and holes; optical properties; magnetic properties. These topics are discussed in terms of their influence on the operation of solar cells, photocathodes, microwave semiconductor devices, junction lasers and LEDs, and bubble and charge-control memories.

631-632 Semiconductor Electronics I and II 631, fall; 4 credits. 632, spring; 3 credits. Prerequisites: Electrical Engineering 306 and 316.

631: 3 lecs, 1 lab. 632: 3 lecs.
Properties of semiconductors, theory of P-N junction, practical P-N diodes, metal-semiconductor contacts,

diode switching, characteristics and application of bipolar junction transistors, circuit models for BJT's, MOS and junction field-effect transistors, four-layer devices and applications. At the level of *Electronic Circuits* by Holt.

633 Solid-State Microwave Devices and Subsystems I Fall. 3 credits.

Prerequisite: Electrical Engineering 304.
2 lecs, 1 lab.
Theoretical and experimental studies of circuits, amplifiers, oscillators, detectors, receivers, and electrical noise at microwave frequencies. Typical topics: one- and two-port resonators; negative resistance amplifiers; oscillator load characteristics, locking and stabilization; microwave transistor amplifiers; intermodulation effects; resistor and shot noise; noise temperature, fm noise.

634 Solid-State Microwave Devices and Subsystems II Spring. 3 credits. Prerequisite: Electrical Engineering 633.

2 lecs, 1 lab.
Basic theories of solid-state devices at microwave frequencies. Specific devices studied: varactors, avalanche diodes; transferred electron diodes; pnp oscillator diodes; tunnel diodes; pin diodes; and microwave transistors. Studies of experimental methods of characterizing these devices include use of H.P. network analyzer and other microwave equipment.

636 Integrated Circuit Technology Spring. 3 credits. Prerequisite: 631 or permission of instructor.

2 lecs, 1 lab.
Integrated circuit fabrication techniques applicable in the fields of computer hardware, telecommunication systems, and optoelectronics, with emphasis on device technology. Diffusion, oxidation, ion implantation; limits on device performance and device design, both MOS and bipolar. Compound semiconductors. At the level of current papers in *IEEE Transactions on Electron Devices*.

651-652 Electric Energy Systems I and II 651, fall; 652, spring. 4 credits each term. Prerequisite for 651: Electrical Engineering 316 or permission of instructor.

3 lec-recs, 1 lab-computing session. S. Linke.
Engineering principles underlying operation of modern electric power systems under steady-state and transient conditions emphasizing major power-system parameters. Digital computer used as dynamic "laboratory" model of complex power systems for load-flow, fault, stability, and economic-dispatch studies. At the level of *Elements of Power System Analysis* (Third ed.) by Stevenson.

655 Advanced Power Systems Analysis I Fall. 3 credits. Prerequisite: Electrical Engineering 302 and concurrent registration in 651, or permission of instructor.

R. J. Thomas, S. Linke.
Analysis of power-system components. These components include rotating machines and systems for excitation control, automatic voltage regulation, boiler-turbine control, and speed regulation as well as ancillary three-phase networks. Emphasis on derivation of mathematical models from first principles; development of algorithms for the formation of applicable network matrices.

656 Advanced Power Systems Analysis II Spring. 3 credits. Prerequisites: Electrical Engineering 655 and concurrent registration in 652 or permission of instructor.

J. S. Thorp, C. Pottle.
Computer methods in power systems applied to short-circuit studies, load-flow studies, transient-stability studies, economic dispatch, and security load flows. Use of sparse-matrix techniques. Comparison of algorithms for digital relaying. State-estimation algorithms. Emphasis on the use of the digital computer in the planning and operation of

large-scale power systems. At the level of *Computer Methods in Power System Analysis* by Stagg and El-Abiad.

661 Error Control Codes Fall. 3 or 4 credits (4 with lab). Lab prerequisite: FORTRAN or PL/I. 3 lecs, 1 lab.

Development of codes for correction or detection of errors in digital data transmission, encoding and decoding algorithms and their implementation using feedback shift register circuits or computer programs. The underlying algebraic theory (groups, Galois fields) is developed from the beginning as needed. The codes studied include Hamming codes, cyclic codes, BCH codes, Reed-Solomon codes, convolutional tree codes, and burst-correcting codes. Lab consists of computer implementation of algorithms covered in lecture.

662 Fundamental Information Theory Spring. 3 or 4 credits (4 with lab). Prerequisite: Electrical Engineering 310 or equivalent. Prerequisite for lab only. Electrical Engineering 661 with lab. 3 lecs, 1 lab.

Fundamental results of information theory with application to storage, compression, and transmission of data. Entropy and other information measures. Block and variable-length codes. Channel capacity and rate-distortion functions. Coding theorems and converses for classical and multiterminal configurations. Gaussian sources and channels. Lab projects investigate problems of statistical characterization of sources and channels using computer simulation.

664 Decision Making and Estimation Fall. 4 credits. Prerequisite: Electrical Engineering 310 or equivalent.

Bayes, minimax, and Neyman-Pearson decision theories, including asymptotic error rates. Bayes and maximum likelihood estimation. Cramer-Rao bound, Fisher information, efficient and consistent estimates. Coherent signal-processing applied to estimation and decision-theory problems in radar, sonar and surveillance. Estimation of range, doppler, spectral moments. Ambiguity functions, synthetic aperture imaging.

667 Communication Systems I Fall. 4 credits. Prerequisite: Electrical Engineering 310 or equivalent. 2 lecs, 1 rec.

Analog and digital signal representation, spectral analysis, linear signal processing, modulation and demodulation systems. Time and frequency division multiplex systems. Introduction to random processes and noise in analog and digital systems.

668 Communication Systems II Spring. 4 credits. Prerequisite: Electrical Engineering 667 or equivalent. 3 lecs, 1 rec.

Analysis of multiterminal communication systems. Basic results on Markov chains and queuing theory will be covered. Satellite communication systems and ground networks will be investigated: stability properties, measures of performance, optimization of such systems.

671-672 Feedback Control Systems 671, fall; 672, spring. 3 credits each term (4 with lab). Prerequisite: Electrical Engineering 302 or permission of instructor.

System performance specifications. Analysis of linear feedback control systems by root locus and frequency response methods. Classical cascade and feedback compensation techniques. Sampled-data systems and digital compensation. Laboratory work consists of familiarization with system frequency response measurements, transfer function measurements, and transient response measurements; also, design and compensation of linear positional and speed control systems, analysis and compensation of sampled-data systems. Emphasis is on correlation of theoretical and experimental results.

675 Computer Structures Fall. 4 credits. Prerequisite: Electrical Engineering 230 or Computer Science 314.

3 lecs, 1 lab. N. M. Vrana.
Organization and design of digital computers, arithmetic hardware, I/O systems. Three laboratory groups combine efforts to design and build a digital computer.

676 Microprocessor Systems Spring. 4 credits. Prerequisite: Electrical Engineering 675.

3 lecs, 1 lab. N. M. Vrana.
System design using microprocessors. Hardware and software techniques employed for logic design, interfacing, instrumentation, and control.

677 Computer Processor Organization and Memory Hierarchy Fall. 4 credits. Prerequisites: Electrical Engineering 676 and 310, or permission of instructor.

Design and evaluation of processor and memory architectures is examined in light of actual implementations of both large-scale and small-scale (microprocessors) systems. Topics include: microprogramming and directly executable languages, number representation and instruction set trade-offs, parallel and pipelined architectures, interleaved memories, cache and virtual memories, multilevel memory hierarchies, and protection mechanisms.

678 Computer Input/Output and Distributed Architecture Spring. 4 credits. Prerequisite: Electrical Engineering 677 or permission of instructor.

Methods and approaches to input/output processing, device interface, selector and multiplexor channels, parallel processing, task partitions and resource allocations, distributed processing, interconnection topology, minicomputer and microcomputer networks, interprocessor communications.

679 Current Topics in Computer Engineering Fall. 3 credits. Prerequisite: Electrical Engineering 677 or coregistration in 677.

2 lecs.
In-depth treatment of current and emerging computer engineering research and development activities. Topics vary from year to year and are chosen from research reports and published journal articles. Subjects may include: fault tolerant computing, reliability studies, innovative microcomputer structures, direct execution of high-level languages, and impact of very-large-scale integration technologies on computer organizations.

[680 Elementary Plasma Physics and Gas Discharges] Fall. 3 credits. Prerequisite: Electrical Engineering 304 or equivalent. Not offered 1980-81.

2 lecs, 1 lab.
Coordinated lectures and ten experiments. Discharges, arcs, reflex discharge. Positive column, collisions, diffusion, breakdown, sheaths. Langmuir probes. Electromagnetic waves, plasma oscillations, space-charge waves, cyclotron harmonic radiation. Microwave and laser interferometers. Relativistic electron beams.]

681 Introduction to Plasma Physics (also A&EP 606) Fall. 4 credits. Prerequisites: Electrical Engineering 303 and 304 or equivalent. First-year graduate-level course; open also to exceptional fourth-year students at discretion of instructor.

3 lecs.
Plasma state; motion of charged particles in fields; collisions, coulomb scattering; transport coefficients, ambipolar diffusion, plasma oscillations and waves; hydromagnetic equations; hydromagnetic stability and microscopic instabilities; test particle in a plasma; elementary applications.

682 Advanced Plasma Physics (also A&EP 607) Spring. 4 credits. Prerequisite: Electrical Engineering 681.

3 lecs.

Boltzmann and Vlasov equations; waves in hot plasmas; Landau damping, microinstabilities; drift waves, low-frequency stability, collisional effects; method of dressed test particles, high-frequency conductivity and fluctuations; neoclassical toroidal diffusion, high powered beams.

683 Electrodynamics Fall. 4 credits. Prerequisite: Electrical Engineering 304 or equivalent.

3 lecs.
Maxwell's equations, electromagnetic potentials, integral representations of the electromagnetic field. Special theory of relativity. Radiation of accelerated charges. Cerenkov radiation. Optional topics: electrodynamics of dispersive dielectric and magnetic media; elementary quantum electrodynamics, second quantization, interaction of electromagnetic fields with atoms. At the level of *Classical Electrodynamics* by Jackson.

684 Microwave Theory Spring. 4 credits. Prerequisite: Electrical Engineering 304 or equivalent.

3 lecs. P. McIsaac.
Theory of passive microwave devices. Homogeneous and inhomogeneous waveguides. Nonreciprocal waveguide devices. Scattering matrix analysis of multipoint junctions, resonant cavities, directional couplers, isolators, circulators. Periodic waveguides, coupled mode theory. At the level of *Introduction to the Theory of Microwave Circuits* by Kurokawa.

[685-686 Upper Atmosphere Physics I and II] 685, fall; 686, spring. 3 credits each term. Not offered 1980-81.

3 lecs.
Physical processes in the earth's ionosphere and magnetosphere, the solar corona, and the solar wind. Diagnostic techniques including radar and in situ observations; production, loss, and transport of charged particles in the ionosphere and magnetosphere; airglow, tides, winds, and gravity waves; electric fields generated by the solar wind and winds in the neutral atmosphere and their effects on transport processes; the equatorial and auroral electrojets; instabilities in space plasmas, structure of the solar corona and solar wind and their interaction with the magnetosphere; acceleration and drift of energetic particles in the magnetosphere; precipitation of particles and the aurora; magnetic and ionospheric storms.]

687 Electromagnetic Wave Propagation I Fall. 3 credits.

3 lecs.
Some aspects of antenna theory; diffraction; refraction and ducting in the troposphere; propagation of radiowaves and cold plasma waves in the ionosphere and magnetosphere; Alfvén, whistler mode, and hybrid waves; the CMA diagram; WKB solutions of the coupled wave equations.

688 Electromagnetic Wave Propagation II Spring. 3 credits.

3 lecs.
Full-wave solutions of the wave equations; interactions between particles and waves; scattering of radio waves from random fluctuations in refractive index; scatter propagation; incoherent scatter from the ionosphere and its use as a diagnostic tool; radio star and satellite scintillations and their use as diagnostic tools; radar astronomy.

690 Fundamentals of Acoustics (also T&AM 666) Spring. 3 credits.

3 lecs, biweekly lab.
See T&AM 666 for course description.

691-699 Special Topics in Electrical Engineering 1-3 credits.

Seminar, reading course, or other special arrangement agreed upon between the students and faculty members concerned.

721 Theory of Linear Systems Fall. 4 credits.
Prerequisite: Electrical Engineering 302 or permission of instructor.
The state-space model for linear systems. Fundamental and transition matrices. Matrix exponential functions, the Cayley-Hamilton theorem, and the Jordan form. Forced network and system response. Controllability, observability, stability, realizability. Applications of Fourier, Laplace, Hilbert transforms. Paley-Wiener theorem. At the level of *System Theory* by Padulo and Arbib.

[722 Theory of Nonlinear Systems Spring. 4 credits. Prerequisite: Electrical Engineering 721. Not offered 1980-81.
3 lecs.
Analysis of nonlinear systems with applications. Phase-plane analysis; singular points, limit cycles, and equilibrium states. Stability of nonlinear systems; the methods of Lyapunov and Popov; circle criteria. Forced nonlinear systems; periodic systems. Floquet theory, Mathieu-Hill theory; applications to the stability of nonlinear and parametrically excited systems.]

731 Quantum Electronics I Fall. 4 credits.
Prerequisites: Electrical Engineering 306 and 407 or Physics 443.
3 lecs, 1 rec-computing session.
A detailed treatment of the physical principles underlying lasers and masers, related fields, and applications. Topics include: a review of quantum mechanics and the quantum theory of angular momentum, the interaction of radiation and matter, including emission, absorption, and scattering; the quantum mechanical density matrix and macroscopic material properties; theory of the laser, including methods of achieving total and partial population inversion; Lamb theory.

732 Quantum Electronics II Spring. 4 credits.
Prerequisite: Electrical Engineering 731 or permission of instructor.
3 lecs, 1 rec-computing session.
A continuation of 731. Topics include: optical resonators, output power of amplifiers and oscillators; dispersive effects and laser oscillation spectrum. Spectroscopy of atoms, molecules, and ions in crystals as examples of laser media; survey of chemical and dye lasers; noise in optical devices; principles of electro-optic and parametric devices.

733 Opto-Electronic Devices Fall. 4 credits.
Prerequisites: Electrical Engineering 304 and 630 or equivalent.
3 lecs, 1 rec.
An understanding of physical properties of solids that affect use in optical devices is sought. Wave propagation in lossy, anisotropic, layered, and electro-optic media; microscopic and band-theoretic models for dielectric constant and loss; carrier transport, scattering and trapping; photoconductivity; electro-optics, photoemissive and photoconductive devices; noise in optical detectors.

734 Theory and Applications of Nonlinear Optics 4 credits. Prerequisite: Electrical Engineering 731 or 733 or equivalent of Physics 572.
3 lecs, 1 rec.
Basic concepts and recent developments in nonlinear and electro-optics. Topics will include higher-order perturbation theory of the Schrodinger and density-matrix equations and their applications in nonlinear optics; classical anharmonic oscillators; nonlinear optical properties of organic and inorganic crystals and semiconductors; harmonic generation and multiphoton processes; nonlinear and electro-optical devices and their applications in, for example, spectroscopy and optical communications. At the level of Rabin and Tang and current literature.

735 Solid-State Devices I Fall. 4 credits.
Prerequisite: Electrical Engineering 630 or equivalent.
3 lecs.
Band structure, generation recombination statistics, ambipolar transport, deep level spectroscopy, p-n

junction analysis, contact technology, secondary ionization, and noise. A review of ion implantation technology with emphasis on associated material and device problems. Topics are presented on the level of current device research literature. Presentation concentrates on relating basic material properties to device parameters. Term paper.

736 Solid-State Devices II Spring. 4 credits.
Prerequisite: Electrical Engineering 735 or equivalent.
3 lecs.
A general treatment of the time dependence of secondary ionization and the simpler "quasistatic" approximation. Applications to microwave generation and amplification and broadband optical detection, including stability, nonlinearity, and noise. The fundamentals of transferred electron devices, including band structure, distribution functions, stability and doping configurations of devices. Term paper.

[737 Physics, and Technology of Very-Large-Scale Integration (VLSI)] Fall. 3 credits.
Prerequisites: Electrical Engineering 631-632. Not offered 1980-81.
No lab.
Basic materials and technology problems to be considered in the design and fabrication of VLSI circuits. The material problems include: reduction of threshold voltage in submicron-channel MOSFET's; hot-electron tunneling through MOSFET oxides; mobility reductions in thin epitaxial layers; role of velocity overshoot effects in short-channel devices; comparison of elemental and compound semiconductors. Technology problems include: fabrication methods for submicron dimensions; light-sensitive, electron-beam, and x-ray resists; testing of VLSI circuits; throughput; yield.]

738 Physics of Solid-State Devices Spring. 2-3 credits. Prerequisite: Electrical Engineering 736 or equivalent.
2 lecs.
Basic theory of electron and hole scattering in semiconductors. Examination of methods for obtaining high electric field solutions for the distribution function from the Boltzmann equation. Hot electron phenomena reviewed with emphasis on band-structure induced instabilities.

739 VLSI Digital System Design Fall. 3 credits.
Prerequisites: Electrical Engineering 636 and 676.
N. R. Powell.
Theory of operation of MOS devices and circuits, and their fabrication; the foundations of LSI system design and implementation; examples of LSI system design; and topics of current research relating to system timing, arrays of extensible LSI devices, algorithms consistent with VLSI processor arrays, and organization of hierarchical and concurrent computing devices. A laboratory project is required.

[761-762 Random Processes in Electrical Systems 761, fall; 762, spring. 4 credits each term.
Prerequisites: Electrical Engineering 302 and 310. Not offered 1980-81.
3 lecs.
The concepts of randomness and uncertainty and their relevance to the design and analysis of electrical systems. An axiomatic characterization of random events. Probability measures, random variables, and random vectors. Distribution functions and densities. Functions of random vectors. Expectation and measures of fluctuation. Moments and probability inequalities. Properties and applications of characteristic functions. Modes of convergence of sequences of random variables: laws of large numbers and central limit theorems. Kolmogorov consistency conditions for random processes. Poisson process and generalizations. Gaussian processes. Covariance stationary process, correlation function, spectra; Bochner and Wiener-Khinchin theorems. Continuity, integration, and differentiation of sample functions. Optimum filtering and prediction. Spectral representation,

orthogonal series representations. Markov chains and processes. Linear and nonlinear transformations of random processes.]

[763 Advanced Topics in Information Theory Fall. 4 credits. Prerequisites: Electrical Engineering 662 and either 761 or Mathematics 571 or permission of instructor. Not offered 1980-81.
3 lecs.
An in-depth treatment of an information theory research area. The topic varies from year to year and is chosen from the following subjects: source encoding (rate-distortion theory), convolutional codes and sequential decoding, multiterminal communication networks, ergodic theory and information, and complexity and instrumentability of coding schemes.]

764 Foundations of Inference and Decision Making Spring. 3 credits. Prerequisite: a course in probability and some statistics, or permission of instructor.
3 lecs.
An examination of methods for characterizing uncertainty and chance phenomena and for transforming information into decisions and optimal systems. Discussion of the foundations of inference includes: comparative probability; quantitative probability; relative frequency interpretations; computational complexity; randomness; classical probability and invariance; induction; subjective probability.

771 Estimation and Control in Discrete Linear Systems Fall. 4 credits. Prerequisites: Electrical Engineering 302 and 310 or permission of instructor.
3 lecs.
Optimal control, filtering, and prediction for discrete time linear systems with extensive use of the APL/360 system. Approximation on discrete point sets. The principle of optimality. Kalman filtering. Stochastic optimal control.

772 Optimal Control and Estimation for Continuous Systems Spring. 4 credits.
Prerequisite: Electrical Engineering 771 or permission of instructor.
3 lecs.
Control system design through parameter optimization, with and without constraints. The minimum principle; linear regulators, minimum time and minimal fuel problems. Computational techniques; properties of Lyapunov and Riccati equations.

[773 Random Processes in Control Systems Spring. 4 credits. Prerequisites: Electrical Engineering 762 and 772. Not offered 1980-81.
3 lecs.
Prediction and filtering in control systems: Gaussian-Markov process, prediction problem, stochastic optimal and adaptive control problems. Control of systems with uncertain statistical parameters; stochastic differential equations, optimal nonlinear filtering; stability of control systems with random parameters.]

781 Kinetic Theory (also A&EP 761) Fall. 3 credits. Prerequisite: Electrical Engineering 407 or Physics 561, or permission of instructor. Offered alternate years.
2 lecs. R. L. Liboff.
Theory of the Liouville equation, Prigogine and Bogoliubov analysis of the BBKGY sequence. Master equation, density matrix, Wigner distribution. Derivation of fluid dynamics. Transport coefficients. Boltzmann, Krook, Fokker-Planck, Landau, and Balescu-Lenard equations. Properties and theory of the linear Boltzmann collision operator. The relativistic Maxwellian. Klimontovich formulation. At the level of *Introduction to the Theory of Kinetic Equations* by Liboff.

791–792 Electrical Engineering Colloquium 791, fall; 792, spring. 1 credit each term. For students enrolled in the graduate Field of Electrical Engineering.

Lectures by staff, graduate students, and visiting authorities. A weekly meeting for the presentation and discussion of important current topics in the field.

793–794 Electrical Engineering Design 793, fall; 794, spring. 3 credits each term. For students enrolled in the M.Eng.(Electrical) degree program. Utilizes real engineering situations to present fundamentals of engineering design.

795–799 Special Topics in Electrical Engineering 1–3 credits.

Seminar, reading course, or other special arrangement agreed upon between the students and faculty members concerned.

Geological Sciences

Freshman and Sophomore Courses

101 Introductory Geological Sciences Fall or spring. 3 credits.

2 lecs, 1 lab; evening exams, field trips.

C. S. Hutchison, fall; J. M. Bird, spring.

Understanding the natural earth; weathering, erosion, the evolution of coast lines and river valleys, glaciation, the origins of earthquakes and mountains, the genesis of volcanoes, and the drifting of continents. Studies of ground water, mineral deposits, petroleum, and coal. Recognizing major minerals and rocks, interpretation of topographic and geologic maps.

102 Introduction to Historical Geology Spring. 3 credits. Prerequisite: Geological Sciences 101 or permission of instructor.

2 lecs, 1 lab; evening exams. J. L. Cisne.

A continuation of 101. History of the earth and life in terms of evolutionary processes. The geologic record, its formation, and interpretation of earth history. Introduction to the evolution of life and to fossils and their use in reconstructing past environments and dating rocks.

103 Earth Science Fall. 3 credits (see Geol 105, Earth Science Laboratory).

3 lecs. T. Jordan.

Physical geography, including earth and lunar orbits that determine seasons and tides. Figure and structure of the earth; climatic regions; atmospheric and oceanic circulation; erosion by rivers, glaciers, wind, and waves; climatic change.

105 Earth Science Laboratory Fall. 1 credit. To be taken concurrently with Geol 103, Earth Science.

T. Jordan.

Astronomical determination of position and seasonal events. Topographic mapping and map interpretation. Minerals and rocks, world climatic regions.

107 Frontiers of Geology I Fall. 1 credit. May be taken concurrently with or after Geological Sciences 101.

1 lec. J. L. Cisne and staff.

Lectures by members of the department on selected fundamental topics of current interest, such as continental drift and related tectonic processes, volcanoes, earthquake prediction, natural energy sources, and mineral resources.

108 Frontiers of Geology II Spring. 1 credit. May be taken concurrently with or after Geological Sciences 101 or 102.

1 lec. J. L. Cisne and staff.

Lectures by members of the department on selected fundamental topics of current interest such as plate tectonics, the evolution of mountain belts and island

arcs, the deep structure of continents, ecology and evolution of fossil organisms, correlation of strata by fossils, sea-level changes, and fossil fuels.

[131 Geology and the Environment Fall. 3 credits. Field trips. Not offered 1980–81.

2 lecs, 1 lab.

The principles of geological science, with emphasis on the physical phenomena and rock properties as they influence the natural environments of man.]

262 Mineral and Energy Resources and the Environment Spring. 3 credits.

2 lecs, 3 exercises; reading assignments, term projects. A. K. Gibbs.

Occurrence, location, and scientific principles underlying the availability of mineral and energy resources of today and tomorrow. Limitations on utilization imposed by economic and environmental factors, hazards, patterns of usage, and industrial development. Relation to national and international policy and conservation.

Junior, Senior, and Graduate Courses

Of the following, the core courses Geological Sciences 325, 345, 355–356, 376, and 388 may be taken by those who have successfully completed Geological Sciences 101–102 or the equivalent, or who can demonstrate to the instructor that they have adequate preparation in mathematics, physics, chemistry, biology, or engineering.

325 Structural Geology and Sedimentation

Spring. 4 credits. Prerequisite: Geological Sciences 101 or permission of instructor.

3 lecs, 1 lab. C. S. Hutchison.

Nature, origin, and recognition of geologic structures. Behavior of geologic materials. Geomechanical and tectonic principles applied to the solution of geologic problems. Introduction to the sedimentary processes and petrology of sedimentary rocks. Description, classification, provenance, transportation, depositional environment of sediments, and diagenesis of sediments.

345 Geomorphology Spring. 4 credits.

Prerequisite: Geological Sciences 102 or permission of instructor. Normal fall course offered spring 1981.

2 lecs, 1 lab. A. L. Bloom.

Description and interpretation of land forms in terms of structure, process, and stage.

355 Mineralogy, Petrology and Geochemistry I

Fall. 4 credits. Prerequisite: Geological Sciences 101 or permission of the instructor.

2 lecs, 2 labs; assigned problems and readings.

W. A. Bassett.

Examination of minerals by hand specimen properties and optical microscopy. Geological setting, classification, crystal structures, phase relations, chemical properties, and physical properties of minerals are studied. X-ray diffraction is introduced.

356 Mineralogy, Petrology, and Geochemistry II

Spring. 4 credits.

2 lecs, 1 lab; assigned problems and readings; field trips. R. W. Kay.

Principles of phase equilibrium as applied to igneous and metamorphic systems. Description, classification, chemistry, origin, regional distribution, and dating of igneous and metamorphic rocks. Geochemical distribution of trace elements and isotopes in igneous and metamorphic systems. The petrological evolution of the planets.

376 Historical Geology and Stratigraphy Fall.

4 credits. Recommended prerequisite: Geological Sciences 102.

2 lecs, 2 labs. J. L. Cisne, S. Bachman.

Formation of sedimentary rocks. Depositional processes. Depositional environments and their recognition in the stratigraphic record. Correlation of strata in relation to time and environment. Seismic

stratigraphy. Geological age determination.

Reconstruction of paleogeography and interpretation of earth history from stratigraphic evidence.

388 Geophysics and Geotectonics Spring.

4 credits. Prerequisites: Mathematics 112 and Physics 208 or equivalent.

3 lecs, 1 lab. B. L. Isacks.

Global tectonics and the deep structure of the solid earth as revealed by investigations of earthquakes, earthquake waves, the earth's gravitational and magnetic fields, and heat flow.

410 Experiments and Techniques in Earth Sciences

Spring. 2 credits. Prerequisites: Physics 207–208 and Mathematics 191–192 or equivalents, or permission of instructor.

S. Kaufman.

Lab and field experiments chosen in accordance with students' interests. Familiarization with instruments and techniques used in earth sciences. Independent work is stressed.

423 Petroleum Geology Fall. 3 credits.

Recommended prerequisite: Geological Sciences 325.

2 lecs, 1 lab; field trip. S. B. Bachman.

Introduction to hydrocarbon exploration and development. Source rock and fluid migration studies, oil and gas entrapment, reservoir rocks. Exploration techniques including basin analysis, subsurface mapping, seismic reflection methods and processing, seismic mapping, seismic stratigraphy. Drilling techniques, well logs and their use in stratigraphic and structural interpretations, leasing and economics, career development.

[424 Tectonics of Orogenic Zones; Modern and Ancient

Spring. 3 credits. Prerequisite: permission of instructors. Offered alternate years. Not offered 1980–81.

1 lec. W. B. Travers, D. E. Karig.

A comparative study of island arcs and mountain ranges.]

[428 Geomechanics Spring. 3 credits.

Prerequisites: Mathematics 240 or 296; Geological Sciences 101. Not offered 1980–81.

3 lecs. D. L. Turcotte.

Use of mathematical analysis to explain such geological observations as ocean ridges — their thermal structure, elevation, heat flow, and gravity; ocean trenches — the structure and mechanics of the bending lithosphere; folding — buckling, viscous, and plastic flow; faulting — a detailed mechanical and geological study of the San Andreas fault; intrusives — geothermal power.]

431 The Earth's Crust: Structure, Composition, and Evolution Fall. 3 credits. Prerequisites:

Geological Sciences 356 and 388.

3 lecs. L. D. Brown.

Structure and composition of the crust from geophysical observations, analysis of xenoliths, and extrapolation of petrological laboratory data. Radioisotopic considerations. The nature of the crust-mantle boundary. Thermal and rheological structure of the crust. Oceanic vs. continental crust. Origin and evolution of oceanic and continental crust.

432 Digital Processing and Analysis of Geophysical Data

Spring. 3 credits. Prerequisites: Geological Sciences 488 and familiarity with a programming language.

3 lecs. L. D. Brown, S. Kaufman.

Sampling theory. Fourier, Laplace, and Z-transform techniques. Spectral and cepstral analysis. Temporal and spatial filtering. Geophysical modeling. Deconvolution, migration, and velocity analysis of reflection data. Downward and upward continuation of potential field data.

[433 Interpretation of Seismic Reflection Data] Spring. 3 credits. Prerequisite: Geological Sciences 488 or equivalent. Not offered 1980–81.
2 lecs, 1 lab. L. D. Brown, S. Kaufman.
Techniques for inferring geologic structure and lithology from multichannel seismic reflection data. Data processing sequences, migration, velocity analysis, correlation criteria, resolution considerations, wave form analysis, and synthetic seismograms. Synergistic approaches to interpretation. Seismic stratigraphy.]

454 Modern Petrology Fall. 3 credits. Prerequisite: Geological Sciences 356. Offered alternate years.
2½ lecs, ½ lab. R. W. Kay.
Magmas and metamorphism in the context of plate tectonics. Major and trace element chemistry and phase petrology as monitors of the creation and modification of igneous rocks. Temperature and stress in the crust and mantle and their influence on reaction rates and textures of metamorphic rocks. Application of experimental studies to natural systems. Reading from the literature and petrographic examination of pertinent examples.

455 Isotope Geology Fall. 3 credits. Prerequisite: Geological Sciences 355–356 or equivalent.
3 lecs. R. W. Kay.
Nucleosynthetic processes and the isotopic abundance of the elements. Dating by Pb, Ar, Sr, and Nd isotope variations. Theories of crustal and mantle evolution. Pleistocene chronology using U-series and ¹⁴C dating. Time constants for geochemical cycles. The use of O and H isotopes as tracers in the earth's hydrosphere, and hydrothermal circulation systems.

456 Chemical Geology Spring. 3 credits. Prerequisite: Geological Sciences 355–356 or equivalent.
3 lecs. W. A. Bassett, R. W. Kay.
Crystallography and crystal chemistry of minerals and the methods for their study. Thermodynamic evaluation of homogeneous and heterogeneous equilibrium and disequilibrium processes of geologic interest. Topics include crystal symmetry, mineral structures, x-ray diffraction, mineral equilibrium, and diffusion in minerals.

461 Mineral Deposits I Fall. 4 credits. Prerequisite: Geological Sciences 365 or permission of instructor.
3 lecs, 1 lab, field trip. A. K. Gibbs.
Introduction to mineral resources; sedimentary and magmatic deposits; topics in geochemistry; ore microscopy; and exploration methods.

462 Mineral Deposits II Spring. 4 credits. Prerequisite: Geological Sciences 461 or permission of instructor.
3 lecs, 1 lab, field trip. A. K. Gibbs.
Hydrothermal ore deposits; sulphide systems; related geochemical topics; mineral exploration.

471 Invertebrate Paleontology and Biostratigraphy Fall. 4 credits. Prerequisite: Geological Sciences 102 and 376 or permission of instructor. Recommended prerequisite: some knowledge of biology.
2 lecs, 1 lab. J. L. Cisne.
Fossil invertebrates. Anatomy, classification, and identification of stratigraphically important groups. Applications of paleontology to geochronology and reconstruction of past environments.

473 Stratigraphy Spring. 3 credits. Prerequisite: Geological Sciences 376 or permission of instructor.
2 lecs, 1 lab, field trip. S. B. Bachman.
Interaction of sedimentation and tectonics in development of stratigraphic sequences. Framework of deep ocean, active margin, passive margin, and cratonic sedimentation and stratigraphy. Seismic stratigraphy and the effects of sea-level changes on the stratigraphic record; sedimentary petrology and tectonism. Examples of modern and ancient margin and cratonic development.

[483 Marine Tectonics] Fall. 3 credits. Prerequisites: Geological Sciences 325 and a course in physics or geophysics. Not offered 1980–81.
2 lecs, possible field trips. D. E. Karig.
Study of geophysical and geological characteristics of the earth's crust beneath the oceans. Review of strengths and limitations of marine exploratory techniques. Emphasis on recent geologic data concerning plate margins in the ocean, especially the island arc systems.]

[485 Physics of the Earth I] Fall. 3 credits. Limited to upperclass engineers, majors in the physical sciences, and others by permission of instructor. Not offered 1980–81.
2 lecs, 1 lab. D. L. Turcotte.
Rotation and figure of the earth, gravitational field, seismology, geomagnetism, creep and anelasticity, radioactivity, earth's internal heat, continental drift, and mantle convection.]

488 Introduction to Geophysical Prospecting Fall. 3 credits. Prerequisites: Physics 112–213 and Mathematics 191–192, or equivalents, or permission of instructor.
2 lecs. S. Kaufman.
Physical principles, instrumentation, operational procedures, and interpretation techniques in geophysical exploration for oil, gas, and minerals. Seismic reflection, seismic refraction, gravity, and magnetic and electrical methods of exploration.

490 Senior Thesis Fall or spring. 2 credits. Staff.
Thesis proposal to be discussed with adviser during the junior year. Participation requires acceptance of a thesis proposal by the faculty committee.

610–623 Seminars and Special Work Fall and spring. 2 or 3 credits each term. Prerequisite: permission of instructor.
Advanced work on original investigations in geological sciences. Topics change from term to term.

610 Tectonic and Stratigraphic Evolution of Sedimentary Basins W. B. Travers.

611 Petrology and Geochemistry R. W. Kay.

612 Coastal Geomorphology or Quaternary Geology A. L. Bloom.

613 Marine Geology D. E. Karig.

614 Sedimentary Petrology and Tectonics S. B. Bachman.

615 Topics in Mineral Resource Studies and Precambrian Geology A. K. Gibbs.

616 Plate Tectonics and Geology J. M. Bird.

617 Paleobiology J. L. Cisne.

618 Geophysics, Exploration Seismology L. D. Brown.

619 Earthquakes and Tectonics B. L. Isacks.

620 Exploration Seismology, Gravity, Magnetism S. Kaufman.

621 Geophysics, Seismology and Geotectonics J. Oliver.

622 Geomechanics, Gravity, Magnetism, Heat Flow D. L. Turcotte.

623 Mineralogy and Crystallography, X-ray Diffraction, Microscopy, High-Pressure-Temperature Experiments W. A. Bassett.

[642 Glacial and Quaternary Geology] Spring. 3 credits. Prerequisite: Geological Sciences 345 or permission of instructor. Not offered 1980–81.
2 lecs, 1 lab; several Saturday field trips.
A. L. Bloom.
Glacial processes and deposits and the stratigraphy of the Quaternary.]

681 Geotectonics Fall. 4 credits. Prerequisite: permission of instructor.
2 lecs. J. M. Bird.
Theories of orogeny; ocean and continent evolution. Kinematics of lithosphere plates. Rock-time assemblages of modern oceans and continental margins, and analogs in ancient orogenic belts. Time-space reconstructions of specific regions. Problems of dynamic mechanisms — corollaries and evidence from crustal features.

685 Advanced Geophysics I Fall. 3 credits. Prerequisite: Geological Sciences 388 or 485.
3 lecs. D. L. Turcotte.
Mantle convection, heat flow, the driving mechanism for plate tectonics, the energy balance, definition of the lithosphere.

686 Advanced Geophysics II Spring. 3 credits. Prerequisite: Geological Sciences 388 or 485.
3 lecs. D. L. Turcotte.
Gravity, figure of the earth, earth tides, magnetism, mechanical behavior of the lithosphere, changes in sea level.

[687 Seismology I] Fall. 3 credits. Prerequisite: T&AM 611 or equivalent. Offered alternate years. Not offered 1980–81.
3 lec-recs. B. L. Isacks.
Generation and propagation of elastic waves in the earth. Derivation of the structure of the earth and the mechanism of earthquakes from seismological observations.]

688 Seismology II Spring. 3 credits. Prerequisite: Geological Sciences 687.
B. L. Isacks.
A continuation of Geological Sciences 687.

Field Courses

[601 Intersession Field Trip] January intersession. 1 credit. Prerequisites: Geological Sciences 101–102 or equivalent and permission of instructor. Travel and subsistence expenses to be announced. Not offered 1980–81.
A trip of one week to ten days in an area of interesting geology in the lower latitudes. Interested students should contact the instructor during the early part of the fall semester.]

604 Western Adirondack Field Course Spring. 1 credit.
One week at the end of the spring semester.
W. A. Bassett.
Field mapping methods, mineral and rock identification, examination of Precambrian metamorphic rocks and lower Paleozoic sediments, talc and zinc mines. Students should be prepared for overnight camping and will have to pay for their own meals.

704 Western Field Course Spring. 6 credits. Prerequisites: four courses in Geological Sciences at the 300 level, and permission of instructor. Students should be prepared for overnight camping and will have to pay for their own meals.

Weekly rec and 35-day trip to California, Nevada, and Utah. Staff.
A comparative study of California Coast Range, Sierra Nevada, Basin and Range of Nevada, and Uinta Mountains, Utah. Pretrip seminars and extensive reading at Cornell. Study of Mesozoic ophiolites, and subduction near San Luis Obispo, California; recent earth movements along the San Andreas fault near San Francisco; granitic pluton

emplacement and volcanism in the northern Sierra Nevada; multiphase mountain building near Dixie Valley, Nevada; sedimentology and block faulting of the Uinta Mountains, Utah. Five-day raft trip on the Green River through the core of the Uinta mountains. Visit to an oil field in California and a mine in Nevada. Lectures and field trips with local experts.

Materials Science and Engineering

Undergraduate Courses

201 Elements of Materials Science Fall or spring, 3 credits.

Relations between atomic structure and macroscopic properties of such diverse materials as metals, ceramics, and polymers. Properties discussed include magnetism, superconductivity, insulation, semiconductivity, mechanical strength, and plasticity. Applications to microelectronics, desalination by reverse osmosis, superconducting power transmission lines, synthetic bones and joints, etc. Extensive use of slides, audiotutorial systems, movies.

261 Introduction to Mechanical Properties of Materials Fall or spring, 3 credits.

2 lecs, 1 rec or lab.
See description under Division of Basic Studies.

262 Introduction to Electrical Properties of Materials Spring, 3 credits.

2 lecs, 1 rec or lab.
See description under Division of Basic Studies.

331 Structure and Properties of Materials Fall, 4 credits.

3 lecs, 1 lab.
The most widely used techniques to investigate materials such as metals, glasses, ceramics, and polymers; associated laboratory work teaches the use of the optical microscope and x-ray diffraction, and exposes the student to electron microscopy and the use and application of the scanning electron microscope. Discussion of how knowledge of microscopic structure obtained with these techniques can be used to predict and understand important engineering properties.

332 Electrical and Magnetic Properties of Materials Spring, 3 credits.

3 lecs.
An introduction to electrical and magnetic properties of materials with emphasis on structural aspects. Classification of solids, charge and heat transport in metals and alloys, semiconductors and insulators, principles of operation and fabrication of semiconductor devices, behavior of dielectric and magnetic materials, magnetic devices, phenomenological description of superconducting materials.

333 Research Involvement I Fall, 3 credits.

Prerequisite: approval of department.
Semi-independent research project in affiliation with faculty member and research group of the department.

334 Research Involvement II Spring, 3 credits.

Prerequisite: approval of department.
May be a continuation of MS&E 333 or a one-term affiliation with a research group.

335 Thermodynamics of Condensed Systems

Fall, 3 credits.
3 lecs.
The various phases of materials and the changes that occur when temperatures and pressures change are considered by developing the laws of thermodynamics and applying them to different systems. The use of phase diagrams to predict the phase(s) of an alloy system at any given temperature

and pressure in order to understand heat treatment such as the hardening of aluminum alloys and the quenching of steels. Phase transformations under conditions of quenching and their influence on hardness. Guidelines for heat treatment of steels.

336 Kinetics, Diffusion, and Phase Transformations Spring, 3 credits.

3 lecs.
Introduction to absolute rate theory, atomic motion, and diffusion. Applications to nucleation and growth of new phases in vapors, liquids, and solids; solidification, crystal growth, oxidation and corrosion, radiation damage, recrystallization, gas-metal reactions.

345 Materials and Manufacturing Processes (also M&AE 311) Fall or spring, 3 credits.

May be taken in addition to MS&E 261. Prerequisite: T&AM 202 or permission of instructor.
2 lecs, 1 lab.
See M&AE 311 for course description.

441 Microprocessing of Materials. Fall, 3 credits.

3 lecs, occasional lab.
The materials technology of electronic and magnetic devices; single crystals as well as thin films. Growth and purification (zone refining) of semiconducting crystals; doping procedures, including ion implantation; composition control; oxide growth; photoetching. Preparation of thin films by vapor deposition; sputtering; plating; evaluation of film geometry and composition. Material aspects of recent devices (superlattice growth, magnetic amorphous bubbles, etc.)

442 Macroprocessing of Materials Spring, 3 credits.

3 lecs, occasional lab.
Control of chemical composition through smelting, reaction, and refining processes; applications to iron and steel, aluminum, refractories, etc. Shape control; casting and solidification, welding; mechanical shaping through rolling, drawing, etc. Deformation and annealing, textures; relation to material properties. Thermomechanical treatments for control of material properties.

443-444 Senior Materials Laboratory 443, fall; 444, spring, 3 credits.

Experiments are available in structural studies, properties of materials, deformation and plasticity, mechanical and chemical processing, phase transformation, surface physics, etc.

445 Mechanical Properties of Materials Fall, 3 credits.

3 lecs.
The mechanical properties of materials and how they can be understood and analyzed in terms of microscopic irregularities (lattice defects) in perfect regular crystals. The general relation between stress and strain; the concept of equivalent stresses and strains. How the concept of local defects can explain many aspects of plastic flow, creep, fatigue, and rupture in classical and new engineering materials. Application of these concepts to the development of improved materials.

446 Current Topics in Materials Spring, 3 credits.

3 lecs.
Coordinated lectures on topics of current interest, such as biomaterials, fuel cells, composite materials, materials problems in power generation and distribution systems, stress corrosion cracking.

447 Introduction to Ceramics Fall, 3 credits.

Prerequisite: MS&E 261 or permission of instructor.
3 lecs.
Designed to develop an understanding of ceramic materials and processes for engineering applications. The crystallographic nature of some ceramics, and structural imperfections that can occur. Ionic motions in crystalline ceramics and their relation to properties and forming methods (such as sintering). Mechanical

properties, such as cracking, in terms of microscopic mechanisms. The properties of some new ceramic materials, such as silicon nitride and barium titanate, in special applications.

448 Properties of Solid Polymers Spring, 3 credits.

3 lecs.
Inorganic, organic, and biological polymers. Physical properties of long-chain molecules. Molecular weight distribution and measurement. Gelation and the properties of networks. Rubber elasticity. Amorphous and crystalline polymers for engineering use; their structure and mechanical and thermal properties. Elements of composite material properties.

450 Physical Metallurgy Spring, 3 credits.

Control of microstructure and the relationships between microstructure and engineering properties of commercial alloys. Includes studies of iron and steel, aluminum, titanium, magnesium and copper-bond alloys, selected superalloys and cemented carbides. Emphasis is placed on phenomena and properties which make alloys useful as engineering materials. Topics include strengthening mechanisms, hardenability, environmental factors, and failure analysis.

452 Processing of Glass, Ceramic, and Glass-Ceramic Materials Fall, 3 credits.

Conventional and unconventional techniques for processing glass, ceramic, and glass-ceramic materials. Emphasis is given to the science of processing and to case studies. Applications include vapor processes for high-purity optical fibers, hot-pressing ceramic turbine blades, and nucleation of crystalline phases in glass to prepare photosensitive materials. This course is team taught with two scientists from the research and development laboratory of Corning Glass Works.

455 Analysis of Manufacturing Processes (also M&AE 512) Spring, 3 credits. Prerequisite: MS&E 337.

3 lecs.
See M&AE 512 for course description.

Graduate-Level Professional Courses

553-554 Special Project 553, fall; 554, spring, 6 credits each term.

Research on a specific problem in the materials area.

Graduate Core Courses

601 Topics in Thermodynamics and Kinetics Fall, 3 credits.

The following topics are treated for condensed systems; free energy and phase equilibria; thermodynamics of solutions; interfaces; thermodynamics under applied fields; irreversible thermodynamics; reaction rate theory and diffusion.

602 Elasticity and Physical Properties of Crystals Fall, 3 credits.

Cartesian tensors, elastic stress and strain, constitutive relations between stress and strain, symmetry of crystals, generalized tensor representation of elasticity and other reversible and irreversible properties of crystals, mathematical theory of infinitesimal elasticity with applications including wave propagation and stress fields of dislocations, mathematical theory of yield stress and plasticity, origin of elastic behavior, including rubberlike behavior. At the level of *Physical Properties of Crystals* by Nye.

603 Structure of Solids Spring, 3 credits.

Prerequisites: MS&E 601 and 602, or equivalent. Binding energies in perfect crystals. Structure and energetics of point, line and planar defects in crystalline materials, including metals, ionic solids, covalent solids, and polymers. Interactions between

defects. Bonding and random packing in amorphous materials. Observation of defects in crystalline materials. Structural analysis of amorphous materials.

604 Plastic Flow and Fracture of Materials Fall. 3 credits.

Experimental and theoretical aspects of the deformation and failure of structural materials. Although the emphasis is on metals and alloys, consideration is given also to glasses, ceramics, and polymeric materials. Some of the topics included are: theory and practice of mechanical testing, deformation behavior of polycrystal and single-crystal metals, phenomenological theories of deformation, micromechanical theories of plastic flow and creep, relationship of microstructure to mechanical properties, brittle and ductile fracture of materials.

605 Phase Transformations Spring. 3 credits. Prerequisites: MS&E 601, 602, and 603, or equivalent.

Nucleation theory. Growth theory. Formal theory of nucleation and growth transformation. Spinodal decomposition. Diffusionless transformations. Discussions of topics such as crystal growth from the vapor, solidification, eutectic transformations, solid state precipitation, eutectoid transformations, martensitic transformations. Transformations in polymers and glasses. At the level of *Phase Transformations*, American Society of Metals. 1970.

Related Course in Another Department

Introductory Solid-State Physics (Physics 454)

Further Graduate Courses

610 Principles of Diffraction (also A&EP 711)

Fall. 3 credits. Offered alternate years. Introduction to diffraction phenomena as applied to solid-state problems. Scattering and adsorption of neutrons, electrons, and x-ray beams. Diffraction from two- and three-dimensional periodic lattices. Fourier representation of scattering centers, and the effect of thermal vibrations. Phonon information from diffuse x-ray and neutron scattering and Bragg reflections. Diffraction from almost-periodic structures, surface layers, gases, and amorphous materials. Survey of dynamical diffraction from perfect and imperfect lattices.

614 Electron Microscopy 3 credits.

Electron optics, Abbé theory of image formation with applications to the direct imaging of small defects and atomic planes. Kinematical theory of diffraction with applications to the study of the structure of grain boundaries and the imaging of crystal defects. Dynamical theory of diffraction as applied to the calculation of the images of crystal defects. Instruction in the use of the microscope.

669 Ceramic Materials 3 credits. Prerequisites: MS&E 601 and some familiarity with crystal structures.

Crystal structure and bonding of typical ceramic materials; structure of silicate and nonsilicate glasses; imperfections in oxides; point defects and point defect chemistry, line defects, extended defects; diffusion in stoichiometric and nonstoichiometric ceramics; phase transformations; equilibrium and nonequilibrium phases; grain growth and sintering; plastic deformation and creep; topics from research papers.

701 Electrical and Magnetic Properties of Materials 3 credits. Prerequisite: Physics 454 or equivalent.

Electronic transport properties of metals and semiconductors, semiconductor devices, optical and dielectric properties of insulators and semiconductors, laser materials, dielectric breakdown, structural aspects of superconducting materials, ferromagnetism and magnetic materials. At the level of *Physics of Semiconductor Devices* by Sze, *Ferromagnetism* by Bozworth, and current review articles.

702 Amorphous and Semicrystalline Materials

3 credits. Prerequisite: Physics 454 or equivalent. Topics related to the science of the amorphous state selected from within the following general areas: structure of liquids and polymers; rheology of elastomers and glasses; electrical, thermal, and optical properties of amorphous materials. Presented at the level of *Modern Aspects of the Vitreous State* by Mackenzie, "Glass Transitions" by Shen and Eisenberg in *Progress in Solid State Chemistry*, and *The Physics of Rubber Elasticity* by Treloar.

703 Physics of Solid Surfaces (also A&EP 762)

3 credits. Prerequisites: MS&E 601 and some knowledge of solid-state physics. See A&EP 762 for course description.

704 Advanced Topics in Crystal Defects

3 credits. Prerequisites: MS&E 601, 602, and 603, or equivalent. The structure and properties of point, line, and planar crystal defects treated from a fundamental point of view. Thermodynamics and kinetics of point defects. Atomistic and continuum theories of dislocations. Thermodynamic treatment of grain boundaries. Structure of grain boundaries. Emphasis given throughout to interactions between the various types of defects and to their roles in important phenomena such as diffusion, precipitation, plasticity, radiation damage.

705 The Effects of Radiation on Materials

3 credits. Cross section for atom displacement; orientation dependence of the threshold energy; interatomic potentials; the atomic collision cascade; focusing of atomic collisions; mass transport along collision spectra within a cascade; range concepts and measurements in polycrystalline and single crystal metals and semiconductors; channeled particles and the effect of crystal imperfections on the range; Rutherford back-scattering and channeling and their application to the lattice location of impurity atoms; sputtering of single and polycrystalline metals; recovery mechanisms for radiation damage; void formation in metals irradiated to high fluences and the problem of swelling in liquid metal fast breeder reactors; the first-wall problem in controlled thermonuclear reactors. At the level of *Defects and Radiation Damage in Metals* by M. W. Thompson, *The Observation of Atomic Collisions in Crystalline Solids* by R. S. Nelson, *Ion Bombardment of Solids* by G. Carter and J. S. Colligon, and selected papers and review articles.

706 Amorphous Semiconductors 2 credits.

Prerequisite: knowledge of the theory of crystalline semiconductors on the level of Kittel. The preparation, characterization, and the electronic transport of amorphous semiconductors from an experimental point of view. Particular emphasis is given to amorphous, hydrogenated Si. Some potential device applications, such as in amorphous Si solar cells and the metal-base transistor, are described.

707 Solar Energy Materials 3 credits.

3 lecs. Photovoltaic energy conversion: (1) theory (on the level of Hovel); (2) the role of crystal defects and grain boundaries on the conversion efficiency, and schemes to passivate these defects; (3) current investigations in the JPL program to produce large quantities of solar-grade semiconducting Si.

775 Advanced Topics in Mechanical Properties 3 credits. Prerequisite: MS&E 604 or permission of instructor.

3 lecs. Topics from current research in mechanical properties of structural materials, selected from the following: modern theories of deformation, high-strength alloys, effects of nuclear radiation, amorphous solids, cyclic deformation and fatigue, fracture of brittle and ductile solids, anelasticity and internal friction. Lectures are based largely on current literature.

779 Special Studies in Materials Science Fall or spring. Credit variable. Supervised studies of special topics in materials science.

798 Materials Science and Engineering

Colloquium Fall and spring. 1 credit each term. Credit limited to graduate students. Lectures by visiting scientists, Cornell staff members, and graduate students on subjects of interest in materials science, especially in connection with new research.

799 Materials Science Research Seminars

Fall and spring. 2 credits each term. For graduate students involved in research projects. Short presentations on research in progress by students and staff.

800 Research in Materials Science

Fall and spring. Credit to be arranged. Prerequisite: candidacy for Ph.D. in Materials Science. Independent research in materials science under the guidance of a member of the staff.

801 Research in Materials Science

Fall and spring. Credit to be arranged. Prerequisite: candidacy for M.S. in Materials Science. Independent research in materials science under the guidance of a member of the staff.

Mechanical and Aerospace Engineering

101 Naval Ship Systems Spring. 3 credits.

Limited to freshmen and sophomores. R. L. Wehe.

An introduction to primary ship systems and their interrelation. Basic principles of ship construction, stability, propulsion, control, internal communications, and other marine systems.

221 Thermodynamics Fall or spring. 3 credits.

Prerequisites: Mathematics 191 and 192, Physics 112. 3 lecs.

See description under Division of Basic Studies.

302 Technology, Society, and the Human

Condition Spring. 3 credits. Limited to 40 upperclass engineers and other students who have received permission of instructor. S-U grades optional.

B. J. Conta.

An introduction to the history of technology from the origin of man to the present. Emphasis is on the social and human consequences of technology rather than on internal or gadget history. Of primary interest is the nineteenth and twentieth centuries and the pervasive effects of industrialization — a process that began with manufacturing and was rapidly extended to agriculture, culminating in what Ivan Illich has called the industrialization of man. Among the current topics included are the transition from an economy of abundance and affluence to one of impending shortages and limits to growth, alternative life styles, alternative energy sources and systems, and the growing interest in intermediate or appropriate technology.

305 Introduction to Aeronautics Fall. 3 credits.

Limited to upperclass engineers and students who have received permission of instructor.

D. A. Caughy.

Introduction to atmospheric flight vehicles. Principles of incompressible and compressible aerodynamics, boundary layers, and wing theory. Propulsion system characteristics. Static aircraft performance; range and endurance. Elements of stability and control.

311 Materials and Manufacturing Processes (also MS&E 345) Fall or spring. 3 credits. May be taken in addition to MS&E 261. Prerequisite: T&AM 202.

2 lecs, 1 lab.
Material structures. Physical and metallurgical properties of materials and their control by mechanical and metallurgical means. Manufacturing processes. Emphasis on correlations among design, material properties, and processing methods.

323 Fluid Mechanics Fall or spring. 4 credits.

Prerequisites: M&AE 221, T&AM 202 and 203, or permission of instructor.

4 recs.
Statics, kinematics, potential flow, dynamics, momentum and energy relations. Thermodynamics of compressible flow; dimensional analysis; real fluid phenomena, laminar and turbulent motion, boundary layer; lift and drag; supersonic flow.

324 Heat Transfer and Transport Processes Fall or spring. 3 credits. Prerequisite: M&AE 323.

1 lec, 2 recs.
Conduction of heat in steady and unsteady situations. Fin surfaces and systems with heat sources. Emission and absorption of radiation, and radiative transfer between surfaces. Forced and natural convection of heat owing to flow around bodies and through ducts. Combined modes of transfer and heat exchangers.

325 Mechanical Design and Analysis Fall or spring. 4 credits. Prerequisites: T&AM 202 and 203.

3 recs, 1 lab.
Application of the principles of mechanics and materials to problems of analysis and design of mechanical systems.

326 Systems Dynamics Fall or spring. 4 credits. Prerequisite: M&AE 325.

Dynamic behavior of mechanical systems, modeling, analysis techniques and applications, digital- and analog-computer simulation, balancing of rotating and reciprocating machinery, vibrations of single and multi-degree-of-freedom systems, linear control systems. PDF control, stability analysis.

389 Computer-Aided Design Spring. 3 credits. Limited to juniors and seniors.

2 lec-recs, 1 computing lab; term project.
A broad introduction to computational methods in mechanical design.

[439 Acoustics and Noise] Spring. 3 credits.

Prerequisite: some knowledge of fluid mechanics or permission of instructor. Not offered 1980-81.

A. R. George.
Sound propagation, transmission, and absorption. Sound radiation by surfaces and flow. Loudspeakers. Hearing, music, noise, and noise control criteria. Room acoustics and noise control techniques.]

449 Combustion Engines Fall. 3 credits.

Prerequisite: M&AE 221.
3 recs.
Introduction to combustion engines, with emphasis on application of thermodynamics and fluid dynamics and on control of undesirable exhaust emissions. Emphasis on performance, efficiency, and emissions of current and future spark-ignited and diesel reciprocating engines. Discussion of alternative engines and fuels.

453 Mechanical Engineering Laboratory Fall.

4 credits. Prerequisites: M&AE 325, 323, and concurrent registration in M&AE 326 and 324.

1 lec, 2 labs.
Laboratory exercises in instrumentation, techniques, and methods in mechanical engineering. Measurements of pressure, temperature, heat flow, drag, fluid flow rate, solar energy, thermoelectricity, displacement, force, stress, strain, vibrations, noise, etc.

459 Plasma Energy Systems Spring; offered on demand. 3 credits. Prerequisite: Physics 214.

Fundamental aspects of plasma physics. An elementary treatment of principles on which the concepts of controlled thermonuclear (fusion) reactors are based. Comparisons between fission and fusion systems and treatment of other plasma devices (e.g., MHD converters) as time permits.

464 Design for Manufacture Fall. 3 credits.

Prerequisites: M&AE 311 and 325, or permission of instructor.
Design for casting, forging, stamping, welding, machining, heat treatment, and assembly; beneficial prestressing; improving the distribution of loads and deflections. Selection of materials; dimensioning and fits; joints, fasteners, and shaft mountings. Specifications for manufacturing and maintenance to minimize fatigue failures and improve reliability. Short design problems.

[483 Mechanical Reliability] Spring. 3 credits.

Prerequisite: OR&IE 260 or 270 or equivalent. Not offered 1980-81.

S. L. Phoenix.
Classic system reliability, hazard function concepts, reliability bounds; static and time-dependent material strength models, static and dynamic fatigue, weakest flow models; structural system reliability, static and time-dependent parallel member models. Monte Carlo simulation of structural systems with load sharing.]

486 Automotive Engineering Spring. 3 credits.

Prerequisite: M&AE 325.
Selected topics in the analysis and design of vehicle components and vehicle systems. Emphasis is on automobiles, trucks, and related vehicles. Powerplant, driveline, brakes, suspension, and structure. Other vehicle types may be considered.

490 Special Investigations in Mechanical and Aerospace Engineering Fall or spring. Credit to be arranged. Prerequisite: permission of instructor.

Limited to undergraduate students.
Intended for an individual student or a small group of students who want to pursue a particular analytical or experimental investigation outside of regular courses, or for informal instruction supplementing that given in regular courses.

[506 Aerospace Propulsion Systems] Spring.

3 credits. Prerequisite: M&AE 323 or permission of instructor. Offered alternate years. Not offered 1980-81.

3 recs. F. C. Gouldin.
Application of thermodynamics and fluid mechanics to design and performance of thermal-jet and rocket engines. Mission analysis in space. Auxiliary power supply; study of advanced methods of space propulsion.]

507 Dynamics of Flight Vehicles Spring.

3 credits. Prerequisites: M&AE 305 and T&AM 203 or permission of instructor. Offered alternate years.

D. A. Caughey.
Introduction to stability and control of atmospheric flight vehicles. Review of aerodynamic forces and methods for analysis of linear systems. Static stability and control. Small disturbance equations of unsteady motion. Dynamic stability and transient control response. At the level of *Stability and Control of Airplanes and Helicopters* by Seckel.

512 Analysis of Manufacturing Processes (also MS&E 455) Spring. 3 credits. Prerequisite: M&AE 311.

3 lecs.
Analytical treatment of metal cutting and metal forming processes; conventional and nontraditional manufacturing methods; production systems and machine tool dynamics.

513 Materials Engineering Spring. 3 credits.

Prerequisite: M&AE 311 or MS&E 261 or permission of instructor.
Designed to aid in the design, selection, and use of engineering materials. Theory and practice of extractive, physical, and mechanical metallurgy. Corrosion principles and control; metallurgical failure analysis and prevention; mechanical properties of polymers, ceramics, and composite materials.

514 Numerical Control In Manufacturing Fall. 3 credits.

3 lecs. K. K. Wang.
Principles and the state of the art of numerical control (NC) technology; programming methods for NC and computerized NC (CNC) machine tools with laboratories; economic aspects, and roles in computer-aided design/computer-aided manufacturing (CAD/CAM) systems.

536 Turbomachinery and Applications Spring. 3 credits. Prerequisite: M&AE 323 or permission of instructor.

3 recs.
Aerothermodynamic design of turbomachines in general, energy transfer between fluid and rotor in specific types, axial and radial units, compressible flow. 3-D effects, surging.

543 Combustion Processes Spring. 3 credits.

Prerequisites: M&AE 323, 324.
3 recs.
An introduction to combustion and flame processes with emphasis on fundamental fluid dynamics, heat and mass transport, and reaction-kinetic processes that govern combustion rates. Both premixed and diffusion flames are considered.

554 Solar Engineering Fall. 3 credits. Prerequisite: M&AE 221. Offered alternate years.

Fundamentals of solar radiation. Solar collection and thermal conversion. Solar energy applications to environmental living systems. Generation of solar electric power and photovoltaic conversion. Alternate uses of solar energy. Systems analysis and economics.

[555 Direct Energy Conversion and Storage] Spring.

3 credits. Prerequisite: M&AE 221 or equivalent. Offered alternate years. Not offered 1980-81.

3 lecs.
Primarily a survey of methods for the direct conversion of heat into electrical energy, with emphasis on efficiency, maximum power, practical applications, and limitations. Thermoelectric generators and refrigerators. Thermionic generators. Solar cells. Batteries. Fuel cells.]

556 Power Systems Fall. 3 credits. Prerequisite: M&AE 323 or equivalent.

F. K. Moore.
A broad survey of methods of large-scale power generation, emphasizing energy sources, thermodynamic cycle considerations, and component description. Power industry, economic, and environmental factors. Trends and projections.

557 Future Energy Systems Seminar Spring.

3 credits. Prerequisite: an energy-related course.
Options for future energy-conversion systems or power generation, transportation, and other end-use applications. Technical feasibilities, benefits, and environmental impacts are considered. Classes or seminars based on study projects that reflect student preparation and interests, conducted with faculty advice.

563 Mechanical Components Spring. 3 credits.

Prerequisite: M&AE 325.
Advanced analysis of machine components and structures. Application to the design of new configurations and devices. Selected topics from the

following: lubrication theory and bearing design, fluid drives, shells, thick cylinders, rotating disks, fits, elastic-plastic design, thermal stresses, creep, impact, indeterminate and curved beams, plates, contact stresses.

565 Biomechanical Systems—Analysis and Design Spring. 3 credits. Prerequisites: T&AM 202 and 203.

3 recs; term project. D. L. Bartel.
Selected topics from the study of the human body as a mechanical system. Emphasis on the modeling, analysis, and design of biomechanical systems frequently encountered in orthopedic surgery and physical rehabilitation.

569 Mechanical and Aerospace Structures I Fall. 3 credits. Prerequisite: M&AE 325 or permission of instructor.

A study of advanced topics in the analysis of stress and deformation of deformable bodies with applications to the analysis and design of mechanical and aerospace systems. Topics selected from advanced strength of materials, energy methods in stress analysis, strength theories, and experimental stress analysis.

570 Mechanical and Aerospace Structures II Spring. 3 credits. Term project. Prerequisite: M&AE 569 or permission of instructor.

J. F. Booker.
Introduction to modern computational methods for static and dynamic analysis of mechanical and aerospace structures. Emphasis on underlying mechanics and mathematics. Discussion of inherent capabilities and limitations of general-purpose structural mechanics programs (e.g., NASTRAN). Selected applications, structural and otherwise, of the finite element method.

577 Mechanical Vibrations Spring. 3 credits. Open to qualified undergraduates. Prerequisite: M&AE 326 or equivalent.

2 recs, 1 lab.
Further development of vibration phenomena in single-degree and multidegree of freedom linear and nonlinear systems, with emphasis on engineering problems involving analysis and design.

578 Feedback Control Systems Fall. 3 credits. Open to qualified undergraduates. Prerequisite: M&AE 326 or equivalent.

2 recs, 1 lab. R. M. Phelan.
Further development of the theory and implementation of feedback control systems, with particular emphasis on the application of pseudo-derivative-feedback (PDF) control concepts to linear and nonlinear systems.

[587 Dynamics of Vehicles Fall. 3 credits. Prerequisite: T&AM 203. Offered alternate years. Not offered 1980–81.

Introduction to the dynamics of ground vehicles including cars, trucks, trailers, motorcycles, and railroad vehicles. Emphasis is on the handling behavior and stability of the automobile, tire theory, and suspension analysis. Performance and comfort criteria are developed. Further topics are included to reflect interests of the class.]

590 Design Project in Mechanical Engineering Fall and spring. 3 credits each term. Intended for students in M.Eng. (Mechanical) degree program. Design of an engineering system or a device of advanced nature. Projects by individuals or small groups, sometimes in collaboration with an external organization.

592 Seminar and Design Project in Aerospace Engineering Fall and spring. 2 credits each term. Intended for students in M.Eng. (Aerospace) program. Study and discussion of topics of current research interest in aerospace engineering. Individual design projects.

602 Incompressible Aerodynamics Spring. 3 credits. Intended for graduate students interested in fluid dynamics or aerodynamics research. Open to qualified undergraduates with permission of instructor.
Basic equations, vorticity and flow development. Incompressible potential flow theory; singularity distributions, airfoil, wing, and slender body theory, complex-variable methods, unsteady phenomena.

603 Compressible Aerodynamics Fall. 3 credits. Prerequisite: M&AE 632 or equivalent. Open to qualified undergraduates with permission of instructor.
Basic conservation laws and fundamental theorems of compressible fluid flow. Shock waves, method of characteristics, wave interactions. Perturbation theories and similarity rules. Expansion procedures and singular perturbation problems. Linearized supersonic flow, wing theory, wave drag. Nonlinear theories of transonic and supersonic flow.

608 Physics of Fluids I Fall. 3 credits. Elementary kinetic theory of gases and a microscopic derivation of the Navier-Stokes equations. Statistical mechanics and applications to gas reactions. Elementary chemical kinetics as related to pollution studies.

609 Physics of Fluids II Spring, on demand. 3 credits.
Molecular structure bonding theory, heats of reaction. Atomic and molecular spectroscopy, applications to pollution. Nonequilibrium statistical mechanics; Boltzmann equation, H-theorem, review of Hilbert-Enskog-Chapman theory, fluctuations. Onsager's relations. Radiative transfer; lasers. At the level of *The Dynamics of Real Gases* by Clarke and McChesney.

610 Gasdynamics Spring. 3 credits. Offered on demand.
E. L. Resler, Jr.
A survey of the nonlinear theory of characteristics as applied to two-dimensional steady supersonic flows and one-dimensional unsteady flows. The role of chemical reactions in these flows is treated, as well as experimental techniques to measure chemical reaction rates. Among the topics treated are heat capacity lag and its effects on acoustics, gasdynamic lasers, and shock-tube techniques. Magnetically driven shock waves are also considered, if time permits.

616 Finite Element Methods in Thermo-mechanical Processes Fall. 3 credits. Prerequisites: introductory course work in finite element methods and elasticity, or in analysis of manufacturing processes.
P. R. Dawson.
Application of finite element methods in the analyses of mechanical deformation processes that are nonlinear and influenced by coupling to thermal or electrical behavior. Elastic, elastoplastic, viscoplastic, and thermally coupled analyses applied to problems in large deformation, bulk forming, polymer flows, and welding.

[630 Atmospheric Turbulence and Micrometeorology Spring. 3 credits. Offered alternate years. Not offered 1980–81. Open to qualified undergraduates with permission of instructor.
Z. Warhaft.
Basic problems associated with our understanding of the structure of the velocity field and the transport of scalars such as temperature and moisture in the lower atmosphere, from both theoretical and experimental viewpoints. Topics include the second-order turbulence equations and their closure, Monin-Obukhov theory, diffusion of scalars, spectral characteristics of atmospheric variables, experimental techniques including remote sensing, and the analysis of random time series.]

632 Theoretical Fluid Mechanics and Aerodynamics I Fall. 3 credits.
Introduction to the mechanics of fluids. Derivation of the Navier-Stokes equations. Boundary conditions. Exact solutions. Vorticity theorems. Methods of solution of irrotational flows. Thin airfoil and wing theory. Boundary layer theory. Exact methods of solution of the boundary layer equations.

633 Theoretical Fluid Mechanics II Spring. 3 credits.
Approximate methods in boundary layer theory. Stability of fluid flow. Introduction to turbulent flows. Dynamics and thermodynamics of compressible flows. Sound waves. Subsonic and supersonic flow. One-dimensional steady flows. One-dimensional unsteady flows, method of characteristics, shock waves.

[648 Seminar on Combustion Spring. 3 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1980–81.
3 recs.
Discussion of contemporary problems in combustion research with emphasis on applications of modern experimental and analytical techniques. Typical problems include formation and removal of pollutants in combustion systems, combustion of alternative fuels, coal combustion, and modification of combustion systems for energy efficiency improvement.]

650 Transport Processes I Fall. 3 credits. Prerequisite: M&AE 324 or permission of instructor.
K. E. Torrance.
Advanced treatment of heat conduction and thermal radiation. Differential and integral conduction equations. Exact and approximate solutions; superposition; phase change boundaries. Radiative transport equation and Kirchhoff's laws. Emission and scattering by real surfaces and by gases. Heat exchange in enclosures.

651 Transport Processes II Spring. 3 credits. Prerequisites: M&AE 323, 324, or permission of instructor.
Advanced convection heat transfer. Integral and differential formulations. Basic equations reasoned in detail. Exact and approximate solutions. Natural convection. Forced convection. Laminar, transitional, and turbulent flows. Effects of variable properties, viscous dissipation, and compressibility. Mass transfer. Boiling and condensation.

653 Experimental Methods in Fluid Mechanics and Combustion Fall. 3 credits.
2 lects, 1 lab. F. C. Gouldin.
Study of experimental techniques and data analysis procedures for investigation of fluid and combustive systems, with emphasis on experimental capabilities, underlying principles, and statistical treatment of data. Topics include laser velocimetry, hot-wire anemometry, and spectroscopy.

[672 Experimental Methods in Machine Design Fall. 3 credits. Prerequisite: M&AE 325 or equivalent. Not offered 1980–81.
1 rec, 2 labs.
Investigation and evaluation of methods used to obtain design and performance data. Photoelasticity, strain measurement, photography, vibration and sound measurements, transducers.]

[676 Advanced Mechanical Vibrations Fall. 3 credits. Prerequisite: M&AE 577 or equivalent. Offered alternate years. Not offered 1980–81.
D. L. Taylor.
Vibratory response of multi-degree-of-freedom systems, matrix formulation, concepts of impedance, mobility, frequency response, and complex mode shapes. State-of-the-art techniques such as FFT, sine sweep, and single-point random excitation. Nonlinear vibrations, limit cycle analysis, parametric resonance,

self-excited oscillations, and nonconservative systems. Random vibrations and stochastic excitation. Introduction to vibrations of elastic bodies.]

679 Digital Simulation of Dynamic Systems Fall. 3 credits. Open to qualified undergraduates by permission of instructor. Prerequisite: previous exposure to systems dynamics and digital programming. Offered alternate years.

J. F. Booker.

Modeling and representation of physical systems by systems of ordinary differential equations in vector form. Applications from diverse fields. Simulation diagrams. Analog and digital simulation by direct integration. Problem-oriented digital-simulation languages (e.g., CSMP). Digital analysis of stability and response of large linear systems.

680 Design of Complex Systems Offered on demand. 3 credits. Prerequisite: permission of instructor.

Two 2-hour meetings. R. L. Wehe.

Seminars rely heavily on student participation in discussing frontier problems such as systems for space and underwater exploitation, salt water conversion, and transportation. Reports including recommendations and the reasoning that led to them are required.

682 Hydrodynamic Lubrication Offered on demand. 3 credits.

J. F. Booker.

Designed to acquaint those having a general knowledge of solid and fluid mechanics with the special problems and literature currently of interest in various fields of hydrodynamic lubrication. General topics include equations of viscous flow in thin films, self-acting and externally pressurized bearings with liquid and gas lubricant films, bearing-system dynamics, and computational methods. Also selected special topics, such as elastohydrodynamic lubrication.

[684 Advanced Mechanical Reliability] Fall. 3 credits. Prerequisite: M&AE 483 or permission of instructor. Offered alternate years. Not offered 1980-81.

S. L. Phoenix.

Advanced course in random loading and statistical failure processes in mechanical systems. Continuous and discrete random loadings, random vibrations of mechanical structures, random fatigue processes in materials, order statistics and statistical estimation, reliability, simulation, and computation in mechanical structures, coherent systems and monotone load-sharing, stochastic failure of bundles and composites.]

685 Optimum Design of Mechanical Systems Spring. 3 credits. Prerequisite: graduate standing or permission of instructor.

3 recs. D. L. Bartel.

The formulation of design problems frequently encountered in mechanical systems as optimization problems. Theory and application of methods of mathematical programming for the solution of optimum design problems.

690 Special Investigations in Mechanical and Aerospace Engineering Fall or spring. Credit to be arranged. Limited to graduate students.

695 Special Topics in Mechanical and Aerospace Engineering Fall or spring. Credit arranged. Prerequisite: permission of instructor.

Lecture or seminar format.

Topics of current importance in mechanical and aerospace engineering and research. More than one topic may be taken if offered.

704 Viscous Flows Spring. Offered on demand. 3 credits. Prerequisite: M&AE 632 or equivalent.

S. F. Shen.

A systematic study of laminar flow phenomena and methods of analysis. Exact solutions of the Navier-Stokes equations. The small Reynolds number approximation. Matched asymptotic expansion. The boundary layer approximation; general properties. Transformations for compressibility and axisymmetric effects. Approximate methods of calculation. Unsteady problems. Stability of laminar flows.

707 Aerodynamic Noise Theory Offered on demand. 3 credits. Prerequisites: M&AE 632 or permission of instructor.

Advanced topics in acoustics relevant to aerodynamic and transportation noise sources and control. Random processes. Geometrical acoustics in inhomogeneous moving media, Kirchhoff and Poisson formulas, diffraction, scattering. Lighthill-Curle formulations for sound generation. Absorption and transmission in fluids and at boundaries. Applications to aerodynamic noise sources.

734 Turbulence and Turbulent Flow Fall. 3 credits.

J. L. Lumley.

Topics include the dynamics of buoyancy and shear-driven turbulence, boundary-free and bounded shear flows, second-order modeling, the statistical description of turbulence, turbulent transport, and spectral dynamics.

735 Dynamics of Rotating Fluids Offered on demand. 3 credits. Prerequisites: M&AE 632-633.

S. Leibovich.

Review of classical fluid mechanics. Rotating coordinate systems. Linearized theory for rapidly rotating fluids. Inviscid regions, viscous layers. Spinup. Motions past objects. Waves in rotating fluids. Motions in concentrated vortices. "Vortex breakdown" in swirling flows. Boundary layer interactions.

737 Numerical Methods in Fluid Flow and Heat Transfer Spring. 3 credits. Prerequisites: M&AE 323, 324 and some FORTRAN programming.

K. E. Torrance.

Discretization procedures for the Navier-Stokes and scalar transport equations. Finite differences and finite elements. Analysis of accuracy, stability, and convergence. Survey and comparison of current methods with applications. Assigned problems are solved with a digital computer.

738 Nonlinear Wave Propagation Offered on demand. 3 credits.

S. Leibovich.

Mathematical treatment of nonlinear effects associated with waves in continua. Examples are taken primarily from geophysical fluid dynamics and gas dynamics. Methods of averaging, variational methods, wave interactions, and exact solutions of nonlinear evolution equations.

791 Mechanical and Aerospace Engineering Research Conference Fall and spring. 1 credit each term.

For graduate students involved in research projects. Short presentations on research in progress by students and staff.

799 Mechanical and Aerospace Engineering Colloquium Fall and spring. 1 credit each term.

Credit limited to graduate students. All students and staff invited to attend. Lectures by Cornell staff members, graduate students, and visiting scientists on topics of interest in mechanical and aerospace science, especially in connection with new research.

890 Research in Mechanical and Aerospace Engineering Credit to be arranged. Prerequisite: candidacy for M.S. degree in mechanical or aerospace engineering, or approval of the director. Independent research in an area of mechanical and aerospace engineering under the guidance of a member of the staff.

990 Research in Mechanical and Aerospace Engineering Credit to be arranged. Prerequisite: candidacy for Ph.D. degree in mechanical or aerospace engineering or approval of the director. Independent research in an area of mechanical and aerospace engineering under the guidance of a member of the staff.

Nuclear Science and Engineering

A number of courses in nuclear sciences and engineering are offered through the School of Applied and Engineering Physics; see A&EP 303, 304, 609, 612, 613, 633, 634, 636, 638, 651, and 652.

605 Interaction of Radiation and Matter Spring. 4 credits. Prerequisite: a course in modern physics including quantum mechanics.

3 lec. V. O. Kostroun.

Quantization of the electromagnetic field; relativistic wave equation of the electron; electrons interacting with radiation field — emission, absorption, dispersion, photoelectric effect. Compton scattering, scattering of two electrons, bremsstrahlung, pair production, and annihilation; passage of heavy charged and neutral particles through matter. Examples and applications from low-energy nuclear, plasma, and solid-state physics.

Operations Research and Industrial Engineering

120 Nature of Systems and Operations Analysis Fall or spring. 1 or 2 credits.

1 lec, 1 rec.

Introductory topics in operations research. Can be taken as a six-week, 1-credit minicourse in either half of either term, or as a 2-credit course in either full term. Generally taken as part of DBS 106, in which case the student registers only for DBS 106.

213 Systems Analysis and Design Fall. 3 credits. Prerequisite: first-year calculus.

2 lec, 1 rec.

See description under Division of Basic Studies.

260 Introductory Engineering Probability Fall or spring. 3 credits. Prerequisite: first-year calculus.

3 lec.

See description under Division of Basic Studies.

270 Basic Engineering Statistics Fall or spring. 3 credits. Prerequisite: first-year calculus.

2 lec, 1 rec.

See description under Division of Basic Studies.

320 Optimization I Fall. 4 credits. Prerequisite: Mathematics 293 or 221.

3 lec, 1 rec.

Formulation of linear programming problems and solution by the simplex method. Related topics such as sensitivity analysis, duality, and network programming. Applications include such models as resource allocation and production planning.

321 Optimization II Spring. 3 credits. Prerequisite: OR&IE 320 or equivalent.

2 lec, 1 lec-rec.

A variety of optimization methods, stressing extensions of linear programming and its applications but also including topics drawn from integer, dynamic, and nonlinear programming. Formulation and modeling are stressed, as well as numerous applications. The computer is used in solving typical problems.

350 Cost Accounting, Analysis, and Control Fall or spring. 4 credits.

3 lec, 1 computing-disc.

170 Engineering

Principles of accounting, financial reports; job order and process cost systems—historical and standard costs; cost characteristics and concepts for control, analysis, and decision making.

361 Introductory Engineering Stochastic Processes I Spring. 4 credits. Prerequisite: OR&IE 260 or equivalent.

3 lecs, 1 rec.
Basic concepts and techniques of random processes are used to construct models for a variety of problems of practical interest. Topics include the Poisson process, Markov chains, renewal theory, models for queueing and reliability.

370 Introduction to Statistical Theory with Engineering Applications Fall or spring. 4 credits. Prerequisite: OR&IE 260 or equivalent.

3 lecs, 1 rec.
Provides a working knowledge of basic statistics as it is most often applied in engineering and a basis in statistical theory for continued study. Topics include a review of distributions of special interest in statistics; testing simple and composite hypotheses; point and interval estimation; correlation; linear regression; curve fitting.

383 Introduction to Simulation and Database Systems Spring. 4 credits. Prerequisite: Computer Science 211.

2 lecs, 1 rec; substantial programming exercises. First third of course concerns discrete-event simulation: problems of modeling, programming, and experimental investigation. Balance of course is an introduction to modern database systems: basic models of file organization and access strategies and problems of file maintenance and information retrieval.

410 Industrial Systems Analysis Fall. 4 credits. Prerequisites: OR&IE 350 and 370.

3 lecs, 1 computing session.
Engineering economic analysis, including engineering economy, replacement, taxation effects, decision making based on economic considerations. Operations analysis including process flow, process evaluation, procedural analysis, resource layout, methods analysis and design, work measurement, job evaluation, quality control elements. Project planning and control.

417 Layout and Material Handling Systems Spring. Prerequisites: OR&IE 361 and 383.

2 lecs, 1 rec.
Design of the layout of processes and storage areas and the material handling system for movement of items. Typical equipment used. The functions of identification, control, storage, movement, batching, merging, and dispersion. Introduction to new technologies.

421 Production Planning and Control Spring. 4 credits. Prerequisites: OR&IE 320 and 361 or permission of instructor.

3 lecs.
Planning and control of large-scale production operations. Inventory control. Leveling, smoothing, and scheduling of production. Job shop scheduling and dispatching. Demand forecasting. Economic and practical interpretation of planning and control procedures.

[431 Discrete Models] Spring 3 credits. Prerequisite: OR&IE 320 or permission of instructor. Not offered 1980–81.

3 lec-recs.
Basic concepts of graphs, networks, and discrete optimization. The use of finite mathematical techniques to model contemporary problems selected from operations research, including voting procedures and decision making, efficient and equitable allocations, energy and environment, traffic and urban systems.]

432 Introductory Nonlinear Programming Spring. 3 credits. Prerequisites: OR&IE 320. Computer Science 100.

2 lecs, 1 lec-rec.
Optimization techniques involving nonlinear functions. Stress is on solution methods such as one-dimensional search, steepest-descent and second-order methods for unconstrained optimization; penalty, barrier, cutting-plane and feasible-direction methods for constrained optimization.

435 Introduction to Game Theory Fall. 3 credits. 3 lecs.

A broad survey of the mathematical theory of games, including such topics as two-person matrix and bimatrix games; cooperative and noncooperative n-person games; games in extensive, normal, and characteristic function form. Economic market games. Structure theory for games arising from complex organizations.

[462 Introductory Engineering Stochastic Processes II] Fall. 4 credits. Not offered 80–81. Prerequisite: OR&IE 361 or equivalent.

3 lecs, 1 rec.
A selection of topics from the following: Time series, Markov and semi-Markov processes, optimal stopping; examples and applications are drawn from several areas.]

471 Applications of Statistics to Engineering Problems Fall. 4 credits. Prerequisite: OR&IE 370 or equivalent.

3 lecs, 1 rec.
Sample size calculations for one- and two-sample tests; theory of multiple linear regression and applications to problems in engineering and the sciences, including graphic and analytic techniques useful in model building; analysis of data from experiments with qualitative factors including one-way and two-way Anova models. Use of the computer as a tool for statistics is stressed.

472 Statistical Decision Theory Spring. 3 credits. Prerequisite: OR&IE 471 or equivalent.

3 lecs.
Same topics as OR&IE 672, with emphasis on applications in sampling inspection, inventory control, estimation of parameters, testing hypotheses.

516 Mathematical Models—Development and Application Fall. 4 credits. Prerequisites: OR&IE 320 and 361 or permission.

4 rec-labs.
A laboratory course concerned with structuring problems and operational systems as mathematical models. A sequence of situations for which students must construct representative models is considered. Models are examined for their usefulness in analysis, synthesis, and design.

519 Industrial Engineering Fieldwork Fall or spring. Credit to be arranged. Prerequisite: permission of instructor.
Project-type work, under faculty supervision, on a real problem existing within some firm or institution, usually a regional organization. Opportunities in the course may be discussed with the associate director.

551 Advanced Engineering Economic Analysis Spring. 4 credits. Prerequisites: OR&IE 350 and knowledge of linear programming and statistics, or permission of instructor.

3 lecs, 1 rec.
The economics of production. Topics concerning economic decision making at the level of the firm include long-range planning, budgeting and control, and project investment decisions under certainty and uncertainty. Topics in industrial economics include productivity, technical change, and industrial development.

561 Queueing Theory and Its Applications Fall. 3 credits. Prerequisite: OR&IE 361 or permission.

3 lecs.
Basic queueing models. Design and control of queueing systems. Statistical inference from queueing processes. Solution techniques (including simulation). Scheduling and equipment maintenance. Highway and urban traffic networks. Analysis of computer systems.

562 Inventory Theory Fall. 4 credits. Prerequisite: OR&IE 320 and 361.

3 lecs, 1 rec.
Discussion of the nature of inventory systems and their design and control. Periodic and continuous review policies for single-item and single-location problems. Multi-item and multi-echelon extensions. Dynamic and static models are discussed. Redistribution methods are analyzed. Applications are stressed.

[563 Applied Time Series Analysis] Fall. 3 credits. Prerequisite: OR&IE 361, Computer Science 211, or permission of instructor. Not offered 1980–81.

2 lecs, 1 rec; final project.
Box-Jenkins models, which are versatile, widely used, and applicable to nonstationary and seasonal time series, are covered in detail. The various stages of model identification, estimation, diagnostic checking, and forecasting are treated. Long-range dependence models and the related statistics are considered. As time permits, other topics such as spectral analysis, filtering, the sampling and aliasing problem, and the fast Fourier transform algorithm will be discussed. Applications to economics and hydrology are emphasized. Assignments require computer work.]

[570 Statistical Methods in Quality and Reliability Control] Spring. 3 credits. Prerequisite: OR&IE 370 or equivalent. Not offered 1980–81.

3 lecs.
Control concepts and methods for attributes and variables; process capability analysis; acceptance sampling plans; elementary procedures for variables; acceptance-rectification procedures. Reliability concepts; exponential and normal distributions in reliability; life and reliability analysis of components and systems; redundancy.]

599 Project Fall and spring. 5 credits. For M.Eng. students.
Identification, analysis, design, and evaluation of feasible solutions to some applied problem within the OR&IE field. A formal report and oral defense of the approach and solution are required.

[614 Facilities Location and Design] Spring. 3 credits. Prerequisite: OR&IE 320 or 622 or permission of instructor. Not offered 1980–81.

3 lec-recs.
Formulation, analysis, and solution techniques for location and facility design problems. Applications in industrial, environmental, and regional areas.]

622 Operations Research I Fall. 3 credits. Not open to students who have had OR&IE 320.

3 lec-recs.
Survey of deterministic models. Models are drawn from linear, mixed-integer, nonlinear, and dynamic programming. Network theory, game theory, and deterministic inventory models. Modeling and applications are stressed.

623 Operations Research II Spring. 3 credits. Not open to students who have had OR&IE 361. Prerequisite: OR&IE 260 or 270 or permission of instructor.

3 lec-recs.
Models of inventory and production control. Markov decision models, queueing theory and its applications. Simulation. Illustrative examples and problems.

625 Scheduling Theory Spring. 3 credits.

Prerequisite: permission of instructor. Not offered 1980-81.

3 lec-recs.

Scheduling and sequencing problems. Single resource scheduling, parallel processing, flow shop scheduling. Methodology is drawn from dynamic and integer programming; simulation techniques and heuristic methods.]

626 Advanced Production and Inventory Planning Spring. 3 credits. Not offered 1980-81.

3 lecs.

Introduction to a variety of production and distribution planning problems; the development of mathematical models corresponding to these problems; a study of approaches for finding solutions.]

630-631 Mathematical Programming I and II

630, fall; 631, spring. 3 credits each term.

Prerequisite: advanced calculus.

3 lecs.

A rigorous treatment of the theory and computational techniques of linear programming and its extensions. Formulation, duality theory, simplex, and dual simplex methods. Sensitivity analysis. Network flow problems and algorithms. Theory of polyhedral convex sets, systems of linear equations and inequalities, Farkas' Lemma. Exploiting special structure in the simplex method, computational implementation. Decomposition Principle. Introduction to integer and nonlinear programming and game theory.

632 Nonlinear Programming Fall. 3 credits.

Prerequisite: OR&IE 630. Not offered 1980-81.

3 lecs.

Necessary and sufficient conditions for unconstrained and constrained optima. Computational methods, including interior (e.g., penalty functions), boundary (e.g., gradient projection), and exterior (e.g., cutting plane) approaches.]

635 Game Theory I Fall. 3 credits. Prerequisite:

Mathematics 411 or permission of instructor.

3 lecs.

The minimax theorem for two-person zero-sum games. Two-person general sum games and noncooperative n -person games; Nash equilibrium points. Cooperative n -person games; the core, stable sets, Shapley value, bargaining set, kernel, nucleolus.

637 Dynamic Programming Spring. 3 credits.

Prerequisite: concurrent registration in OR&IE 660 and Mathematics 411 or equivalent.

3 lecs.

Optimization of sequential decision processes. Deterministic and stochastic models, infinite horizon Markov decision models, policy iterations. Contraction mapping methods. Applications drawn from inventory theory, production control; discrete combination examples.

639 Convex Analysis Fall. 3 credits. Prerequisite:

Mathematics 411 and 431 or permission of instructor.

3 lecs.

The theory of finite dimensional convex sets is developed through the study of real valued convex functions and Fenchel duality. Separation of convex sets, polarity correspondences, recession cones, theorems of Helly and Caratheodory.

641 Integer Programming Spring. 3 credits.

Prerequisite: OR&IE 630. Not offered 1980-81.

3 lecs.

Discrete optimization. Linear programming in which the variables are restricted to be integer-valued. Theory, algorithms, and applications. Cutting plane methods, enumerative methods, and group theoretic methods; additional topics are drawn from recent research in this area.]

643 Graph Theory and Network Flows Fall.

3 credits. Prerequisite: permission of instructor.

3 lecs.

Directed and undirected graphs. Bipartite graphs. Hamilton cycles and Euler tours. Connectedness, matching, and coloring. Flows in capacity-constrained networks. Maximum flow and minimum cost flow problems.

644 Combinatorial Optimization Spring. 3 credits.

Prerequisite: permission of instructor.

3 lecs.

Topics in combinatorics, graphs, and networks. These include matching, matroids, polyhedral combinatorics, and optimization algorithms.

660 Applied Probability Fall. 4 credits.

Prerequisite: advanced calculus.

3 lecs, 1 rec.

Introduction to basic probability. The sample space; events; probability. Conditional probability. Independence. Product spaces. Random variables. Important distributions. Characteristic functions. Convergence concepts. Limit theorems.

661 Applied Stochastic Processes Spring.

4 credits. Prerequisite: OR&IE 660 or equivalent.

3 lecs, 1 rec.

An introduction to stochastic processes that presents the basic theory together with a variety of applications. Topics include Markov processes, renewal theory, random walks, branching processes, Brownian motion, stationary processes.

670 Applied Statistics Spring. 4 credits.

Prerequisite: OR&IE 660 or equivalent.

3 lecs, 1 rec.

Review of distribution theory of special interest in statistics: normal, chi-square, binomial, Poisson, t , and F ; introduction to statistical decision theory; sufficient statistics; theory of minimum variance unbiased point estimation; maximum likelihood and Bayes estimation; basic principles of hypothesis testing, including Neyman-Pearson lemma and likelihood ratio principle; confidence interval construction.

671 Intermediate Applied Statistics Fall.

4 credits. Prerequisite: OR&IE 670 or equivalent.

3 lecs, 1 rec.

Statistical inference based on the general linear model; least squares estimators and their optimality properties; likelihood ratio tests and corresponding confidence regions; simultaneous inference. Applications in regression analysis and ANOVA models. Variance components and mixed models. Correlation, ridge regression. Use of the computer as a tool for statistics is stressed.

672 Statistical Decision Theory Fall. 3 credits.

Prerequisite: OR&IE 471 or 670 or equivalent. Not offered 1980-81.

3 lecs.

The general problem of statistical decision theory and its applications. Comparison of decision rules; Bayes, admissible, and minimax rules. Problems involving sequences of decisions over time. Use of the sample cdf and other simple nonparametric methods. Applications.]

673 Nonparametric Statistical Analysis Spring.

3 credits. Prerequisite: OR&IE 670 or permission. Not offered 1980-81.

3 lecs.

Estimation of quantiles, cdf's, and pdf's. Properties of order statistics and rank-order statistics. Hypothesis testing in one- and several-sample situations; sign tests; use of ranks for tests and estimation. Small and large sample properties of tests. Asymptotic distributions of test statistics. Testing goodness of fit.]

674 Design of Experiments Spring. 4 credits.

Prerequisite: OR&IE 671 or permission. Not offered 1980-81.

3 lecs.

Use and analysis of experimental designs such as randomized blocks and Latin squares; analysis of

variance and covariance, factorial experiments; statistical problems associated with finding best operating conditions; response-surface analysis.]

675 Qualitative Data Analysis Spring. 3 credits.

Prerequisite: OR&IE 671.

Varieties of categorical data; cross classifications and contingency tables; tests for independence; multidimensional tables and log-linear models maximum likelihood and weighted least squares estimation; tests of goodness of fit; analysis of incomplete tables; life tables; paired comparison experiments.

676 Statistical Analysis of Life Data Fall.

3 credits. Prerequisite: OR&IE 671 or equivalent.

Analysis of data from reliability, fatigue, and life-testing studies in engineering; also biomedical applications. Survival distributions, hazard rate, censoring. Life tables. Estimation and hypothesis testing. Standards. Goodness of fit, hazard plotting. Covariance analysis, accelerated life testing. Multiple decrement models, competing risks. Sample size determination. Adaptive sampling.

680 Digital Systems Simulation Fall. 4 credits.

Prerequisites: Computer Science 211 and OR&IE 370 or permission of instructor.

2 lecs, 1 rec.

Digital computer programs to simulate the operation of complex discrete systems in time. Modeling, program organization, random number and deviate generation, simulation languages, statistical considerations; applications to a variety of problem areas.

729 Selected Topics in Applied Operations Research

Fall or spring. Credit to be arranged.

Current research topics dealing with applications of operations research.

736 Game Theory II Spring. 3 credits.

Prerequisite: OR&IE 635.

3 lecs.

A continuation of OR&IE 635, including in-depth treatment of some of the same topics plus such additional topics as games in extensive form, games without side payments, economic market games, and games with infinitely many players.

738 Selected Topics in Game Theory Fall or

spring. Credit to be arranged.

Current research topics in game theory.

739 Selected Topics in Mathematical Programming

Fall or spring. Credit to be arranged.

Current research topics in mathematical programming.

752 Advanced Inventory Control Spring.

3 credits. Prerequisite: permission of instructor. Not offered 1980-81.

3 lecs.

The theoretical foundation of inventory theory. Both single-item, single-location problems and multi-item, multi-echelon inventory systems are analyzed. Topics covered include a study of static and dynamic (s,S) policies under a variety of assumptions concerning the demand process and system structure as well as computational techniques.]

761 Advanced Queueing Theory Fall. 3 credits.

Prerequisite: OR&IE 660 or equivalent. Not offered 1980-81.

3 lecs.

A study of stochastic processes arising in a class of problems including congestion, storage, dams, and insurance. The treatment will be self-contained. Transient behavior of the processes is emphasized. Heavy traffic situations are investigated.]

762 Advanced Stochastic Processes Fall.

3 credits. Prerequisite: OR&IE 661 or equivalent.

3 lecs.

A selection of topics from the following: stationary processes, Levy processes, diffusion processes, point processes, martingales, regenerative phenomena, stochastic calculus, weak convergence.

[764 Deterministic and Stochastic Control

Spring. 3 credits. Prerequisite: OR&IE 661 or equivalent. Not offered 1980–81.
3 lecs.

Topics include: elements of calculus of variations, Pontryagin's maximum principle, Markov decision processes, dynamic programming. Problems in filtering and prediction, production planning and inventory control, congestion phenomena, storage models, and environmental management are discussed.]

769 Selected Topics in Applied Probability Fall or spring. Credit arranged.

Topics are chosen from current literature and research areas of the staff.

[773 Statistical Selection and Ranking

Procedures Spring. 3 credits. Prerequisite: OR&IE 674 or permission. Not offered 1980–81.
3 lecs.

A study of multiple-decision problems in which a choice must be made among two or more courses of action. Major emphasis is on selection and ranking problems involving choosing the "best" category where goodness is measured in terms of a particular parameter of interest. Statistical formulations of such problems: indifference-zone, subset, and other approaches. Single-stage, two-stage, and sequential procedures. Applications. Recent developments.]

779 Selected Topics in Applied Statistics Fall or spring. Credit to be arranged.

Topics chosen from current literature and research interests of the staff.

790 Special Investigations Fall or spring. Credit arranged. For individuals or small groups.

Study of special topics or problems.

891 Operations Research Graduate Colloquium

Fall or spring. 1 credit.

A weekly 1½-hour meeting devoted to presentations by distinguished visitors, by faculty members, and by advanced graduate students, on topics of current research in the field of operations research.

893–894 Applied OR&IE Colloquium 893, fall; 894, spring. 1 credit each term.

A weekly meeting of M.Eng. students. Discussion of assigned topics; presentations by practitioners in the field.

Theoretical and Applied Mechanics

Basics in Engineering Mathematics and Mechanics

202 Mechanics of Solids Fall or spring. 3 credits.

Prerequisite: coregistration in Mathematics 293.
2 lecs, 1 rec, 4 labs each semester; evening exams.
See description under Division of Basic Studies.

203 Dynamics Fall or spring. 3 credits.

Prerequisites: coregistration in Mathematics 294.
2 lecs, 1 rec, 4 labs each semester; evening exams.
See description under Division of Basic Studies.

293 Engineering Mathematics (also Mathematics 293) Fall or spring. 3 credits. Prerequisite: Mathematics 192 or 194.

Evening exams (see Mathematics 293).
Infinite series, complex numbers, first and second order ordinary differential equations with applications in the physical and engineering sciences.

294 Engineering Mathematics (also Mathematics 294) Fall and spring. 4 credits. Prerequisite: Mathematics 293.

Evening exams (see Mathematics 294).
Vector spaces and linear algebra, matrices, eigenvalue problems and applications to systems of linear differential equations. Vector calculus. Boundary value problems and introduction to Fourier series.

Engineering Mathematics

310 Advanced Engineering Analysis I Fall and spring. 3 credits. Prerequisite: Mathematics 294 or equivalent.

3 lecs.
Ordinary differential equations as applied in engineering context. Analytical and numerical methods. Special functions, initial value, boundary value and eigenvalue problems in linear partial differential equations, introduction to nonlinear ordinary differential equations.

311 Advanced Engineering Analysis II Spring. 3 credits. Prerequisite: T&AM 310 or equivalent.

Functions of several variables, introduction to complex variables, analytic functions, conformal mapping, method of residues. Application to the solution of Laplace's equation, and transform inversion techniques. Examples drawn from fluid mechanics, heat transfer, electromagnetics, and elasticity.

610 Methods of Applied Mathematics I Fall.

3 credits. Intended for beginning graduate students in engineering and science who have a heterogeneous mathematical background. An intensive course, requiring more time than is normally available to undergraduates (see T&AM 310–311), but open to exceptional undergraduates with permission of instructor.

3 lecs.
Emphasis is on applications. Linear algebra; calculus of several variables; vector analysis; series; ordinary differential equations; complex variables.

611 Methods of Applied Mathematics II Spring. 3 credits. Prerequisite: T&AM 610 or equivalent.

3 lecs.
Emphasis on applications. Partial differential equations; tensor analysis; calculus of variations.

613 Methods of Applied Mathematics IIIa Fall.

2 credits. Prerequisite: T&AM 611 or equivalent. First of an 8-credit sequence (T&AM 613, 614, 615, 616) that develops advanced mathematical techniques for engineering problems.
Review of complex variable theory; conformal mapping; complex integral calculus. Nonlinear partial differential equations; general theory of characteristics.

614 Methods of Applied Mathematics IIIb Spring. 2 credits. Prerequisite: 613 or equivalent.

Integral transforms for partial differential equations. Green's function; asymptotics, including steepest descent and stationary phase, Wiener-Hopf technique. Problems drawn from vibrations and acoustics, fluid mechanics and elasticity, heat transfer, and electromagnetics.

615 Methods of Applied Mathematics IVa Fall. 2 credits. Prerequisite: T&AM 611 or equivalent.

In context of applications: regular and singular perturbation theory, method of matched asymptotic expansions, two timing (method of multiple scales), WKB approximation.

616 Methods of Applied Mathematics IVb Spring. 2 credits. Prerequisite: concurrent registration in T&AM 614 or equivalent.

In context of applications: Hilbert-Schmidt and Fredholm theories of integral equations, Wiener-Hopf equations with application to finite interval, Carleman equation and its generalization, effective approximations.

Experimental Mechanics

640 Experimental Mechanics Fall. 3 credits. 1 lec.

Each student is expected to perform six to ten experiments in mechanics, selected to meet his or her individual interests. Topics: elastic viscoelastic, microplastic, and plastic response of materials; linear and nonlinear vibration of discrete and continuous systems; acoustic and elastic wave propagation and scattering phenomena; dynamical stability of rigid bodies; analog and digital simulation of dynamical systems; magnetoelastic interactions.

Continuum Mechanics and Inelasticity

450 Introduction to Continuum Mechanics Fall. Offered alternate years. 3 credits.

Provides a foundation for further studies in fluid and solid mechanics, materials science, and other branches of engineering. Vector and tensor analysis; kinematics of deformation; analysis of stress and strains; balance laws of physics; constitutive equations; examples of elasticity and fluid mechanics.

[651 Continuum Mechanics and

Thermodynamics Fall. 3 credits. Offered alternate years. Not offered 1980–81.
Kinematics; conservation laws; the entropy inequality; constitutive equations; frame indifference; material symmetry. Simple materials and the position of classical theories in the framework of modern continuum mechanics.]

[752 Topics in Continuum Mechanics Spring. 3 credits. Prerequisite: T&AM 651. Offered alternate years. Not offered 1980–81.

Theory of (nonlinear) elasticity and thermoelasticity; universal solutions, wave propagations, and stability theory. Nonlinear viscoelastic fluids and solids. Viscometric flows. Materials with continuum microstructure.]

754 Analytical Methods in Continuum

Mechanics Spring. 3 credits. Prerequisite: permission of instructor. Offered alternate years. Tensor analysis with applications to shell theory, incompatibility, and finite elasticity. Calculus of variations. Group theoretical methods in solid and fluid mechanics. Noether's theorem. Conservation laws.

[757 Viscoelasticity and Creep Fall. 3 credits. Offered alternate years. Not offered 1980–81.

Linear viscoelasticity: constitutive equations, models, differential and integral operators, Laplace transforms, complex modulus, vibrations and wave propagation, boundary value problems. Thermoviscoelasticity. Creep: classical and modern theories, stress redistribution, boundary value problems.]

758 Theory of Plasticity Fall. Offered alternate years. 3 credits.

Plastic stress-strain laws, yield criteria, flow rules. Work hardening. Flexure and torsion of bars. Boundary-value problems — thick cylinders, spheres, discs, general 3-D. Residual stress. Limit analysis of structures. Plane strain — slip line theory.

Elasticity and Waves

663 Applied Elasticity Fall. 3 credits. Two 1½-hour lec.

Thin curved bars. Plane stress and strain in cylinders; effects of pressure, rotation, and thermal stress. Small (and large) deflection theory of plates; classical, approximate, and strain-energy methods. Thin cylindrical shells. A first course in elastic deformable bodies with numerous engineering applications.

664 Theory of Elasticity Spring, 3 credits.

Two 1½-hour lec.

Analysis of stress and strain. Airy's stress function solutions using Fourier series and integrals. Torsion theory. Three-dimensional solutions. Bending of prismatical bars. Axially loaded circular cylinder and half space. All topics are illustrated by engineering applications.

666 Fundamentals of Acoustics (also Electrical Engineering 690) Spring, 3 credits.

3 lecs, biweekly labs.

Introduction to the principles and theories of acoustics. The vibrations of strings, bars, membranes, and plates; plane and spherical acoustic waves; transmission phenomena; resonators and filters; waves in solids and fluids. Application is made to sonic and ultrasonic transducers, music and noise, and architectural acoustics, and an introduction is given to the processing of acoustic signals. At the level of *Fundamentals of Acoustics* by Kinster and Frey.

667 Mechanical Vibrations and Waves Fall, 3 credits.

Two 1½-hour lec, 4 labs each semester.

Review of vibrations of discrete systems, including multi-degree-of-freedom vibrations, forced oscillations, determination of natural modes and frequencies. Unified treatment of vibrations and wave phenomena in continuous elastic systems including strings, rods, beams, membranes, and plates. Approximate methods for finding natural modes and frequencies. Calculation of wave speeds, dispersion, and group velocity. Plane, cylindrical, and spherical waves. Transient response of discrete and continuous systems.

[765 Mathematical Theory of Elasticity Spring.

Offered alternate years. 3 credits. Prerequisite: T&AM 664. Not offered 1980–81.

The basic equations of large-deformation elasticity; solution of certain large-deformation problems. Linearization. Boussinesq-Papkovich potentials and three-dimensional problems; plane stress by method of Muskhelishvili; conformal mapping; torsion problems.]

[768 Elastic Waves in Solids Fall, 3 credits. Two 1½-hour lec. Offered alternate years. Not offered 1980–81.

An advanced course on dynamic stress analysis and wave propagation in elastic solids. Theory of elastodynamics. Waves in isotropic and anisotropic media. Reflection and refraction. Surface waves and waves in layered media. Transient waves and methods of Lamb-Cagniard-Pekeris. Thick plate theories. Vibration of spheres. Scattering of waves and dynamic stress concentration.]

Dynamics and Space Mechanics**670 Intermediate Dynamics** Fall, 3 credits. Two 1¼-hour lec.

Newtonian mechanics for single particles and systems of particles, conservation laws, central-force motion; special relativity; Eulerian mechanics for rigid bodies, tops, gyroscopes; generalized coordinates, D'Alembert's principle, Lagrangian equations, analytic mechanics for particles and rigid bodies.

[672 Celestial Mechanics (also Astronomy 579)

Spring, 3 credits. Two 1¼-hour lec. Offered alternate years. Not offered 1980–81.

Description of orbits; 2-body, 3-body and n-body problems; Hill curves, libration points and their stability; capture problems; virial theorem. Osculating elements, perturbation equations: effects of gravitational potentials, atmospheric drag, and solar radiation forces on satellite orbits; secular perturbations, resonances.]

673 Mechanics of the Solar System (also**Astronomy 571)** Spring, 3 credits. Prerequisite: an undergraduate course in dynamics.

Two 1¼-hour lec.

Gravitational potentials, planetary gravity fields. Free and forced rotations, Chandler wobble, polar wander, damping of nutation. Equilibrium tidal theory, tidal heating. Orbital evolution of natural satellites, resonances, spin-orbit coupling, Cassini states. Long-term variations in planetary orbits. Dust dynamics. Dynamics of ring systems. Physics of interiors, seismic waves, free oscillations. Illustrative examples are drawn from contemporary research.

771 Advanced Dynamics Fall, 3 credits.

Prerequisite: T&AM 670 or equivalent. Offered alternate years.

Review of Lagrangian mechanics; Hamilton's principle, the principle of least action, and related topics from the calculus of variations; Hamilton's canonical equations; approximate methods for two-degrees-of-freedom systems (Birkhoff's transformation); canonical transformations and Hamilton-Jacobi theory; Poisson stability and related topics from topological dynamics; Hamilton's principle for continuous systems, applications to shell dynamics.

[775 Nonlinear Vibrations Fall, 3 credits.

Prerequisite: T&AM 667 or equivalent. Offered alternate years. Not offered 1980–81.

Review of linear systems, free and forced vibrations. Nonlinear systems, phase plane methods, method of isoclines. Conservative systems. General autonomous systems, equilibrium and periodic solutions, linearization and Lyapunov stability criteria, Poincaré-Bendixson theorem, indices. Quantitative analysis of weakly nonlinear systems in free and forced vibrations, perturbation methods, Krylov-Bogoliubov method. Applications to problems in mechanics.]

776 Stability of Motion Spring, 3 credits. Offered

alternate years.

3 lecs.

Definitions of Lagrange, Lyapunov, and orbital stability; invariance of these definitions under a change of coordinates; linearized variational equations: Jordan canonical form, Floquet theory, perturbations, Mathieu's equation, Lyapunov's theory of types; nonlinear variational equations: Lyapunov's direct method, validity of the linearized variational equations.

777 Qualitative Theory of Dynamical Systems

Fall, 3 credits. Prerequisite: T&AM 775 or equivalent. Offered alternate years.

Review of planar (single degree-of-freedom) systems. The concept of dynamical systems, local and global analysis. N-dimensional systems, types of solutions, Poincaré maps, stability. Structural stability and generic properties, bifurcations in planar systems. Discrete dynamical systems, maps and difference equations, homoclinic and heteroclinic motions, the Smale Horseshoe and other complex invariant sets. Implications for systems of dimension greater than 3, strange attractors and chaos in free and forced oscillator equations.

Special Courses, Projects, and Thesis Research**491–492 Project in Engineering Science** 491,

fall; 492, spring. 1 to 4 credits, as arranged.

Projects for undergraduates under the guidance of a faculty member.

798–799 Selected Topics in Theoretical and Applied Mechanics 798, fall; 799, spring.

1–4 credits, as arranged.

Special lectures or seminars on subjects of current interest. Topics are announced when the course is offered.

890–990 Research in Theoretical and Applied**Mechanics** Fall or spring. 1–6 credits; 890:

1–9 credits; 990: as arranged.

Thesis or independent research at the M.S. (890) or Ph.D. (990) level on a subject of theoretical and applied mechanics. Research is under the guidance of a faculty member.

School of Hotel Administration

For more complete information about undergraduate program requirements, see the *Announcement of the School of Hotel Administration* or the *Announcement of Academic Information*.

The school offers programs leading to the degrees of Master of Professional Studies, Master of Science, and Doctor of Philosophy. For further information on graduate degree programs, the reader should consult the *Announcement of the Graduate School* or contact Professor Stanley W. Davis, the director of the M.P.S. program.

For the most current and detailed information regarding course offerings of the School of Hotel Administration, the student should consult the supplementary course announcement issued each semester through the school's records office.

Administrative and General Management

101 Orientation Fall or spring. 1 credit. S-U grades only. Required.

M 2:30-3:20. Office of the dean.
An introduction to the school, Statler Inn, and the various facets of the hospitality industry.

102 Lectures in Hotel Management Fall. 1 credit. Hotel elective.

F 1:25. R. A. Beck.
A series of lectures given by nonresident speakers prominent in the hotel, restaurant, and allied fields.

200 Personal Real Estate Investments Fall or spring. 2 credits. Limited to juniors and seniors from outside the School of Hotel Administration.

M 10:10-12:05. D. Sher.
Lectures and case studies cover the advantages and disadvantages of real estate investments and how to maximize gain and minimize risk and possible loss. Subjects covered include (1) the economics of real estate, tax shelters, financial leverage; (2) types of personal real estate investments; (3) risk analysis, cash flow, and return on investment; (4) sources of financing; (5) joint ventures and syndications; and (6) acquisition and development of real estate.

203 Club Management Fall or spring. 2 credits. Hotel elective.

M 10:10-12:05. J. F. Tewey and guest lecturers.
The private membership club, and how it differs from other business forms in the hospitality industry. Emphasis is on legal and operational aspects of ownership and governance. All types are discussed, from the small in-town luncheon club to the large, complex suburban operation. New developments in the field are surveyed. Several club managers serve as guest lecturers.

204 Franchising in the Hospitality Industry Fall. 2 credits. Hotel elective.

M 12:20-2:15. D. E. Whitehead.
Relationships between franchisor and franchisee, advantages and disadvantages of franchising, structure and services offered by franchisors. Case studies of leading motor inn and restaurant companies currently offering franchises.

205 Resort and Condominium Management Spring. 3 credits. Hotel elective.

Leccs, T 1:25, R 2:30-4:25. M. A. Noden.
The operation of resort hotels and condominiums. Resorts of the various types, seasons, and economic levels are considered. Emphasis is on the promotion of business, the provision of facilities and services

and guest entertainment, and the selection, training, and direction of the employed staff. Terminology, rental pool agreements, and S.E.C. regulations, together with developer-management-owner contracts and relationships in condominiums, are reviewed.

206 General Insurance Fall. 3 credits. Hotel elective.

M W F 12:20. K. McNeill.
A comprehensive introduction to the insurance field. The emphasis is on fire insurance, casualty insurance, and multiple peril policies. Topics covered may include: the law of contracts as it relates to insurance; the fire insurance policy and fire insurance forms; business interruption, marine, burglary, crime, and liability insurance; rates and rate making; bonds; negligence and torts; compensation; package policies; adjustment of losses; and types of insurers.

[301 Development of a Hospitality Property Fall. 3 credits. Hotel elective. Not offered 1980-81.

M 2:30-4:25. D. E. Whitehead.
Seminar groups of two to four students develop a hospitality project. All aspects of development are covered from the feasibility study, site acquisition, franchising, construction management, operational preopening, marketing, personnel training, furniture and fixture installation through the opening of the hotel, motor inn, or restaurant.]

302 Principles of Management Fall or spring. 3 credits. Prerequisite: Hotel Administration 211 or equivalent. Hotel elective. Students planning to enroll eventually in Hotel Administration 401 are urged to take this course, as it will be a prerequisite for 401 at a future date.

W 11:15-1:10, F 9:05. P. L. Gaurnier.
A basic course designed to examine management processes, concepts, and principles, and to improve personal competence in decision making, problem solving, and communication. Required readings highlight both classical and modern concepts of management.

304 Rooms Division Management—Front Office and Reservations Fall. 2 credits. Hotel elective. Estimated cost of field trip to Washington, D.C., \$50.

F 2:30-4:25. D. A. Dermody, S. Weisz.
An operational view of the front office and reservation functions. A trip to Washington, D.C., is scheduled for late in the term. The course, under the direction of Professor Dermody, is taught by personnel of Marriott Hotels.

305 Rooms Division Management—Housekeeping and Laundry Operations Fall. 2 credits. Hotel elective. Estimated cost of field trip to Washington, D.C., \$50.

F 10:10-12:05. D. A. Dermody, S. Weisz.
The operation of the housekeeping and laundry departments.

306 General Survey of Real Estate Fall or spring. 2 credits. Prerequisite: Hotel Administration 281 and 282 or equivalent, or written permission. Hotel elective.

M 2:30-4:25. D. Sher.
A practical survey of real estate as the capital investment decision in the hospitality industry and related industries. Lectures and case studies cover the role and importance of real estate in the retail environment; the relationship of real estate to the marketing strategy of a company and its investment decisions; the marketing and merchandising of real estate; the financing of real estate; and the effects of real estate financing on a company's overall corporate financial structure and on its future borrowing ability.

307 Hotel Security and Crime Prevention Summer. 2 credits. Hotel elective.

M-F 9-4. J. E. H. Sherry and school faculty.
Designed to provide corporate hotel management with a practical orientation for resolving the

operational losses related to personal and physical premises security. Faculty members discuss aspects of legal liability, insurance protection, architectural and interior design controls, financial controls, and personnel administration.

401 Seminar in Management Principles Fall or spring. 2 credits. Limited to 20 seniors and graduate students. Prerequisites: Hotel Administration 211 or equivalent. Hotel elective.

T 11:15-1:10. P. L. Gaurnier.
This course uses the case-study approach to management principles and concepts. Each student prepares a comprehensive analytical report, based on previous work, for class discussion and analysis.

402 Hotel Management Seminar Fall. 1 credit. Limited to 20 seniors and graduate students. Hotel elective.

F 10:10. R. A. Beck.
A meeting with the Hotel Administration 102 speaker of the day. The subject matter varies, depending on the visitor and his or her area of expertise. Students are expected to ask questions and participate in discussions.

403 The Small Business Fall or spring. 3 credits. Limited to 24 seniors and graduate students who have received written permission of the instructor. Hotel elective.

W 10:10-12:05, R 11:15. R. M. Cantwell and guest lecturers.
Managerial problems as related to small business operations. Emphasis is on the acquisition of a new business or the takeover of an existing business. Preliminary investigation prior to decision making is explored. Case studies are used to illustrate relevant points. A term project is required.

404 Management Organization of Small Business Fall or spring. 3 credits. Limited to hotel school seniors and graduate students; open to out-of-school students with written permission only. Prerequisite: Hotel Administration 221 or Agricultural Economics 323 or equivalent. Hotel elective. Approximate cost of field trips, \$50.

T 9:05-11, R 9:05. R. M. Cantwell and guest lecturers.
A comprehensive survey of basic management fundamentals to plan, organize, direct and control the small enterprise. Course work includes a team term project, selected readings, case studies, and field exercises.

406 Integrated Case Studies in the Hospitality Industry Fall or spring. 3 credits. Limited to 21 seniors and graduate students. Hotel elective.

W 1:25-4:25. R. M. Cantwell, P. L. Gaurnier, and R. M. Chase.
Analysis of case studies involving issues of business strategy, human relations, administration, marketing, and finance. Students apply course principles in a restaurant management simulation exercise.

407 Seminar in Hotel Operations Spring. 2 credits. Limited to 30 seniors and graduate students. Hotel elective. Estimated cost of field trip, \$30.

F 10:10-12:05. P. L. Gaurnier.
Intended to provide a working knowledge of terminology, concepts, and procedures utilized by hotel management in developing information and making decisions relevant to forecasting and controlling manpower requirements consistent with fluctuating business conditions. Major topics include: staff planning, budgeting, scheduling and payroll control, forecasting technique and practice, considerations for operating within the guidelines of collective bargaining, financial statement analysis, and hotel case studies oriented toward productivity analysis. A field trip, usually in the third week, is required.

408 Casino Management Fall or spring. 2 credits. Limited to 50 seniors and graduate students. Hotel elective. Estimated cost of field trip, \$75.

M 2:30–4:25. D. E. Whitehead and guest lecturers. The management responsibility of casino operations. General instruction in the basic casino games including odds, percentages, and strategy. Overview and analysis of casino administration with emphasis on the relationships and responsibilities between hotel general manager and casino manager, marketing and junkets, physical layouts, licensing, governmental regulation, staffing, internal controls, and security systems. Includes a weekend field trip to Atlantic City.

409 T.A. Training in Administrative and General Management Fall or spring. 1–3 credits.

Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.

The student planning to be a teaching assistant in administrative and general management is exposed to recommended techniques of instruction and such other methodology, readings, etc., as the professor in charge of the course may require.

701 Graduate Seminar in Hotel Operations Fall. 2 credits. Limited to 30 last-term seniors and graduate students. Hotel elective. Estimated cost of field trip, \$75.

F 10:10–12:05. P. L. Gaurnier.

Intended to provide a working knowledge of terminology, concepts, and procedures utilized by hotel management in developing information and making decisions relevant to forecasting and controlling manpower requirements consistent with fluctuating business conditions. Major topics include: staff planning, budgeting, scheduling and payroll control, forecasting technique and practice, considerations for operating within the guidelines of collective bargaining, financial statement analysis and hotel case studies oriented toward financial statement analysis and toward productivity analysis. A required field trip to the participating hotel is an integral part of the study program. The field trip is usually scheduled for the second week of classes; students therefore *cannot* miss the first week and register in the course. Students who intend to return to school one week late should not attempt to preregister for this course.

Human Resources Management

111 Introductory Psychology Fall or spring. 3 credits. Required.

M W F 9:05. F. Berger.

An introductory study of psychological principles essential for understanding human behavior. Basic concepts integral to effective hotel management are treated, including perception, motivation, learning, and personality.

211 Management of Human Resources Fall or spring. 3 credits. Prerequisite for hotel students: Hotel Administration 111. Required.

Lecs, M W 11:15, 12:20 or 1:25; 1-hour lab to be arranged. D. A. Dermody.

Problems of personnel management, including an introduction to the personnel function; recruitment, selection, and placement of personnel; the role of supervision with emphasis on induction, training, communications, performance appraisal, and leadership style; wage and salary administration; motivation; and union-management relations. Emphasis is on class discussion and analysis of case problems from business and industry.

311 Union-Management Relations in Private Industry: A Survey Fall. 3 credits. Limited to

juniors, seniors, graduate students, and those who

have received written permission of the instructor. Hotel elective.

W 1:25, R 4:30–6:25. F. A. Herman.

Major areas of study include the development of the trade union movement in the United States, with emphasis on the history and structure of unions active in all phases of the hospitality industry; federal and state laws governing the bargaining relationship, including the role of the National Labor Relations Board; the collective bargaining process, including negotiations and contract administration; and the critical role of conciliation procedures (such as mediation and arbitration) in keeping industrial peace.

314 Psychology in Business and Industry Fall or spring. 3 credits. Prerequisites: Hotel Administration 111 and 211 or equivalent. Limited to 50 hotel students. Hotel elective. Students who plan to take Hotel Administration 315 should plan to take 314, first.

T 12:20, R 12:20–2:15. S. W. Davis.

The principles of psychology applied to industrial and business systems; personnel selection; placement and training; problems at work including evaluation, motivation, efficiency, and fatigue; and the social psychology of the work organization.

416 Special Studies in the Management of Human Resources Fall. 3 credits. Prerequisite: Hotel Administration 211. Limited to seniors and graduate students, except for those who have received written permission of the instructor. Hotel elective.

M 7:30–9:30 p.m., T 1:25–2:15. D. A. Dermody and guest lecturers.

A case-study approach to the problems and challenges of managing people in business organizations. Actual cases are presented for discussion by individuals who were themselves involved in the case.

419 T.A. Training in Human Resources

Management Fall or spring. 1–3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.

The student planning to be a teaching assistant in human resources management is exposed to recommended techniques of instruction and such other methodology, readings, etc., as the professor in charge of the course may require.

711 Dispute Resolution in Service Industries

Management Spring. 3 credits. Limited to graduate students and seniors who have received written permission. Hotel elective.

W 2:30–5:30. F. A. Herman.

The nature of conflicts that arise during negotiation of new labor contracts (interest disputes), and those that arise over the meaning and interpretation of labor contracts already in force (grievance disputes). Methods for resolving conflicts in nonunionized properties are also explored. Picketing, recognition, certification and decertification, unfair labor practices, successor rights and obligations, and pre-election behavior are discussed and illustrated, as are the practical applications of grievance handling through the final step of the procedure (usually arbitration).

Accounting and Financial Management

120 Basic Principles of Accounting and Financial

Management Fall or spring. 2 credits. Limited to students outside the School of Hotel Administration. Intended for students who desire a general knowledge of the language of business and finance.

M 2:30–4:25. Faculty.

A survey of accounting principles, financial statements, cash forecasting, cash budgeting, and an introduction to financial analysis.

121 Financial Accounting Fall. 3 credits. Required. Limited to School of Hotel Administration students.

Lec, M W 10:10; 1-hour lab to be arranged.

D. H. Ferguson.

An introduction to the basic principles of accounting, involving transactions analysis, flow of accounting data to the financial statements, and careful consideration of accounting for revenues, expenses, assets, liabilities, and owner's equity.

122 Hospitality Accounting Systems Fall or spring. 3 credits. Prerequisite: Hotel Administration 121 or equivalent. Required.

Lecs, T R 9:05; 2-hour lab to be arranged.

D. C. Dunn.

The accounting systems recommended by the American Hotel and Motel Association, the National Restaurant Association, and the Club Managers' Association of America for hotels, motels, restaurants, and clubs. Topics include hotel and motel front office accounting; accounting for the restaurant and other sales areas; special journals and ledger accounts peculiar to hospitality accounting systems; the flow of accounting transactions through the accounting system; and the preparation and interpretation of financial statements.

125 Finance Fall or spring. 3 credits. Prerequisite: Hotel Administration 121 or equivalent. Required.

Lecs, T R 1:25 and 1-hour to be arranged.

R. M. Chase.

An objective study of financial management in profit-oriented enterprises. Important concepts include cash flow, the time value of money, and capital budgeting. Emphasis is on the analysis of accounting information, problem solving, and decision making.

220 Financial Accounting Principles Fall or spring. 3 credits. Limited to students outside the School of Hotel Administration in the fall; in the spring, hotel students may substitute this course for 121.

Lecs, M W 10:10; 1-hour lab to be arranged.

Faculty.

The basic principles of accounting, including transactions analysis, and flow of accounting data to the financial statements. Emphasis is on accounting for revenues, expenses, assets, liabilities, and owner's equity.

221 Managerial Accounting Fall. 3 credits. Prerequisites: Hotel Administration 121 and 125 or equivalent. Required.

Lecs, T R 10:10; 2-hour lab to be arranged. Two

evening exams to be arranged. A. N. Geller.

The use of accounting information for managerial planning, control, and evaluation. Particular emphasis is on differential accounting and its role in extracting relevant decision variables. Other topics are accounting systems, behavior of costs, budget preparation, standard costs, the analysis of variance from standard costs, and performance reports.

222 Managerial Accounting in the Hospitality Industry Spring. 3 credits. Limited to 160 students.

Prerequisite: Hotel Administration 122 or 221 or equivalent. Required.

Lecs, M W 10:10; 1-hour lab to be arranged.

J. J. Eyster.

Methods of operational analyses for hospitality properties are evaluated and used in ratio, comparative, and cost-volume-profit analyses. Other topics include internal control, operational budgeting, and the use of feasibility studies in long-term capital budgeting decisions. Stress is on presenting analysis results in management letters.

223 Front Office Machine Accounting Fall or spring. 1 credit. Prerequisite: Hotel Administration 121 or equivalent. Hotel elective.

Two-hour practice to be arranged. D. C. Dunn. Students learn the operation of the NCR front office

posting machine by completing a series of practical exercises ranging from simple posting of charges and credits to error correction and the night audit.

224 Food and Beverage Control Fall or spring 2 credits. Prerequisite: Hotel Administration 122, or written permission of instructor. Hotel elective.

R 10:10–12:05. T. P. Cullen.
Essentials of food and beverage control from both the operational and accounting standpoints. Practice with typical methods and forms found in the hospitality industry.

321 Hotel Management Contracts Fall, weeks 2–8. 1 credit. Limited to 60 juniors, seniors, and second-year graduate students. Hotel elective.

M 12:20–2:15. J. J. Eyster and guest lecturers.
A critical analysis of the negotiation and administration of hotel management contracts. Topics include: advantages, disadvantages, and risks of contracts to both owners and operators; owner and operator concerns during negotiations and their resolution; owner and operator concerns during administration of the contract; and the future role of contract use. Guest lecturers include owners and operators.

322 Investment Management Fall or spring. 2 credits. Limited to juniors, seniors, and graduate students. Hotel elective.

T 2:30–4:25. Faculty
A survey of investment opportunities and the methods of analysis used by business and the individual to determine the best use of investment funds. Special emphasis is placed on the stock and bond markets, including security portfolio management.

323 Financial Analysis and Planning Fall. 3 credits. Prerequisite: Hotel Administration 222. Hotel elective.

M W 8:30–10. J. J. Eyster.
After defining and describing the environment in which a business organization must design its strategy, an examination will be made of financial analysis and planning techniques necessary to operate in that environment. Focus is on discussion and case studies involving the following areas of financial management: the tax environment, profit planning and forecasting, budgeting, capital budgeting techniques, and cost of capital determination.

324 Financial Charts and Graphs Spring, weeks 2–8. 1 credit. Limited to 20 students. Prerequisite: Hotel Administration 251 and 221. Hotel elective.

W 2:30–4:25. R. H. Penner.
An introduction to and concentrated study of financial charting—the visual presentation of quantitative data. Includes a review of the several types of charts and graphs and their use to show relative or proportionate amount, trend, etc. Students analyze and evaluate charts in annual reports and the media, and design charts to communicate data effectively.

326 Introduction to Statistical Analysis and Inference Fall. 3 credits. Limited to juniors, seniors, and graduate students. Students with any previous exposure to statistics or probability should see the instructor before enrollment. Hotel elective.

T R 11:15–1:10. D. C. Dunn.
An introduction to the basic techniques of statistical method.

421 Internal Control in Hotels Spring. 2 credits. Prerequisite: Hotel Administration 122 or equivalent. Limited to seniors and other students who have received permission of instructor. Hotel elective.

T R 9:05 or 10:10. A. N. Geller.
Discussion of problems encountered in distributing the accounting and clerical work in hotels to ensure a good system of internal control. Study of many actual cases of the failure of internal control and the analysis of the causes of the failure. Practical problems and actual techniques of functioning systems of internal control.

422 Personal and Corporate Taxation Fall. 2 credits. Limited to 50 juniors, seniors, and graduate students. Hotel elective.

W 2:30–4:25. R. Gilfoil.
An overview and history of tax legislation initiates the course and documents the impact of taxation upon business and personal financial management. Specific topics include personal income tax, federal and state corporate tax, tax incentives, and tax shelters.

429 T.A. Training in Accounting and Financial Management Fall or spring. 1–3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.
The student who plans to be a teaching assistant in accounting and financial management is exposed to recommended techniques of instruction and such other methodology, readings, etc., as the professor in charge of the course may require.

722 Graduate Managerial Accounting in the Hospitality Industry Spring. 3 credits. Required M.P.S. course.

T 2:30–4:25, R 11:15–1:10. J. J. Eyster.
Hotel and restaurant accounting systems that provide decision-making information to management are reviewed. Methods of operational analysis for hospitality properties are evaluated and utilized to include ratio, comparative, and cost-volume-profit analyses. Other topics include internal control, operational budgeting and the use of feasibility studies in long-term capital budgeting decisions. Stress is on communicating analysis results using management letters.

723 Graduate Corporate Finance Fall. 4 credits. Prerequisite: Hotel Administration 722.

Recommended: knowledge of algebraic techniques and elementary statistics (students who have not recently had a statistics course are urged to purchase and study programmed review books in mathematics and elementary statistics). A list of recommended books (available at the Campus Store) will be distributed at registration. Required M.P.S. course.

Lecs, T R 2:30–4:25; 2-hour section to be arranged. A. N. Geller.

An introduction to the principles and practices of business finance, including the development of theory and its application in case studies. Specific topics include types of securities and their uses, valuation concepts, capital budgeting, cost of capital, capital structure, dividend policy, long-term financing and bank relations, short and intermediate term financial management, mergers and consolidations, and the legal aspects of financial management.

724 Interpretation and Analysis of Financial Statements Spring. 3 credits. Limited to 20 students. Prerequisite: all required hotel accounting courses. Required M.P.S. course.

Sems, T R 2:30–4:25. A. N. Geller.
The various financial accounting issues encountered in reporting the results of operations of corporate enterprises are discussed. A macro view of the firm will be taken with emphasis on both outsider's views of the operation and decision making through interpretation of the published statements. Current generally accepted accounting principles and future extensions are explored and discussed. Emphasis is on the components of financial statements, how and why they are reported, and their impact on the overall financial position of the firm.

Food and Beverage Management

131 Introduction to Food and Beverage Operation and Management Fall or spring. 2 credits. Required.

W 11:15–1:10. J. C. Ross and staff.

An introductory course designed to familiarize students with the language and systems of commercial food and beverage operations. The language of food production, equipment, utilities preparation, cooking, beverage, and service will compose the major portion of the course.

132 Techniques of Food Production Fall or spring. 1 credit. Required.

3-hour sec to be arranged. R. Grout.
This course is designed to familiarize students with the terminology of food, as well as the techniques, methods, and procedures of preparing foods for a commercial food operation.

231 Meat Science and Management Fall or spring. 3 credits. Required. Estimated cost of field trip, \$75.

Lec, M 2:30–4:25; 2-hour lab to be arranged. S. A. Mutkoski.
Deals with the major phases of meat, poultry, and fish service from the hotel, restaurant, club and institutional standpoints; nutritive value, structure and composition; sanitation; selection and purchasing; cutting, freezing, portion control, and specifications; cooking, carving, and miscellaneous topics. A three-day field trip to visit purveyors in New York is required.

[232 Operational Food Production Systems Fall or spring; *not offered after fall 1980*. 3 credits. Required. Estimated cost of utensils, \$30.

M 1:25–2:10; 6-hour lab. T. O'Connor.
Students in the afternoon laboratory plan, prepare, and manage the dinner meal for the Statler Inn main dining room for half of the term and for Café Rhea for the other half of the term. Students in the morning laboratory plan and manage the preparation and service of the luncheon meal in Café Rhea for half of the term and in the main dining room for the other half.]

233 Food Production Systems: Institutional Fall or spring. 3 credits. Prerequisites: 131 and 132. Required.

Lec, M 1:25–2:10; 6-hour afternoon lab. A. L. Colucci.
Application of principles of menu planning, purchasing, receiving, storage, issuing, sanitation, preparation, scheduling, and human relations.

331 Food Production Systems: Restaurant and Banquet Fall or spring (first offered spring 1981). 3 credits. Required. Prerequisite: Hotel Administration 232N.

Hours to be arranged. Food and beverage management faculty.
Preparation techniques and service of à la carte menus, with emphasis on beginning management skills.

332 Restaurant Management Fall or spring (first offered fall 1981). 3 credits. Elective. Prerequisite: Hotel Administration 233.

Hours to be arranged. Food and beverage management faculty.
Policies and procedures of the food and beverage system, food and beverage control, and human relations practices.

333 Corporate Restaurant Management Fall. 3 credits. Prerequisite: Hotel Administration 232. Limited to 30 seniors and graduate students. Hotel elective. Estimated cost of field trip, \$100.

T 10:10, R 9:05–11; labs to be arranged. V. A. Christian.
Principles of modern restaurant management as they relate to small and large corporate organizations. Case studies and lectures cover such topics as: managerial and technical duties, governmental regulations, and guest demands. A field trip to Washington is conducted. This course is recommended only for those with intensive interest in food and beverage management.

337 Survey of Beverages Fall or spring. 2 credits. Limited to seniors and graduate students in the School of Hotel Administration. Hotel elective. Fee for tasting equipment, \$5.

W 7:30–9:25. V. A. Christian.

An introduction to wines, beers, spirits, and other beverages as they relate to the hospitality industry. Samples from a variety of countries, regions, and vineyards are evaluated.

338 Purchasing Spring. 2 credits. Limited to 65 juniors, seniors, and graduate students in the School of Hotel Administration. Hotel elective.

W 2:30–4:25. S. A. Mutkoski.

An in-depth look into the functions of a purchasing department within a hotel or restaurant facility. The managerial aspects of purchasing, such as setting up a purchasing department, the function of the purchasing agent, purchasing specifications, purchasing forms, and controls are considered. Includes many of the products purchased by a food facility: china, flatware, glasses, fabric, meat, frozen foods, canned goods, produce, dairy products, etc. The products will be displayed by leading purveyors and discussed in detail.

430 Introduction to Wine and Spirits Fall or spring. 2 credits. Limited to seniors and graduate students outside the School of Hotel Administration. S-U grades only.

W 2:30–4:25. V. A. Christian.

The course begins with the history of wine and spirits. The main focus is on flavor characteristics, fermentation processes, and brand specifications. Lectures are also given on purchasing, storage, wine tasting techniques, and drink formulas. Samples from a variety of countries, regions, and vineyards are evaluated. Pre-enrolled students who do not attend the first class, and fail to notify the secretary in Statler 212 of their absence, will automatically be dropped from the course.

439 T.A. Training in Food and Beverage Management Fall or spring. 1–3 credits.

Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.

The student who plans to be a teaching assistant in food and beverage management is exposed to recommended techniques of instruction and such other methodology, reading, etc., as the professor in charge of the course may require.

731 Graduate Food and Beverage Management Fall or spring. 3 credits. Required M.P.S. course. Estimated cost of field trip, \$60.

Lecs, T 12:20, R 11:15–1:10; three 7:30–9:30 p.m. sessions to be arranged. V. A. Christian.

The managerial and operational principles and techniques of planning, operating, and evaluating a food and beverage operation. Special emphasis is placed on menu planning, wine list design, professional standards, and the managerial approach to purchasing, receiving, storage, issuing, preparation and service. A field trip is required.

732 Graduate Operational Food Production Systems

Prerequisite: Hotel Administration 731 or equivalent. Limited to 27 students. Required M.P.S. course. Estimated expense for clothing and utensils, \$95.

Lec, R 2:30–5:30 or R 7–10; 8-hour F Lab.

J. C. Ross. A. L. Colucci.

Students are responsible for production and service of dinner for the Statler Inn main dining room and Café Rhea. The course is designed to teach and apply the fundamentals of food production systems, from menu planning through service, and provide experience in managing a commercial kitchen or dining room. The lecture-demonstration provides further exposure to managerial as well as technical skills.

[733 Corporate Food and Beverage Management

—Hyatt Fall. 3 credits. Prerequisites: Hotel Administration 731, 732, and written permission of instructor. Hotel elective. Estimated cost of field trip, \$125. Not offered 1980–81.

Sem, R 7–9:30 p.m. V. A. Christian and guest lecturers.

The operation of the food and beverage department of a 1,000-room commercial hotel, examining the management and day-to-day operations and support systems. Lectures will be given by managers, directors, and department heads relating their experiences, problems, and successes. A working field trip of four days in Chicago is conducted. Each student will spend two shifts in a department of his or her choice, working with a key staff member or department head.]

735 Graduate Meat Science and Management

Fall. 3 credits. Limited to graduate students. M.P.S. elective.

M 5:30–8:30 p.m. S. A. Mutkoski.

Purchasing, receiving, storage, utilization, and cost analysis of meat, fish, and poultry, as well as meat extenders and analogs, are discussed from the standpoint of commercial food service. This will be done in a seminar-lab combination. Independent research on current problems in meat science and management is required.

Law

247 Law and the Woman Employee Spring. 3 credits. Hotel elective.

M W F 12:20. J. E. H. Sherry.

Designed to enable management to deal with the legal problems of woman employees as they affect the hospitality industry, and to provide the non-law student with information regarding the emerging legal rights of women generally.

341 Law of Business I Fall. 3 credits. Open to juniors and seniors, and a limited number of sophomores. Required.

M W F 10:10. J. E. H. Sherry.

A basic introduction to law and legal relationships in business. A variety of subjects are covered, all intended to aid managers in decision making.

342 Law of Business II Spring. 3 credits.

Prerequisite: Hotel Administration 341. Hotel elective.

M W F 10:10. J. E. H. Sherry.

A continuation of 341 for those students who desire more extensive legal training to further their business careers. Emphasis is on the laws pertaining to the Uniform Commercial Code (sales and negotiable instruments); bailments; trusts and estates; transfers by will; unfair competition and trade regulation; bankruptcy and insurance.

343 Law of Federal Securities Fall. 1 credit. Open to juniors, seniors, and graduate students. Best taken after an introductory course in business law.

M 1:25–3:20 (alternate Mondays). P. Panarites.

The overall objective is to acquaint the student with the application of federal securities laws to the hospitality industry. The course will cover capital formation through the public offering of stocks and bonds and the obligations of executives of publicly owned companies. Emphasis will be placed on the rights and responsibilities of the corporate executive, with use of problems drawn from the hospitality industry. The subject will be treated by analysis of case histories.

344 Law of Innkeeping Fall or spring. 3 credits.

Prerequisite or corequisite: Hotel Administration 341 or equivalent. Required.

M W F 9:05. J. E. H. Sherry.

A basic grounding in the fundamentals of hotel and restaurant management as they affect legal rights

and responsibilities. Emphasis is on recognition of issues and organization of solutions in a logical, well-conceived manner.

449 T.A. Training in Law Fall or spring.

1–3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.

The student who plans to be a teaching assistant in law is exposed to recommended techniques of instruction and such other methodology, reading, etc., as the professor in charge of the course may require.

744 Law of Innkeeping for Graduate Students

Fall or spring. 3 credits. Required M.P.S. course.

M W F 8. J. E. H. Sherry.

A review of fundamentals followed by an in-depth consideration of the legal aspects of the hospitality industry.

Properties Management

251 Property Management Graphics Fall or spring. 3 credits. Required.

Lecs, M W 9:05; 2-hour lab to be arranged.

J. M. Loughran.

An introduction to both properties management and hospitality facilities. Components of the course include projection and architectural drawing, site analysis and planning, and hotel functional design. Lab emphasis is on basic graphic skills, including the layout of lodging and dining spaces, and the interpretation of construction drawings.

351 Hotel Mechanical and Electrical Problems I

Fall. 3 credits. Prerequisite: Hotel Administration 251. Required.

Lecs, M W F 11:15; 2-hour lab to be arranged.

J. J. Clark.

Investigation of management problems associated with the mechanical systems of the physical plant. Utility management and energy conservation are emphasized. Water, electricity, and lighting systems as well as sound and acoustics are covered. Basic engineering theory of each system is taught. Capital, operating, and repair and maintenance costs are stressed.

352 Hotel Mechanical and Electrical Problems II

Spring. 3 credits. Prerequisite: Hotel Administration 351. Required. Approximate cost of AIA articles and binders, 75¢.

Lecs, M W F 11:15; 2-hour lab to be arranged.

J. J. Clark, R. A. Compton.

Investigation of management problems associated with the mechanical systems of the physical plant with emphasis on major systems of heating, refrigeration, and air conditioning. The problems of capital expenditures, operating costs, and repairs and maintenance are stressed.

353 Introductory Food Facilities Engineering

Fall. 3 credits. Limited to 20 students. Hotel elective.

Lecs, M W 1:25; 2-hour lab to be arranged.

R. A. Compton.

The basic concepts of food facilities design and planning. Studies are carried out to determine space allocation for kitchens, refrigeration, storage, waste disposal, and service areas. Development of basic production work flow in the preparation and service areas will be emphasized. The basic requirements for the selection of equipment utilizing industry standards for production capability, quality of construction, and ease of maintenance are covered. Labs involve planning, design, and specification writing for a small- to medium-size restaurant kitchen.

354 Food Facilities Equipment Design and Layout

Spring. 3 credits. Prerequisite: Hotel Administration 353 or equivalent.

Lecs, M W 1:25; 2-hour lab to be arranged.

R. A. Compton and M. H. Redlin.

A course designed to apply the basic concepts of food facilities design to advanced applications. Emphasis will be focused on preparing a program, developing and critiquing equipment layouts, mechanical and electrical spotting, and equipment detail drawings.

451 Physical Plant Planning and Construction

Fall or spring. 3 credits. Prerequisite: Hotel Administration 352. Required.

Lecs, M W F 12:20-1:10; 2-hour lab to be arranged. Fall, R. A. Compton; spring, R. A. Compton, R. H. Penner.

The construction, renovation, and maintenance of hotels and food service operations are discussed and analyzed. Procedures, methods, and materials used in new construction projects are covered as well as repair, rehabilitation, and renovation of existing structures. Building codes, trade practices, materials, cost estimation, and management responsibilities are emphasized.

453 Seminar in Environmental Control

Fall. 3 credits. Limited to 10 students. Prerequisite: Hotel Administration 351, 352 and written permission of instructor. Hotel elective.

Hours to be arranged. J. J. Clark.

Application of topics covered in Hotel Administration 351-352 to realistic projects. Projects for a given term are decided at an early seminar and emphasize utility management and control, interhal environmental control (light, HVAC, acoustics), and ecological considerations.

454 Seminar in Hotel Planning

Fall. 3 credits. Prerequisite: Hotel Administration 351 and written permission. Limited to 16 students. Hotel elective.

T R 11:15-1:10. R. H. Penner, J. M. Loughran.

The hotel planning process, emphasizing program development, site selection, conceptual design, and building systems. Discussion of space allocation, hotel equipment and furnishings, establishing budgets, and responsibilities of the development team. One or two team projects are developed.

455 Seminar in Restaurant Planning

Spring. 3 credits. Limited to 12 students. Prerequisite: Hotel Administration 351. Hotel elective. Estimated cost of field trip, \$150.

M W F 9:05. R. A. Compton.

The procedures followed in the planning of a restaurant facility. Primary emphasis is on design, engineering, and construction. Discussions of space allocation, trade practices, building and health codes, equipment and furnishings, cost estimations, and management responsibilities when working with professional planners. Case studies are used and a project will be developed. Includes an optional field trip.

459 T.A. Training in Properties Management

Fall or spring. 1-3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.

The student who plans to be a teaching assistant in properties management is exposed to recommended techniques of instruction and such other methodology, reading, etc., as the professor in charge of the course may require.

751 Graduate Study in Project Development and Construction

Fall. 3 credits. Required M.P.S. course.

Lec, T R 8:30-9:45; 2-hour lab to be arranged. R. H. Penner.

The major elements of project development and construction are presented from an engineering management viewpoint. Topics include: feasibility studies, functional planning and design, financing techniques, the bidding process, construction contracts, project scheduling, and actual building construction. Techniques for effective graphic communication are developed and integrated into the design process.

752 Graduate Study in Electrical and Mechanical Systems

Spring. 3 credits. Required M.P.S. course.

Estimated cost of AIA articles and binders, \$4.

Lecs, T R 8:40-9:55; 2-hour lab to be arranged.

J. J. Clark.

The major electromechanical systems of large buildings and lodging properties are considered from a capital-cost versus operating-cost viewpoint. Systems considered include water, heating, refrigeration, air conditioning, electrical, and lighting. Concepts of energy conservation and efficient utilities management, beginning with the original selection of equipment through operating procedures, are emphasized. Students analyze case studies, criticize papers and reports, and suggest new systems and modifications.

Communication

161 Typewriting

Fall or spring. 2 credits. Hotel elective.

M W F 10:10 or 11:15. B. B. David. A course in elementary typewriting, designed for students who want to learn touch typing.

165 Basic Business Writing

Fall or spring. 3 credits. Each section limited to 20 students. Required.

M T 9:05, 10:10, 11:15, 1:25, or 2:30.

D. A. Jameson, D. G. Flash, J. Lumley.

This course focuses on strengthening skills in outlining and organizing, understanding and using research sources, and developing skills in writing clearly and precisely. To apply these skills, students write both internal and external reports.

261 Report Typing

Fall or spring. 2 credits.

Limited to 32 students. Prerequisite: Hotel Administration 161 or equivalent. Elective.

T R 10:10. B. B. David.

A course in electric typing designed for students who can type but want to improve their speed and accuracy. Special emphasis is placed on the typewritten report as a form of communication. Business letters are typed in various styles and their effectiveness is studied.

262 Typewriting and Business Procedures

Fall or spring. Limited to 32 students. Prerequisite: Hotel Administration 161 or equivalent. Elective.

M W F 12:20. B. B. David.

Students who already know touch typing develop sufficient speed and accuracy on electric typewriters to meet business standards for an executive assistant in the typing and composing of business letters and special forms of business communication, including tabulated reports. Instruction in filing, duplicating processes, and machine transcription is provided.

263 Shorthand Theory

Fall or spring. 3 credits. Limited to 32 students. Prerequisite: a typing course. Elective.

M W R 1:25. B. B. David.

The basic theory of Gregg shorthand is completed. Dictation and transcription speed is developed to meet the needs of a stenographic position.

265 Effective Communication

Fall or spring. 3 credits. Limited to 25 students per section. Required.

Lecs, M 9:05-11 and W 9:05 or T 9:05-11 and R 9:05. Individual conferences arranged throughout the term. F. A. Herman.

This seminar is designed to help students (1) express themselves clearly and effectively and (2) acquire skills to better understand the ideas of others. Principles of the communication process are explored, tested, and reinforced during the term through classroom interaction, case studies, debates, and individual and group videotaped presentations.

268 Written Communication

Fall or spring. 1 credit. Limited to 18 students. S-U grades only. Elective.

Hours to be arranged. M. M. Kreithen.

Principles and techniques of writing, including clarity, style, interest, and collection and presentation of data. Individual conferences are an integral part of the course.

364 Advanced Business Writing

Fall or spring. 2 credits. Limited to 14 upperclass and graduate students. Hotel elective.

F 11:15-1:10. M. M. Kreithen.

Students learn the techniques of good letter composition needed by an executive. Skill is developed in correct procedures for machine dictation and dictation to stenographers.

469 T.A. Training in Communication

Fall or spring. 1-3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.

The student who plans to be a teaching assistant in communication is exposed to recommended techniques of instruction and such other methodology, readings, etc., as the professor in charge of the course may require.

Science and Technology

171 Food Chemistry I

Fall. 3 credits. Required.

Lecs, M W F 8; 1-hour lab to be arranged.

P. Rainsford.

Principles and concepts of inorganic and organic chemistry, with emphasis on the chemistry of fats, carbohydrates, and proteins.

172 Food Chemistry II

Spring. 4 credits.

Prerequisite: Hotel Administration 171 or equivalent. Required.

Lecs, M W F 8; 3-hour lab to be arranged.

P. Rainsford.

The chemistry of fats, carbohydrates, and proteins is emphasized in relation to food products and food production techniques. The roles of additives in food, colloidal phenomena, food processing, and reconstitution techniques are studied.

173 Sanitation in the Food Service Operation

Fall or spring. 2 credits. Required.

Lec, T 1:25; 2-hour lab to be arranged.

B. Richmond.

The causes and prevention of food spoilage and food-borne disease. Sanitary principles applied to the hospitality industry, including laws, rules, and regulations. Emphasis is on current outbreaks of food-borne illnesses.

174 Information Systems

Fall or spring. 3 credits. Required.

M 1:25 and W 1:25-3:20. D. H. Ferguson.

An introduction to information systems and computing machines. Students learn basic programming skills for application to selected business problems. The concept of file processing is introduced to provide the student with an understanding of computing as it applies to the hospitality industry. Programs are executed on the University's computing system.

274 Hotel Computing Applications

Fall or spring. 3 credits. Prerequisite: Hotel Administration 174 or equivalent. Hotel elective.

Lecs, T 2:30-4:25, R 1:25; 2-hour lab to be arranged. R. G. Moore.

The course exposes students to the diverse applications of computing technology within the hospitality industry. Half of the course is devoted to hotel computing systems and the remainder to systems used in the restaurant, club, and food-service industries. Special attention is given to

the new generation of electronic cash registers and point-of-sale devices available to the food-service operator.

371 Principles of Nutrition Fall or spring. 3 credits. Prerequisites: Hotel Administration 171 and 172 or equivalent chemistry courses. Elective. M W F 12:20. M. H. Tabacchi.

Designed especially for students interested in the food industry. The nutrient composition of fresh and processed foods, nutrient handbooks, recommended daily allowances, nutrition labeling, additives, special diets, fad diets, and weight control. The uses of nutrients and nutrient interactions are emphasized.

374 Business Computer Systems Design Fall or spring. 3 credits. Elective. Prerequisite: Hotel Administration 174 or 774 or equivalent.

T R 12:20, plus recitation to be arranged. R. G. Moore.
Programming in "Business Basic," an interactive, easily learned computer language commonly used on small business computers; installing a computerized business system and processing information; and designing a business computer system using data base management programs on an IBM 5110 computer. The course is intended for students who expect to be working with computer systems and desire experience in hospitality electronic data processing.

479 T.A. Training in Science and Technology Fall or spring. 1-3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.
The student who plans to be a teaching assistant in science or technology is exposed to recommended techniques of instruction and such other methodology, reading, etc., as the professor in charge of the course may require.

771 Graduate Food Chemistry Fall. 4 credits. Required M.P.S. course.

Lecs. M W F 10:10; 2½-hour lab to be arranged. M. H. Tabacchi.
The chemistry of fats, carbohydrates, and proteins is emphasized in relation to food products and food production techniques. Additives in foodstuffs, colloidal phenomena, food processing, and reconstitution techniques are studied.

774 Computers and Hotel Computing Applications Fall or spring. 3 credits. Required M.P.S. course. Limited to 30 students.

Lecs. M 2:30-4:25. W 1:25; 2-hour lab to be arranged. R. G. Moore.
The first segment of the course is devoted to learning computer concepts and PL/I programming. Programs written by the students are executed on the University's IBM 370/168 computer. During the second part of the course, the introduction of the computing machine to the hospitality industry is examined from several viewpoints: managerial impact, cost justification, user reaction, and guest satisfaction. The various successes and failures of hotel computing systems are analyzed in detail. Students in the course use a Sweda 800/80 front-office system.

Economics, Marketing, and Tourism

281 Macroeconomics Fall. 3 credits. Required. T 11:15-1:10; 1-hour sec to be arranged. D. Sher.
Modern economic problems are examined in historical perspective, as national issues, and in the economic context of business decisions.

282 Microeconomics Spring. 3 credits. Required. M W F 10:10 or 11:15. Faculty.
An analytical look at the basis of production and consumption behavior, market structures, the pricing system, resource allocations, market failures, and public policies directed toward these failures.

283 Principles of Marketing Fall or spring. 2 credits. Hotel elective.

T 11:15-1:10. W. H. Kaven.
The economic principles of marketing, with emphasis on the marketing of services.

284 Tourism Fall. 3 credits. Hotel elective. T 1:25, R 2:30-4:25. M. A. Noden.

The primary characteristics of foreign and domestic tourism. Areas of concern include geographic considerations, development of infrastructure and superstructure in host countries, travel delivery systems, and the social and cultural aspects of tourism. Transportation, the travel service industries, and the socioeconomic effects of tourism on developing countries are emphasized. Consideration is also given to travel research and marketing.

285 Hotel Sales Fall or spring. 2 credits. Hotel elective.

F 2:30-4:25. D. A. Dermody.
A practical approach to the selling of hotel space with particular emphasis on selling to and effectively serving groups.

381 Advertising and Public Relations Fall. 2 credits. Limited to juniors, seniors, and graduate students. Hotel elective.

F 11:15-1:10. Faculty.
This is the first of two courses covering the essential phases of hotel-motel marketing. Topics include advertising, publicity, public relations, and sales communication.

382 Cases in Hospitality Marketing Spring. 2 credits. Hotel elective. Prerequisite: Hotel Administration 283 or 781.

M 1:25-3:15. W. H. Kaven.
A continuation of Hotel Administration 381. A case-study course focusing on market planning; marketing strategy formulation; price, promotion, place, and product program design.

383 Seminar in Selected Topics in Hospitality Marketing Fall or spring. Prerequisite: Hotel Administration 283 or 781. Hotel elective.

W 2:30-4:25. W. H. Kaven.
The marketing strategy and its development through opportunity analysis, research, and target market selection. A continuing seminar that changes focus each semester over a four-semester cycle. Devoted to topics of current interest each semester. Course topic announced in advance each semester.

481 Seminar in Advertising and Public Relations Fall. 2 credits. Prerequisite: Hotel Administration 381. Hotel elective.

F 2:30-4:25. Faculty.
Case histories of the advertising, publicity, business promotion, and public relations of hotels, resorts, restaurants and national travel attractions are studied.

483 Psychology of Advertising Fall. 3 credits. Limited to 30 seniors and graduate students. Prerequisites: Hotel Administration 111 and 283, or equivalent, or permission of instructor. Hotel elective.

M 2:30-5 and 7-9:30 p.m. (alternate Mondays). P. C. Yesawich.
The principles of psychology employed in advertising. Topics include: learning, perception, motivation, advertising research, consumer behavior, and advertising strategy.

489 T.A. Training in Economics, Marketing, and Tourism Fall and spring. 1-3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.
The student who plans to be a teaching assistant in economics, marketing, or tourism is exposed to recommended techniques of instruction and such other methodology, reading, etc., as the professor in charge of the course may require.

781 Marketing Management Spring. 3 credits. Required M.P.S. course.

T 11:15-1:10, W 11:15. Faculty.
Hospitality marketing management decision making. Emphasis is on managerial analysis of the marketing environment; market opportunity analysis; and marketing strategy design, implementation, and control.

Independent Research

600-680 Undergraduate Independent Research Fall or spring. Variable credit. Prerequisite: written permission. Hotel elective. *Only the first three credits of directed study may count as hotel electives during the student's undergraduate academic career.*

Additional directed study, if taken, is applied toward free electives, except for the work-study program of 12 credits. *Permission in writing is required prior to course enrollment.*

Faculty.
Students pursue independent research projects under the direction of a faculty member.

600 Administrative and General Management

601 Work Study - Operations 6 credits.

602 Work Study - Academic 6 credits.

610 Human Resources Management

620 Accounting and Financial Management

630 Food and Beverage Management

640 Law

650 Properties Management

660 Communication

670 Science and Technology

680 Economics, Marketing and Tourism

700-900 Graduate Independent Research Fall or spring. Variable credit. Limited to graduate students. Prerequisite: permission of instructor. *Obtain permission form from the school's graduate office.*

Faculty.
The student plans a project and locates a faculty member willing to supervise the study.

700 Administrative and General Management

710 Human Resources Management

720 Accounting and Financial Management

730 Food and Beverage Management

740 Law

750 Properties Management

760 Communication

770 Science and Technology

780 Economics, Marketing, and Tourism

800 Monograph I

801 Monograph II

802 Master of Science Thesis Research

803 Graduate Teaching Internship

900 Doctoral Thesis Research

New York State College of Human Ecology

Interdepartmental Courses

Field Study Office

T. Stanton, director; C. Cook, M. Holzer, M. Whitham

100 Orientation to Field Study: Skills for Learning in the Field Fall: 6 sessions from September 10–October 29; Spring: February 4–March 18 and April 1–May 12.1 credit. Limited to 25 students. S-U grades optional.

W 2:30–4:25. Staff.

Workshops train students in skills that will help them become more effective field learners and better able to cope with the complex demands of a field placement. Topics will include cross-cultural communication, participant observation, active listening, investigative interviewing, understanding nonverbal communication, identifying sources of information in the community, and analyzing verbal presentations. All of the concepts are applied to assignments in the field.

200 Preparation for Fieldwork: Perspectives in Human Ecology Fall or spring. 4 credits. Limited to 25 students. Prerequisite: permission of instructor. For students interested in preparing themselves for field experience.

T R 10:10–12:05 or T R 2:30–4:25. Staff. Introduces students to field skills (such as interviewing, observation, public speaking, and leading discussion) and provides opportunities to practice and develop those skills. Additionally, small student task forces consider case studies highlighting complex issues in the interaction between community agencies and government regulation. Students work together to define problems, analyze and synthesize data from a variety of sources, and make group presentations.

400 Directed Readings For study that predominantly involves library research and independent reading.

401 Empirical Research For study that predominantly involves data collection and analysis.

402 Supervised Fieldwork Fall or spring. Credit to be arranged. S-U grades optional. Registration with permission of department faculty sponsor(s) and approval of the director of the field study program.

Hours to be arranged. Provides an opportunity for students to develop field study experience within an interdisciplinary framework, usually under the supervision of faculty members from two or more departments. Supervised field study involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

403 Teaching Apprenticeship For study that includes assisting faculty with instruction.

406 Sponsored Field Learning/Internships Fall, spring, or summer. Variable 6–15 credits. S-U grades optional, up to 12 credits. Limited to 25 students. Prerequisite: ID 100 for 1980–81 participation; ID 200 for 1981–82 participation. Enrollment by permission of instructor. T. Stanton.

Hours to be arranged. A course for students seeking interdepartmental sponsorship and supervision of participation in structured, off-campus field experiences or internships operated by non-Cornell or non-credit granting institutions or agencies. Examples include:

New York State Assembly Internship Program, Washington Center for Learning Alternatives, and internships arranged independently by students with individual public or private organizations or institutions.

Field supervision, largely carried out through weekly correspondence, is aimed at complementing students' work-and-study assignments while on their internships and at enabling students to gain an in-depth understanding of how their internship organization operates and the internal and external ecological forces that influence it. Completion of course requirements is signified by a formal presentation to the college community upon return to Cornell (graduating seniors may make special arrangements). Credit is variable to allow students to arrange for combined interdepartmental and departmental sponsorship and supervision.

Information on course enrollment and internship opportunities is available in the Field Study Office, 170 Martha Van Rensselaer Hall. Students should begin planning at least one full semester before leaving campus for an internship.

407 Field Experience in Community Problem Solving Fall or spring. Variable 3–9 credits. Limited to 25 students. Prerequisite: ID 100 for 1980–81 participation; ID 200 for 1981–82 participation. Enrollment by permission of instructor. Intended for juniors or seniors. M. Whitham.

Hours to be arranged.

A course designed to provide students with a structured, closely supervised field experience encompassing an ecological approach to human problem solving. Interdepartmental teams of from two to five students will contract with community businesses, agencies, and organizations as special projects staff members delegated primary responsibility for problem solving in a designated area of agency need. Students will spend twenty hours each week working directly on the projects, three hours each week in seminar, and additional time completing seminar readings and assignments. Seminar is aimed at assisting students in systematically analyzing the complex factors that affect the implementation of new programs, policies, or projects in upstate community settings. Set in this context, the field placement will be viewed as a case study in the ecology of organizational decision making.

Supervision of all projects will be provided jointly by the course instructor and appropriate agency personnel. In addition, each project will be subject to review twice during the semester by an oversight committee composed of community and faculty representatives with relevant expertise. Completion of the course will be signified by formal presentation of project results to the contracting organization's staff, board of directors, or other appropriate administrative units, and members of the oversight committee, together with submission of an academic analysis of the implementation process to the course instructor.

Credit is variable to allow students to arrange for combined interdepartmental and departmental sponsorship and supervision.

Information on projects is available during course enrollment in the Field Study Office, 170 Martha Van Rensselaer Hall. Students may assist in the planning and project identification process by making their interests known to the office a full semester before intended enrollment in the course.

408 The Ecology of Urban Organizations: New York City Fall or spring. 15 credits. Limited to 20 students. Prerequisite: ID 200 and permission of director of the field study program. Intended for juniors and seniors. Deadline for receipt of applications in the Field Study Office: October 30, 1980, for spring 1981; March 20, 1981, for fall 1981. M. Holzer.

A full-semester, off-campus field course in the New York City metropolitan area designed to give an in-depth understanding of how contemporary organizations operate and what forces influence the delivery of goods and human services. The course combines intensive participation in an organization that represents at least one of three perspectives (providers of goods and human services, policy makers and regulators, or community action and consumer groups) with a weekly seminar-workshop that provides the skills, concepts, and theories necessary for understanding and analyzing these organizations and the critical issues they face.

Interdepartmental Major

See the Interdepartmental Major in Social Planning and Public Policy under the Departments of Consumer Economics and Housing and of Human Service Studies.

Division of Student Services

W. H. Gauger, Assistant Dean for Student Services; B. Bricker, Director of Admissions; C. Reed, Director of Special Educational Projects; L. Wiley, Director of Placement; N. Yaghlian, Director of Counseling; A. Carlson, P. Holmes, E. A. Martire, B. Morse, M. Thomas. Special studies sponsored by faculty in the division involve such topics as counseling theory and practice in relation to various student populations, the career development process in fields related to human ecology, and the delivery of student services.

400–401–402 Special Studies for Undergraduates Fall or spring. Credits to be arranged. S-U grades optional.

Hours to be arranged. Staff.

For independent study by an individual student in advanced work not otherwise provided in departments or for study on an experimental basis, with a group of students, in advanced work not otherwise provided in departments. Students prepare a multicopy description of the study they wish to undertake on forms available from the Counseling Office. This form must be signed by the student services faculty member directing the study, the office director, and the assistant dean: for student services and filed at course registration or within the change-of-registration period after registration. To ensure review before the close of the course registration or change-of-registration period, early submission of the special studies form to the assistant dean is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study.

400 Directed Readings For study that predominantly involves library research and independent reading.

401 Empirical Research For study that predominantly involves data collection analysis or laboratory or studio projects.

402 Supervised Fieldwork For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

600 Special Problems for Graduate Students Fall or spring. Credit to be arranged. S-U grades optional. Limited to graduate students recommended by their chairperson and approved by the assistant dean for student services and the member of the staff in charge of the problem for independent, advanced work.

Hours to be arranged. Staff.

Consumer Economics and Housing

E. S. Maynes, chairman; C. B. Meeks, graduate faculty representative; H. B. Biesdorf, W. K. Bryant, P. Chi, S. Clemhout, A. J. Davey, M. S. Galenson, W. H. Gauger, J. Gerner, A. J. Hahn, B. Hall, R. K. Z. Heck, M. Johnson, M. Lea, C. Meeks, J. Robinson, N. C. Saltford, J. Swanson, E. Wiegand

100 Introduction to Consumer Economics Fall or spring. 3 credits. Enrollment limited to 120. S-U grades optional. Students who have taken 101 or another introductory macroeconomics course should not register.

Fall: M W F 1:25; M. Galenson. Spring: M W F 11:15; J. Robinson.

An introductory course designed to provide a basic understanding of macroeconomics, with particular attention to those areas affecting families. The course will cover national income accounting, income distribution, prices, and monetary and fiscal policy. This will serve as a basis for the study of income redistribution programs and other areas of government action.

147 Housing and Society Fall or spring. 3 credits. Enrollment limited to 4 sections of 25 students each. S-U grades optional.

Lecs, T R 11:15; secs, T 1:25 or 3:35, W 1:25, or R 9:05. P. Chi.

A survey of contemporary American housing issues as related to the individual, the family, and the community. The course focuses on the current problems of the individual housing consumer, the resulting implications for housing the American population, and governmental actions to alleviate housing problems.

148 Sociological Perspectives on Housing

Spring. 3 credits. Enrollment limited to 5 sections of 12 students each. S-U grades optional. No prerequisites.

Lecs, T R 10:10; secs, M 2:30, T 10:10 or 11:15, W 9:05 or 10:10, or R 10:10. Staff.

A theoretical and empirical analysis of housing patterns in the United States from a sociological perspective. Topics include migration patterns, residential mobility, suburbanization, and the structure and function of neighborhoods. Emphasis is on explaining the widespread patterns of segregation in the United States by race, ethnicity, and social class.

233 Marketing and the Consumer Spring. 3 credits. Prerequisite: microeconomics. S-U grades optional.

M W F 8. N. C. Saltford.

A study of marketing functions, institutions, policies, and practices with emphasis on how they create consumer satisfaction. A marketing project with a nearby consumer products firm and a field trip to New York City to study selected marketing operations are arranged when feasible.

248 Housing and Local Government Fall.

3 credits. Prerequisite: Economics 102. S-U grades optional.

T R 10:10–11:25. M. Lea.

Analysis of state and local government tax, expenditure, and regulatory activities that affect the housing market. Detailed consideration will be given to property taxation, provision of local public goods, zoning, housing and building codes, and other governmental policies that deal with housing and neighborhood environment.

300 Special Studies for Undergraduates Fall or spring. Credit arranged.

Hours to be arranged. Staff.

Special arrangement for course work to establish equivalency for courses not transferred from a previous major or institution. Students prepare a

multicopy description of the study they wish to undertake on forms available from the Counseling Office. The form, signed by both the instructor directing the study and the head of the department, is filed at course registration or during the change-of-registration period.

312 Household Decision Making Fall or spring. 3 credits. Enrollment limited to 28 students; preference given to human ecology juniors, seniors and transfer students. Not open to freshmen. S-U grades optional.

Fall: M W F 11:15. Spring: M W F 1:25. A. Davey. A systems approach identifies and analyzes components of household management and decision making. The contribution of household management to quality of family living is emphasized. The Personalized System of Instruction (PSI) format permits self-pacing. Field trips are included.

325 Economic Organization of the Household

Spring. 3 credits. Prerequisite: Economics 102 or equivalent. S-U grades optional.

M W F 9:05. J. Gerner.

Theories and empirical evidence on how households spend their resources are used to investigate how households alter the amounts and proportions of time and money spent in various activities, their size, and their form in response to changing economic forces.

330 Personal Financial Management Fall or

spring. 3 credits. Enrollment limited to 200.

Preference given to human ecology students; not open to freshmen. S-U grades optional.

Fall: M W F 1:25; J. Robinson. Spring: M W F 9:05; R. Heck.

The study of personal financial management at various income levels and during different stages of the family life cycle. Topics covered will include the use of budgets and record keeping in achieving family economic goals; the role of credit and the need for financial counseling; economic risks and available protection; and alternative forms of saving and investment.

332 Consumer Decision Making Spring.

3 credits. Prerequisite: Economics 101–102 or permission of instructor.

T R 10:10. E. S. Maynes.

This course is designed to help students make more effective choices as consumers through an understanding of the economy and the use of relevant economic and statistical principles. The course is normative, stressing how consumers should act in order to achieve their goals.

[341 Fundamentals of Housing Economics Fall.

3 credits. Prerequisite: Economics 101–102 or equivalent. S-U grades optional. Offered alternate years. Not offered 1980–81; next offered 1981–82.

M W F 1:25. J. Gerner.

To give a basic understanding of the structure and operation of the housing market, the economic determinants of housing supply and demand are related to (1) levels of housing consumption and housing standards, (2) the composition of the housing inventory, and (3) levels of and fluctuations in housing production.]

[355 Wealth and Income Fall. 3 credits. Open to

sophomores, juniors, and seniors. Graduate students may elect to audit and write a research paper for one to two credits under CEH 600. Prerequisites: Economics 101–102 or equivalent. S-U grades optional. Not offered 1980–81.

M W F 9:05. K. Bryant.

Examination of contemporary economic problems that affect the welfare of families in the United States. Examples are affluence and poverty; monetary and fiscal policies as these affect families; and efficacy of the delivery of public services in the areas of health, education, and subsidized housing. Where relevant, the historical origin of these problems will be studied.]

400–401–402 Special Studies for Undergraduates Fall or spring. Credits to be arranged. S-U grades optional.

Hours to be arranged. Staff.

For advanced, independent study by an individual student or for study on an experimental basis with a group of students in a field of CEH not otherwise provided through course work in the department or elsewhere at the University. Students prepare a multicopy description of the study they wish to undertake on forms available from the Counseling Office. This form must be signed by the instructor directing the study and the department chairman and filed at course registration or within the change-of-registration period after registration. To ensure review before the close of the course registration or change-of-registration period, early submission of the special studies form to the department chairman is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study:

400 Directed Reading For study that predominantly involves library research and independent reading.

401 Empirical Research For study that predominantly involves data collection and analysis or laboratory or studio projects.

402 Supervised Fieldwork For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

411 Time as a Human Resource Fall. 3 credits. Prerequisites: one course in sociology; one course in microeconomics recommended. S-U grades optional.

T R 10:10–11:25. R. Heck.

Seminar based on historical and contemporary readings. Examines and explores time management concepts and applications. Investigates changes in time use of family members in relation to social change. Explores meanings of market work, household work, and leisure in the context of family choices at different stages of the life cycle. Investigates current research concerning time allocations made by family members to household and market work. Examines use of time as a measure of household activities and production.

413 Family Management: An Ecological Approach Spring. 3 credits. Enrollment limited to 20 students. Students may elect a field experience to fulfill part of the course requirements. Suggested for students preparing to work with families in social work, geriatrics, secondary and adult education, and financial counseling. Offered 1980–81 and alternate years.

T R 12:20–2. A. Davey.

An ecological approach is used to examine the resource limitations of families and to study ways to correct imbalances and develop new resources. Special attention is given to the resource problems associated with different stages of the family life cycle and different forms of the family.

[425 Economics of Recreation and Leisure Spring. 3 credits. S-U grades optional. Prerequisite: microeconomics. Recommended: a course in sociology. Not offered 1980–81.

T R 8–9:15. W. Gauger.

The course focuses on leisure time use and views recreational activities as consumer goods that are subject to economic decisions on the allocation of time and money. Empirical observations and data will be examined for theoretical insights.]

430 The Economics of Consumer Policy Fall. 3 credits. Prerequisites: Economics 101–102, or permission of instructor.

M W F 2:30. E. S. Maynes.

Students are acquainted with the basic approaches to consumer policy and perform economic analyses of specific consumer policy issues. Consumer sovereignty, the consumer interest, and consumer representation are all dealt with, along with economic analyses of current and enduring consumer policy proposals and programs.

[441 Housing Finance Spring. 3 credits. Prerequisites: Economics 101–102 and CEH 147. S-U grades optional. Not offered 1980–81.

T R 8–9:55. C. Meeks.

Examines the residential financing process, alternative instruments, and sources of credit. Both primary and secondary mortgage markets are discussed as well as the impact of legislation on these markets. Also examined are the implications of the financing process for consumers.]

443 Social Effects of the Housing Environment Fall. 3 credits. Prerequisite: CEH 147 or CEH 148. S-U grades optional.

T R 2:30–3:45. Staff.

A seminar dealing with the interplay of housing and human behavior. Physical and social deterministic viewpoints are considered. Discussion of substantive issues including the effect of housing on crime rates, health, racial attitudes, and satisfaction. Research skills are developed to analyze and evaluate critically the literature in the field.

449 Housing Policy and Housing Programs

Spring. 3 credits. Prerequisites: Economics 101 or equivalent and CEH 147. S-U grades optional.

T R 10:10–11:25. S. Clemhout.

Critical examination of the development and current state of federal and selected state housing policies. Beginning with the rationales for government housing policy, the course will examine the purpose of various housing programs, assess their operation and potential for continued effective functioning. Topics include public housing, cash-based housing programs, urban renewal, and the operation of the secondary mortgage market. The applications and effects of state and federal housing policies in New York City will be addressed.

465 Consumer and the Law Fall. 3 credits.

Prerequisite: CEH 100 or equivalent. S-U grades optional.

T R 10:10–11:25. M. Galenson.

The operations of federal agencies and the courts in various consumer areas, including compensation for injury from defective products, deceptive advertising, the Fairness Doctrine in television and radio broadcasting, the regulation of food and pharmaceutical drugs, class actions, fraud, and a proposed consumer protection agency.

472 Community Decision Making Fall. 3 credits.

Prerequisite: Govt 111 or equivalent. S-U grades optional.

T R 8–9:55. A. Hahn.

Identification and discussion of factors that influence the outcomes of community issues. Topics include political participation, decision-making processes, the interests and resources of key decision makers, and community change. Concurrent participation in community activities is desirable but not required.

480 Welfare Economics Fall. 3 or 4 credits.

Prerequisite: permission of instructor before preregistration. S-U grades optional.

M W F 9:05. S. Clemhout.

A study of the social desirability of alternative allocation of resources. Topics include Pareto Optimality, external effects on production and consumption with applications to problems of environmental quality, public expenditure decisions, measurement of welfare, and evaluation of relevant public policy issues.

[485 Public and Private Decision Making Spring.

3 credits. Prerequisite: an intermediate microeconomic theory course or equivalent. Offered 1981–82 and alternate years. Not offered 1980–81.

T R 2:30–3:45. M. Lea.

This course will focus on the demand for and provision of public goods and the evaluation of government programs providing such goods. Individual demand for public goods as expressed through voting and other ways that reveal preferences will be examined, as will the behavior of bureaucracies and other institutions providing public goods. Cost-benefit analysis as a tool of evaluation will be discussed and programs in both the consumer and housing areas will be evaluated as case studies.]

600 Special Problems for Graduate Students Fall or spring. S-U grades optional.

Hours to be arranged. Staff.

Independent advanced work by graduate students recommended by their chairperson and approved by the head of the department and the instructor.

[619 Seminar in Family Decision Making Fall.

3 credits. Prerequisites: graduate standing and some background in home or family management. S-U grades optional. Not offered 1980–81.

T R 12:20–2. A. Davey.

An in-depth study of family decision making based on the several approaches found in the literature of home or family management.]

[621 Explorations in Consumer Economics

Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. Not offered 1980–81.

Hours to be arranged. Staff.

With the guidance of the instructor, students will select and investigate independently a substantive current consumer issue. Topic selected must be one that can be studied within both an economic and an institutional framework. Students will present status reports of their investigation to the group regularly for criticism and feedback. A term paper is required.]

626 Economics of Household Behavior I Spring.

3 credits. Prerequisite: Economics 311 or concurrent enrollment in Economics 311. S-U grades optional.

M W F 10:10. K. Bryant and J. Gerner.

Introduction at graduate level to theory and empirical research on household demand, consumption, saving, and market work, with implications for current policy issues. Provides introduction to more advanced treatment of market work, household production, and economics of the family presented in CEH 627.

627 Economics of Household Behavior II Fall.

3 credits. S-U grades optional. Prerequisites: Econ 311 and CEH 626.

M W F 10:10. K. Bryant and J. Gerner.

Further examination of theoretical and empirical literature concerning market work, household production, and family formation, as well as policies in these areas. Based on introduction provided in CEH 626.

630 Family Financial Management Spring.

3 credits. Prerequisites: introductory statistics course and CEH 330 or equivalent. S-U grades optional.

W 2–4:25. R. Heck.

The study of management theory applied to the financial dimension of the household. Resource use will be examined, emphasizing financial resources such as income, expenditures, savings, credit, and investments. A critical examination of current theories in the area of management and a survey of literature in the field will be included.

640 Fundamentals of Housing Fall. 3 credits.

Prerequisite: graduate standing or permission of instructor. S-U grades optional.

W 2:30–4:25. P. Chi.

An introductory survey of housing as a field of graduate study. Consideration of the spatial context and institutional setting of housing; the structure and performance of the housing market; housing finance;

the house-building industry; the nature and impact of government housing programs; the social and economic effects of housing regulations.

[642 Advanced Housing Market Analysis Fall.

3 credits. Prerequisite: Economics 311 or equivalent. S-U grades optional. Offered 1981–82 and alternate years. Not offered 1980–81.

R 2:30–5. M. Lea.

The interaction of supply and demand in the housing market studied from a spatial perspective through location theory and the development of metropolitan areas, and from a time perspective involving new construction and residential filtering. Topics to be studied include both theoretical and empirical location models, empirical housing demand and supply studies, optimum city size, property value and rent determination models and housing discrimination studies.]

[648 Demographic Aspects of Housing Spring.

3 credits. S-U grades optional. Prerequisite: graduate standing or consent of instructor. Not offered 1980–81; next offered 1981–82.

R 2:30–4:25. P. Chi.

The dynamic relationship between population and the housing market. The size and composition of the population, components of population growth, population distribution, and residential location will be analyzed in light of the amount and quality of the housing stock. The course will use techniques and models for population and housing projections at both national and subnational levels. A set of computer programs will help students actually use various techniques to project population structure and housing demand.]

[665 Seminar on Consumer Law Problems

Spring. 3 credits. Open to CEH graduate students and to others with permission of instructor. Enrollment limited to 20 students. S-U grades optional. Not offered 1980–81.

T 10:10–12:05. Staff.

A study of areas of current interest to consumers involving the law as developed by regulatory commissions and the courts, with emphasis on the institutional and economic background. The aim is to encourage critical examination of policy issues and their social and economic effects on families.]

680 Applied Welfare Economics — Policy Issues

Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional.

M W F 9:05. S. Clemhout.

Topics vary from year to year. The objective of the course is to evaluate the economic impact of various policies in conjunction with the efficiency of existing institutions. Policy issues covered include education (effects of automation and so forth), health, and environmental problems (urban development or transportation, for example). Attention is given to the interrelationship of policy and planning within the larger economic and sociopolitical framework.

697 Seminar Fall or spring. Noncredit course.

M 4–5. Staff.

Planned to orient students to graduate work in the field, to keep students and faculty abreast of new developments and research findings, to acquaint them with topics in related areas, and to examine and discuss problems of the field.

[726 Consumption and Demand Analysis Spring.

3 credits. Prerequisite: intermediate economics theory or permission of instructor. S-U grades optional. Offered 1981–82 and alternate years. Not offered 1980–81.

M W 1:25–3:20. K. Bryant.

Major developments in the theory of household behavior with applications to consumption, saving, physical asset, debt, and liquid asset positions of households; demand and expenditure analyses, economics of consumer information; market work and homework activities of households; economics of household size and form.]

[727 Human Capital Fall. 3 credits. Prerequisite: intermediate economic theory or permission of instructor. Recommended but not required: CEA 411. S-U grades optional. Offered 1982-83 and alternate years. Not offered 1980-81.

Hours to be arranged. J. Gerner.
This course examines the public sector policies that influence family time allocation decisions. Particular attention will be given to the time allocated by female family members to nonhousehold activities and how these activities are influenced by outside economic forces and by internal family characteristics.]

[740 Seminar in Current Housing Issues Spring. 1-3 credits. Prerequisite: permission of instructor. S-U grades optional. Not offered 1980-81.

F 9:05-11. Staff.
Focuses on a selected group of national issues related to housing. The issues evaluated vary from year to year, based on current importance and student interest. When possible, this course presents present or recent research, with emphases on both content and methodology.]

743 Readings in Housing Spring. 2 credits. Prerequisite: permission of instructor. S-U grades optional.

Hours for discussion of readings to be arranged. Staff.

758 Seminar for Doctoral Candidates Fall. 2 credits. S-U grades optional. Staff.

Review of critical issues and thought in consumer economics and public policy questions.

899 Master's Thesis and Research Fall or spring. Prerequisite: permission of the chairperson of graduate committee and the instructor. S-U grades optional.

Graduate faculty.

999 Doctoral Thesis and Research Fall or spring. Prerequisite: permission of the chairperson of graduate committee and the instructor. S-U grades optional.

Graduate staff.

Design and Environmental Analysis

W. R. Sims, Jr., chairman; N. C. Saltford, graduate faculty representative; G. Atkin, R. Barker, F. D. Becker, M. Boyd, A. Bushnell, C. N. Cawley, C. C. Chu, P. Eshelman, C. E. Garner, A. T. Lemley, B. A. Lewis, W. J. McLean, S. H. Mensch, G. C. Millican, S. K. Obendorf, E. R. Ostrander, M. Purchase, A. Racine, R. Rector, G. Sloan, C. Straight, S. S. Watkins, P. Weiss, M. V. White, C. Williams, C. Yackel

101 Design I: Fundamentals A Fall or spring. 3 credits. Each section limited to 23 students. Approximate cost of materials, \$50.

M W 1:25-4:25, or T R 10:10-1:10 or 1:25-4:25.

M. Boyd, C. Straight, C. Williams.
A studio course introducing the fundamental vocabulary and principles of design. Students experiment with the development of form through problem-solving approaches.

102 Design I: Fundamentals B Spring. 3 credits. Each section limited to 23 students. Prerequisite: DEA 101. Approximate cost of materials, \$35.

M W 1:25-4:25, or T R 8-11. M. Boyd.
A. Bushnell, C. Straight.
A study of visual organization including problems of color and visual perception. Emphasizes the development of visual sensitivity, imagination, and problem structuring, utilizing simple materials to produce abstract solutions.

111 Theory of Design Spring. 3 credits. Enrollment limited to 120 students; DEA majors given priority.

M W F 11:15. C. Williams.
Introduction to the field of design for the student in any academic area. The course reviews the spectrum of design activities, examining various movements in the visual arts and differences among designers in philosophical premises, social and functional roles, and cultural positions. Also examined are requirements in the man-made environment as affected by the interaction of people, design, and materials. Lectures and visual material are presented by DEA faculty and visiting design professionals.

115 Drawing Fall or spring. 3 credits. Each section limited to 25 students. Minimum cost of materials, \$15.

M W 1:25-4:25 or 7:30-10:30 p.m., or T R 1:25-4:25. P. Eshelman, C. Garner, S. Mensch, C. Millican, P. Weiss.

A studio drawing course. Short demonstrations or lectures on the idea and techniques of drawing are presented every week. The student is introduced to the functions of line, shape, and value as they apply to design. Drawing from the figure and from inanimate objects; perspective; and conceptual drawing are emphasized.

117 Drawing the Clothed Figure Spring. 3 credits. Enrollment limited to 25 students. Prerequisites: DEA 115 or equivalent. Priority given to DEA Option IB and II majors. S-U grades optional. Approximate cost of textbook and supplies, \$25-50.

M W 8-11. C. Garner.
Intended to improve students ability to illustrate two-dimensionally the interaction of draped fabric and the human form and to develop awareness of clothing as a design medium. Emphasis is on development of techniques and skills in selected media necessary for professional communication of design ideas.

135 Textiles I Fall. 3 credits. Prerequisite or corequisite: Chemistry 103 or 207. Each lab limited to 20 students. Maximum cost of supplies and textbook, \$30.

Lecs, M W 10:10; lab, T or W 2:30-4:25. R. Barker.
An introduction to the basic properties of textile materials, with consideration of their technology, consumer uses, and economic importance. Behavior of textile materials is observed in a variety of environmental conditions that influence aesthetics, comfort, and performance. This course is designed to provide a basis for further study in textiles, but it also contains sufficiently broad coverage of the subject to be used as an elective course.

145 Apparel Design I Fall or spring. 4 credits. Each lab section in the fall limited to 25 students; spring lec and lab sections limited to 40 students. Prerequisite: basic sewing skills. Those with formal course work in pattern design may take an exemption exam by contacting instructor the first day of registration. Approximate cost of supplies, \$30 plus fabric for final project.

Fall: lecs, T R 1:25; labs, M W 2:30-4:25 or T R 2:30-4:25. Spring: lecs and labs, M W 7:30-10:30 p.m. A. Racine.

Intensive study of principles and processes of flat pattern design and fitting techniques with emphasis on development of creative expression.

Sewing skills are not taught. For those with limited skills, an autotutorial laboratory must be scheduled concurrently or prior to enrollment. Contact the instructor. Materials for autotutorial laboratories. \$10.

150 Environmental Analysis: Human and Social Factors Fall. 3 credits. Required for DEA majors, who must complete the course in the freshman or sophomore year.

M W F 12:20. F. Becker, G. Sloan.
Introduction to study of relations between physical environment and behavior of individuals and groups.

Perception of space and effects of spatial arrangements on interactions between persons. Significance of human capabilities and limitations as factors in designing person-environment systems. Guidelines for analyzing environmental conditions.

201-202 Design II 201, fall; 202, spring. 6 credits per term. Prerequisites: DEA 101; DEA 115 prerequisite or corequisite with 201; DEA 102 prerequisite or corequisite with 202; or permission of instructor; recommended: DEA 111, 150. Each section limited to 15 students. Minimum cost of materials, \$60 per semester, shop fee, \$10. Additional spring fees: darkroom fee, \$10; optional field trip, approximately \$60.

M W 8-11 and T R 1:25-4:25, or M W 1:25-4:25 and T R 8-11. A. Bushnell, P. Eshelman, P. Weiss.
A studio course emphasizing the conceptualization of form as a function of the theory and handling of materials. Included are basic drafting, model building, and presentation drawing. The course is structured around a series of design problems, three to five weeks in length, using wood, plastic, metal, glass, ceramics, concrete, and textiles. Where possible, problems include the handling of the actual materials.

230 Science for Consumers Fall. 3 credits. Each lab limited to 20 students. Not open to students who have taken DEA 434. Prerequisite: high school or college chemistry or physics. S-U grades optional.

Lecs, T R 9:05; lab, W 12:20-2:15 or 2:30-4:25. M. Purchase.
Principles of science related to consumer problems, such as energy conservation in the home, electricity in dwellings, heat transfer, control of temperature, humidity, sound, and odors in dwellings, mechanics of equipment, chemistry of cleaning agents, and chemical characteristics of surfaces to be cleaned. Particularly valuable for environmental designers and analysts and students planning to work with consumers as teachers, extension workers, home service personnel, or consultants.

232 Science, Technology, and Human Needs Spring. 3 credits. Prerequisite: high school chemistry or physics. S-U grades optional.

M W F 10:10. A. T. Lemley.
An examination of some underlying scientific principles of today's complex technology, designed to enable students to identify, understand, and better evaluate current problems that have a basis in the physical sciences and are of concern to society. Some areas to be covered: air and water quality, computers, body chemistry, medicine and drugs, cosmetics, communications, energy, and synthetic materials. Course relates principles of the natural sciences to specific applications that affect people and their environment.

235 Textiles II Spring. 3 credits. Each lab limited to 16 students. Prerequisites: DEA 135 and 2 semesters of chemistry.

Lec, T 9:05; labs, T R 10:10-12:05 or M W 1:25-3:20. S. K. Obendorf.
A study of critical performance characteristics of textiles and the relation of these characteristics to use of textile articles. Emphasis is on comfort, durability, and special performance characteristics. Also included is study of the purposes, scope, and limitations of laboratory textile testing and the relations between laboratory testing and end-use performance.

240 Clothing Through the Life Cycle Spring. 3 credits. Not open to students who have taken DEA 445.

T R 10:10-11:30. S. Watkins.
An introduction to clothing as it affects the physical and psychological well-being of the individual. Emphasis is on the functional aspects of clothing for individuals from infancy through old age and for

groups such as the handicapped or those in special occupations. Students explore the resources available to the designer for solving clothing problems.

245 Dress: A Reflection of American Women's Roles Fall. 3 credits. Enrollment limited to 40 students. S-U grades optional. Because the class meets only once a week, attendance at each session, especially the first, is extremely important.
M 7:30–10:30 p.m. A. Racine.

A historical survey of changing patterns of American women's dress from the colonial period to present day, as well as the sociocultural forces that affected women's development within the social class structure. The Cornell Costume Collection and illustrated lectures are used to develop an awareness of historic costume, while assigned readings will focus on expected roles. Students will investigate topics dealing with the impact of dress on cultural assimilation of immigrant women in America.

250 Environmental Psychology: Perspectives and Methods Fall. 3 credits. Prerequisite: DEA 150 or permission of instructor. Graduate students should enroll in DEA 660 concurrently with 250.

T R 10:10–11:30. F. Becker.
Issues central to the study of person-environment relationships and the uses of evaluation research in the design process.

251 Historic Design I: Furniture and Interior Design Fall. 3 credits. Prerequisites: DEA 101 and 111. Recommended sequence: DEA 251, 252, and 353.

M W F 11:15. G. C. Millican.
A study of the patterns of historical development and change in furniture and interiors from man's earliest expressions through the eighteenth century as they reflect the changing cultural framework of Western civilization, excluding America.

252 Historic Design II: Furniture and Interior Design Spring. 3 credits. Prerequisite: DEA 101. Corequisite: DEA 111. Recommended sequence: DEA 251, 252, and 353.

M W F 8. G. C. Millican.
A study of the patterns of historical development and change as revealed through American furniture and interiors, 1650–1885. Design forms are considered individually, collectively, and in their historical context as they express the efforts, values, and ideals of American civilization.

261 Fundamentals of Interior Design Fall. 3 credits. Enrollment limited to 20 students. Prerequisite: DEA 101. Minimum cost of materials, \$30.

T R 1:25–4:25. G. C. Millican.
A studio course that emphasizes the fundamental principles of design applied to the planning of residential interiors and coordinated with family and individual needs. Studio problems explore choices of materials, space planning, selection and arrangement of furniture, lighting, and color. Illustrated lectures, readings, and introductory drafting and rendering techniques are presented.

264 Apparel Design II Fall. 3 credits. Prerequisites: DEA 145 and completion of or concurrent registration in DEA 101 and 135. Recommended: DEA 115 and 240. Apparel design majors should take DEA 264 and DEA 367 in the same academic year. Minimum cost of materials, \$40.

T R 1:25–4:25. C. Yackel.
A studio course interrelating two techniques for designing apparel: draping and advanced flat pattern. Problems require the student to make judgments regarding the design process, nature of the materials, body structure, and function.

300 Special Studies for Undergraduates Fall or spring. Credit to be arranged.

Hours to be arranged. Department faculty. Special arrangement for course work to establish equivalency for courses not transferred from a previous major or institution. Students prepare a multicopy description of the study they wish to undertake on forms available from the Counseling Office. The form, signed by both the instructor directing the study, and the head of the department, is filed at course registration or during the change-of-registration period.

301–302 Design III 301, fall; 302, spring. 6 credits per term. Prerequisites: DEA 201–202. DEA 302 and DEA 499 may not be taken concurrently. Minimum cost of materials, \$60 per semester.

M T W R 1:25–4:25. S. Mensch.
A studio course emphasizing the conceptualization of form as a function of human and social factors. Environmental analysis concepts and techniques are studied to provide design students with enough understanding to begin a behaviorally based design project. Several short-term problems are explored in the fall semester. More complex problems are undertaken in the spring semester.

330 Household Equipment Principles Spring. 3 credits. Prerequisites: NS 146 or DEA 135 or DEA 230. S-U grades optional.

M W 2:30–4:25. M. Purchase.
Principles of operation of appliances for food preparation and preservation, cleaning, laundering, temperature and humidity control, and lighting. Use of energy by appliances. Evaluation of features in relation to their functions and cost. Selection, use, and care of household equipment. Individual study related to the student's background and interests.

335 Textiles III: Structure and Properties Spring. 4 credits. Prerequisites: DEA 235; Physics 101, 112, or 207; and Chemistry 253 and 251, or 357–358 and 251.

Lecs, M W F 12:20; plus 3-hour lab to be arranged. C. C. Chu.
An in-depth study of the structures of textile materials and their component parts, from polymer molecules through fibers and yarns to fabrics, and the techniques of controlling structure to achieve desirable end-use properties. Emphasis is on properties important to the consumer, including easy care, elasticity, durability, comfort, and aesthetics. Laboratory experimentation illustrates the important interrelationships among structures and properties of polymers, fibers, yarns, and fabrics.

338 Textiles for Interiors and Exteriors Spring. 3 credits. Prerequisites: DEA 235 or permission of instructor. S-U grades optional.

M W 7:30–9:30 p.m. V. White.
Through lectures, seminars, and laboratory experiences, students examine interior and exterior environments and their interaction with textiles. Physical and chemical properties of fiber, yarn, and fabric are studied relative to product requirements such as product reliability, safety, performance, and aesthetics. Communication at consumer, government, and industry interfaces is considered.

[342 Design: Weaving Fall or spring. 3 credits. Limited to 12 students. Prerequisite: DEA 101. Recommended: DEA 102, 115, 135. Minimum cost of materials, \$65. Not offered 1980–81.

A studio course encompassing the basics of weaving and the functioning of a loom. Using a variety of fibers, yarns, and other materials, students are introduced to design possibilities on the loom. Relationships between color, design technique, and function are explored by weaving a number of experimental samples and several more complicated woven projects.]

343 Design: Introductory Textile Printing Fall. 3 credits. Each section limited to 15 students. Prerequisites: DEA 101 and at least one other studio design course. Minimum cost of materials, \$50.

M W 1:25–4:25 or T R 10:10–1:10. C. Straight.
A studio course exploring the print as a design form. Silk-screen printing is the basic process used, but opportunities are provided for using other processes.

349 Graphic Design Fall or spring. 3 credits. Enrollment limited to 18 students. Prerequisite: DEA 201 or permission of instructor. Priority given to DEA majors. Approximate cost of materials, \$25.

M W 7:30–10:30 p.m. M. Boyd.
The fundamentals of lettering, typography, layout, and presentation techniques. Printing processes and the use of photography and illustration also are covered. Consideration is given to graphics in product and interior design, packaging, exhibit design, and informational systems.

350 Environmental Analysis: Human Factors Spring. 3 credits. Recommended: DEA 150.

M W F 12:20. G. Sloan.
Implications of human characteristics and limitations on the design and modification of the built environment. An introduction to engineering anthropometry, work physiology, biomechanics, lighting, acoustics, and methods of noise control. Application of human factor concepts and data to the design of settings, products, and tasks.

351 Selected Topics in History of Costume Spring. 3 credits. S-U grades optional.

Recommended: courses in history of art or cultural history.
M W 10:10–12:05. C. Yackel.
A study of the relationship between costume and culture in selected periods of history from ancient times to the present. History is used as a resource for solving contemporary apparel needs. Lectures and class discussion are illustrated with items from the Cornell Costume Collection.

353 Historic Design III: Contemporary Design Spring. 3 credits. Prerequisite: DEA 101; corequisite: DEA 111. Recommended sequence: DEA 251, 252, and 353.

M W F 10:10. G. C. Millican.
A historical study of the emergence and development of contemporary design, 1885 to present. Examines the social, economic, technical, and stylistic forces that shape the design forms of the present and includes a critical analysis of selected works of furniture, fabrics, and interiors.

361 Residential Design Spring. 3 credits. Prerequisite: DEA 201 or 261, or permission of instructor. Recommended: DEA 135 and 350. Approximate cost of materials, \$30.

T R 8–11. G. C. Millican.
An introduction to residential architectural design. While designing a solution for specific occupant needs, students consider site, orientation, climate, and materials. Drafting room work consists of plans, elevations, perspectives, and presentation of solutions. Lectures, discussions, and required readings.

367 Apparel Design III Spring. 4 credits. Prerequisites: DEA 111, 115, 150, 240, and 264. Corequisites: DEA 235 and 117. Apparel design majors should take DEA 264 and DEA 367 in the same academic year. Minimum cost of materials, \$50.

T R 1:25–4:25. C. Yackel.
A studio course covering color theory, form study, accessory work, and the use of nontraditional materials for body coverings. Development of the design process as it relates to problem solving will be stressed. Problems focus on the aesthetic and functional nature of dress. The Cornell Costume Collection is used for illustration and inspiration.

400-401-402 Special Studies for Undergraduates Fall or spring. Credits to be arranged. S-U grades optional.

Hours to be arranged. Department faculty. For advanced, independent study by an individual student or for study on an experimental basis with a group of students in a field of DEA not otherwise provided through course work in the department or elsewhere at the University. Students prepare a multicopy description of the study they wish to undertake on forms available from the Counseling Office. This form must be signed by the instructor directing the study and the department chairman and filed at course registration or within the change-of-registration period after registration. To ensure review before the close of the course registration or change-of-registration period, early submission of the special studies form to the department chairman is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study:

400 Directed Readings For study that predominantly involves library research and independent reading.

401 Empirical Research For study that predominantly involves data collection and analysis or laboratory or studio projects.

402 Supervised Fieldwork For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

430 The Textile and Apparel Industries Fall. 3 credits. Prerequisites: CEH 233, DEA 235, or permission of instructor.

M W 12:20-2:15. N. Saltford.

A critical review of the textile and apparel industries including structure and marketing practices, and government policies that affect industry decisions and operations in such areas as energy, the environment, safety, international trade, and employee benefits and opportunities. The role of trade unions also is explored. A one-day field trip is arranged when feasible.

431 The Textile and Apparel Industries — Field Experience Second week of January intersession. 1 credit. Prerequisite or corequisite: DEA 430. S-U grades only. Offered alternate years. Students are responsible for trip expenses, approximately \$175.

N. Saltford.

A one-week field experience in the textile regions of the South. Students have the opportunity to see various textile processes including fiber production, knitting, weaving, dyeing and finishing, and designing. In addition, seminars with executives of each participating firm relate theory to current practice.

434 Care of Textiles Fall. 2 credits. Prerequisite: DEA 235. Not open to students who have taken DEA 230. Offered alternate years.

W 9:05 and F 9:05-11:00. M. Purchase.

The interaction of textiles with soils and stains, cleaning agents, and laundry equipment. Topics include characteristics of soils, mechanisms for bonding soils to substrates, textile properties and changes related to care processes, functional finishes, wet- and dry-cleaning processes, the supplies and techniques used in cleaning, and instructions for care.

436 Textiles IV: Textile Chemistry Fall. 4 credits. Prerequisites: DEA 235; Chemistry 253 and 251 or Chemistry 357-358 and 251.

Leccs, T R 10:10; labs, T R 11:15-1:10. B. A. Lewis. An introduction to the chemistry of the major classes of natural and man-made fibers, including their structure, properties, and reactions. Labs include the

qualitative identification of textile fibers and consideration of chemical damage to fabrics, finishes, and dyes.

438 Apparel Textiles Fall. 3 credits. S-U grades optional. Prerequisites: DEA 235, 264, or permission of instructor.

M W 2:30-4:25. V. White.

A study of the interrelationships of aesthetics, fashion and function, and other trade-offs of concern to the consumer. Consideration of the use of standards, specifications, and other means of communication at consumer, government, industry interfaces. Individual or team projects. Seminars and lectures with required readings. Labs include evaluation of apparel.

439 Textile Materials for Biomedical Use Fall. 2 credits. S-U grades optional for non-DEA majors. Prerequisites: DEA 135, 235, or permission of instructor.

T 2:30-4:25. C. C. Chu.

Focuses on chemical and physical properties of textiles and the performance of textile materials (including structures for general hospital use and internal or external body use) clinically and in the laboratory. Typical materials include sutures, surgical dressings, elastic stockings, surgical apparel, and prosthetic materials. The impact of governmental regulations also will be examined.

445 Apparel Design IV: Theory of Functional Clothing Fall. 3 credits. Prerequisite: DEA 367. It may be possible for students outside the major with sufficient background to waive the prerequisite with permission of the instructor.

M W 10:10-12:05. S. Watkins.

Application of theories of physical science to problems in clothing design. Problems require the student to relate three aspects of apparel design: needs and functions of the human body, structural properties of materials, and apparel forms. Information gained from study and testing of textiles and garment forms is applied to the problems of movement, warmth, impact protection in active sports equipment, and other topics related to comfort and function of clothing.

455 Psychology of the Near Environment Spring. 3 credits. Prerequisites: DEA 150, Psychology 101, and either Psychology 128, HDFS 115, or an equivalent. Recommended: a statistics course.

M W F 10:10. E. Ostrand.

An exploration of the interaction of human beings and the immediate nonsocial environment. Interaction is considered in terms of basic psychological processes, including perception, learning, and motivation. Applications of psychological principles are made to consumer products such as clothing and appliances and the settings in which we live, work, and play.

465 Apparel Design V: Product Development and Presentation Spring. 3 credits. Prerequisites: DEA 117 and 367 or permission of instructor. Recommended: DEA 102, 430, 445, Economics 102, CEH 233. Minimum cost of materials, \$50.

M W 1:25-4:25. A. Racine.

Through studio problems students examine the influence of manufacturing technology and cost on the designer. Projects are developed to various stages, from sketch to finished prototype.

499 Design IV Fall or spring. 1-8 credits. (A 4-credit senior project is required for the DEA option la major. Credits may be taken in 1 or 2 semesters. Students may elect additional credits in DEA 499, up to a total of 8 credits.) Prerequisite: DEA 301-302. DEA 302 and DEA 499 may not be taken concurrently. Minimum cost of materials, \$60.

T R 8-11. A. Bushnell, P. Eshelman, C. Williams, and department faculty.

A senior thesis (essentially a problem-solving experience): the problem area is selected by the student and approved by the department faculty.

Most projects will be within product design or interior design. However, other interests may be pursued if the department approves the proposal and if the student can find a DEA instructor who will be responsible for the program.

600 Special Problems for Graduate Students Fall or spring. Credit to be arranged. S-U grades optional.

Hours to be arranged. Department faculty. Independent, advanced work by graduate students recommended by their chairmen and approved by the head of the department and instructor.

608 Shelter Spring. 3 credits. Undergraduates and non-DEA graduate students must have permission of the instructor. S-U grades optional.

Hours to be arranged. C. Williams.

A combination seminar and lecture course. Historical aspects of housing since World War I: structures and materials, energy constraints; construction and manufacture; cost; physical and psychological human needs; survey of housing patterns.

[621 Textile Fiber Evaluation by Modern Analytical Techniques Spring. 3 credits.

Prerequisites: DEA 335 or 436 or permission of instructor. S-U grades optional. Offered alternate years; Not offered 1980-81; next offered 1981-82.

M W F 11:15. S. K. Obendorf.

Study of modern analytical methods, including electron microscopy, scanning and transmission electron microscopy, X-ray analysis, microprobes, X-ray diffraction, laser Raman spectroscopy, electron spin resonance. Evaluation of the application of these techniques in textile and polymer science. Labs on campus will be visited for demonstrations.]

630 Physical Science in the Home Fall.

2 or 3 credits (3 credits require laboratory attendance). Prerequisite: college chemistry. S-U grades optional. Consult instructor before registering.

Leccs, T R 9:05; lab, W 2:30-4:25. M. Purchase.

Applied physical science for professionals working with consumers and home appliances. Energy conservation is considered, selected principles from physics are applied to household equipment, and the chemistry of cleaning supplies and cleaning processes is studied.

635 Special Topics in Textiles Spring. 3 credits. Prerequisite: DEA 235 or permission of instructor.

Hours to be arranged. S. K. Obendorf.

An in-depth study of one or more selected topics such as comfort, formed fabrics, flammability. Relationships of fabric properties and end-use performance as well as test method development will be studied in the laboratory.

[636 Advanced Textile Chemistry Spring. 4 credits. Prerequisite: DEA 436. Offered alternate years. Not offered 1980-81.

The chemistry and physicochemical properties of natural and synthetic rubbers, polyurethanes and other elastomeric materials, high-temperature polymers, and inorganic materials used as textile fibers and the relationship between their chemistry and functional properties as textile materials. Other topics will include polymerization processes, textile finishing processes, dyes and dyeing, and degradation of textile materials under environmental conditions.]

637 Textile Seminar Fall or spring. 1 credit. S-U grades only. Required every semester of all graduate students in textiles.

T 4:30-5:45. V. White.

Topics of major concern to the field and discussion of research in progress by faculty, students, and invited guest speakers.

639 Mechanics of Fibrous Structures Fall. 3 credits. Prerequisites: DEA 235 or equivalent or permission of instructor. Corequisite: DEA 335.

Hours to be arranged. R. Barker.

A study of the pioneering research in the mechanics of textile structures: creep phenomena and the dynamic properties of fibers and yarns, idealized yarn and fabric models and their relationship to research data, special topics in the deformation of yarns and fabrics in tensile, shear, and compression stress, fabric bending and buckling, and the mechanical behavior of nonwoven textile materials.

650 Person-Environment Fit: Systems Analysis Spring. 3 credits. Recommended: DEA 350, DEA 455.

T R 9:05. G. Sloan.

An introduction to systems analysis, with an emphasis on the formulation of system requirements that follow from user characteristics and limitations. Application of human factor problem-solving techniques to the design and operation of both new and existing systems (settings, consumer products, and organized activities).

653 Nonverbal Communication: The Role of Objects and Space in Everyday Life Spring. 3 credits. Limited to 20 students. Prerequisites: introductory psychology or sociology and permission of instructor for undergraduates.

M W 7:30–9 p.m. F. Becker.

Starting from the premise that the psychologist's first task is to discover the problems hidden in the familiar, the course will focus on the ways people relate to and use objects and space as symbols affecting group and interpersonal processes in their everyday lives.

655 Social Psychology of the Near Environment Fall. 3 credits. Prerequisites: elementary psychology and DEA 250 or 350 or 455, or permission of instructor.

M W F 11:15. E. Ostrander.

The impact of the near environment on our behavior as social beings. Ways our environment facilitates or hinders effective functioning, individually or in groups, considered in terms of sociopsychological theory. Frameworks developed for analyzing our social behavior in varied settings. Methodological problems are considered.

659 Topics in Human Environments Fall or spring. 1 credit. S-U grades only. Expected every semester of graduate students majoring and minoring in environmental analysis—human-environment relations.

R 12:20. DEA faculty.

Seminar on current issues and content in the field of person-environment relations. Discussion by faculty, students, and invited guests.

660 Environmental Psychology: Perspectives and Methods Fall. 1 credit. Prerequisite: permission of instructor. Graduate students should register for DEA 250 concurrently with 660.

Hours to be arranged. F. Becker.

Focus is on the relationships between people and their environment and the uses of evaluative research in the design process.

899 Master's Thesis and Research Fall or spring. Credit to be arranged. Prerequisite: permission of the chairman of the graduate committee and the instructor. S-U grades optional.

Hours to be arranged. Department graduate faculty.

111 Observation Spring. 3 credits. Not open to first-semester freshmen.

M W F 11:15. Staff.

An overview of methods of observing people and the settings in which they behave in order to (a) develop observational skills, (b) increase understanding of behavior and its development, and (c) acquaint students with basic methodological concepts underlying the scientific study of behavioral development. Direct experience in applying observational methods in laboratory and real-life settings is emphasized. Discussion groups accompany the observation experience.

115 Human Development: Infancy and Childhood Fall. 3 credits. S-U grades optional.

M W F 11:15. Staff.

Provides a broad overview of theories, research methods, and the status of scientific knowledge about human development from infancy through childhood. Attention is focused on the interplay of psychological factors, interpersonal relationships, social structure, and cultural values in changing behavior and shaping the individual. Special emphasis is given to the social implications of existing knowledge.

116 Human Development: Adolescence and Youth Spring. 4 credits. S-U grades optional.

Lecs, M F 1:25; sec, W 1:25. M. Basseches and/or R. Savin-Williams.

Provides a broad overview of theories, issues, and research in the study of human development from early adolescence to early adulthood (youth). Attention is focused on the interplay of biological and cognitive factors, interpersonal relationships, social structure, and cultural values in shaping the individual's development. Familial, peer group, educational, and work contexts for development are discussed.

141 Introduction to Expressive Materials Spring. 3 credits. Limited to 18 freshmen and sophomores.

T R 2:30–4:25. W. L. Brittain.

Designed to explore the means and materials suitable for creative expression for children of different ages, as well as for adults. Students are expected to acquire competence in evaluating and utilizing various media and understanding the creative process. Experimentation in paint, clay, chalk, crayon, paper, wire, plaster, wood, and other materials.

150 The Family in Modern Society Fall. 3 credits.

M W F 1:25. Staff.

Contemporary family roles and functions are considered as they appear in United States history, as they change over the life cycle, and as they are influenced by the locales in which families live and the social forces that impinge on them.

212 Early Adolescence Fall. 3 credits.

Prerequisite: HDFS 116. Strongly recommended: a course in biology. S-U grades optional.

T R 12:20–2:15. R. Savin-Williams.

Examines the period of the life-cycle during which the biological changes of pubescence occur. The impact of these changes on individual behavior, interpersonal relations with peers and family, the relationship of the individual to society, and individual psychological development in general are explored.

[218 From Adolescence to Adulthood: Developmental Issues Fall. 3 credits. Prerequisite:

HDFS 116. S-U grades optional. Offered alternate years. Not offered 1980–81.

Explores effects on individual and society when many people well beyond puberty are not yet granted full adult social status or not assume typical adult roles and responsibilities (for example, students, transients, people experimenting with alternative life-styles). Considers both the unique developmental potentials and the stresses of youth associated with questioning of what it means and what it takes to become a full member of adult society. Intimacy,

vocational choice, life-style choice, religious and political commitment, moral judgment, intellectual functioning and orientation, self-concept, and authority and dependence relations will be treated as developmental and stressful issues of this period, with several of these examined in depth.]

242 Participation with Groups of Children in the Early Years Fall or spring. 4 credits. Prerequisites:

HDFS 111 and 115. Each section limited to 20 students. Course limit depends upon the availability of placements and of supervision. S-U grades optional.

Lecs, M W 12:20; two additional half-days of field study each week, either two mornings (9–12) or afternoons (1–4)—mornings are preferred. Staff.

A field-based course structured to integrate practicum, lectures, discussions, readings, and term projects to provide a better knowledge and understanding of children between the ages of two and six. Practicum settings include nursery schools, day-care centers, Head Start centers, and the Special Children's Center.

243 Participation with Groups of Children in the Middle Years Spring. 4 credits. Enrollment limit

depends on the availability of placements and supervision; maximum enrollment 15 students. Prerequisites: HDFS 111 and 115. S-U grades optional.

T 10:10–12:05; two additional half-days of field study, either 9 a.m.–noon (the preferred time) or noon–3 p.m. Staff.

A field-based course structured to integrate practicum, lectures, discussions, readings, and other assignments to provide better knowledge and an understanding of children between the ages of seven and twelve. Practicum settings will be in elementary schools.

253 The Family (also Sociology 243) Fall.

3 credits. Human ecology students must register for HDFS 253.

T R 10:10 and 1 hour to be arranged. B. C. Rosen.

The structure and function of the family both in the West and cross-culturally. Specific areas examined include sex roles, socialization, mate selection, sex and sexual controls, internal familial processes, disorganization, and social change.

270 Processes of Adaptation and Atypical Development Spring. 3 credits. Prerequisites:

HDFS 115, Psychology 101, or Education 110. M W F 9:05. Staff.

An introduction to atypical development through the study of environmental sources of stress on the growing person. Attention is given to the family, the neighborhood, the peer group, and the school in order to understand atypical adaptations and development.

300 Special Studies for Undergraduates Fall or spring. Credit to be arranged.

Hours to be arranged. Department faculty.

Special arrangement for course work to establish equivalency for courses not transferred from a previous major or institution. Students prepare a multicopy description of the study they wish to undertake on forms available from the Counseling Office. The form, signed by both the instructor directing the study and the head of the department, is filed at course registration or during the change-of-registration period.

302 Family and Community Health Fall or spring. 3 credits. S-U grades optional.

T R 1:25; sec 1, T 2:30, or sec 2, R 2:30. M. Doris.

This introduction to health science focuses on research and knowledge related to personal, family, and community responsibility for healthful living, disease prevention, and the environmental problems that affect the quality of health throughout the life cycle. Substantive material includes physical, mental, and emotional functioning, chemical alteration of behavior, family health, personal health care, and

Human Development and Family Studies

P. Schoggen, chairman; G. Suci, graduate faculty representative; M. Basseches, H. T. M. Bayer, W. L. Brittain, U. Bronfenbrenner, M. Cochran, J. Condry, J. Doris, M. Doris, G. Elder, H. Feldman, J. Gebhardt, A. Halpern, S. Hamilton, J. Harding, C. Howard, B. Koslowski, L. C. Lee, B. Lust, P. Moen, M. Potts, H. N. Ricciuti, R. Savin-Williams, L. Semaj, E. Walker, P. Ziegler

health in society. Discussion sections deal with decision making and application of theory in health science.

[307 Collective Behavior and Social Movements (also Sociology 307)] Fall. 4 credits. Prerequisite: a course in sociology or another social science. Human ecology students must register for HDFS 307. Not offered 1980–81.

T R 2:30–4. G. Elder.
An inquiry into social behavior that breaks with institutionalized or conventional forms, such as acting crowds, riots, social movements, and revolution. Analysis of antecedent conditions, emergent forms, processes, and consequences. Historical and contemporary studies will be covered.]

[313 Problematic Behavior in Adolescence] Fall. 3 credits. Prerequisites: HDFS 116 and one other course on adolescence. Students interested in adding related field experience should register concurrently for HDFS 410. Offered alternate years. Not offered 1980–81.

M W F 1:25. R. Savin-Williams.
Focuses primarily on juvenile delinquency and other problems of adolescence such as drug abuse, alcohol, pregnancy, suicide, and other social and personal issues.]

315 Human Sexuality: A Psychosocial Perspective Fall and spring. 3 credits. Prerequisite: introductory course in HDFS, psychology, or sociology, or equivalent social science course. S-U grades optional.

Fall: lec. T 12:20–1:35; sec R 12:20–1:35 or 2:30–3:45; H. Feldman. Spring: hours to be arranged; staff.

The aim of this course is to delineate the major psychological and sociological components of human sexual attitudes and behavior. Two central themes will be addressed: the development of sexual orientation over the life cycle and the evolution of sexual norms and customs within changing social systems. An underlying issue will be the role of moral assumptions and contemporary ethics in generating research and theory on human sexuality in the social sciences. Materials will be drawn from interdisciplinary sources including biology, history, and anthropology.

[333 Cognitive Processes in Development] Fall. 3 credits. Prerequisite: HDFS 115 or equivalent. Not offered 1980–81.

M W F 11:15. Staff.
A survey of theories and problems in the development of selected cognitive processes: attention, perception, mediation processes, and language.]

338 The Development of Creative Thinking Spring. 3 credits. Prerequisites: HDFS 115, Psychology 101, or Education 110. Not to be taken concurrently with HDFS 141.

M W F 9:05. W. L. Brittain.
A study of theories of creativity and a review of the research on creative behavior. Emphasis is on the conditions and antecedents of creative thinking.

342 Models and Settings in Programs for Children Fall. 3 credits. Prerequisite: HDFS 115.

T R 12:20–1:35. Staff.
Explores a wide range of programs for children. Basic theories and beliefs will be linked to programs they have helped create (i.e., Montessori, Piaget, Berier, Engleman, Bank Street Model).

[344 Infant Behavior and Development] Fall. 3 credits. Prerequisite: HDFS 115 or equivalent. Not offered 1980–81.

T R 12:20–1:35.
Nature and determinants of major developmental changes in infant behavior from birth to two years. Special attention directed to role of major environmental influences on perceptual-cognitive and social-emotional development, and to recent attempts to modify infants' experiences in the interest of facilitating psychological development.]

346 The Role and Meaning of Play Spring. 2 credits. Limited to 35 students. Prerequisites: HDFS 111 and 115.

W 7–9 p.m. Staff.
The role and meaning of play in the lives of children ages two through seven. Seminar discussions will integrate the theoretical literature on play with practical application in a variety of early childhood settings. Special emphasis on ways to facilitate play experiences through the structuring of the environment and the use of materials and equipment. Students will explore and construct early childhood materials in workshops.

347 Human Growth and Development: Biological and Social Psychological Considerations (also NS 347) Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent; HDFS 115 or Psychology 101; and NS 115 or equivalent.

M W F 1:25. J. Haas, H. Ricciuti.
A review of major patterns of physical growth from the fetal period through adolescence, with consideration given to biological and socioenvironmental determinants of growth, as well as to physical and psychological consequences of variations in growth patterns. Normal patterns of growth will be examined, followed by an analysis of major sources of variations in growth (normal and atypical).

348 Specialized Participation in Preschool Settings Spring. 3 credits. Limited to 10 students concurrently taking HDFS 346. Prerequisites: HDFS 242 and permission of instructor.

Hours to be arranged; two half-days and an hour staff meeting each week. Staff.
An advanced supervised fieldwork experience at the Cornell Nursery School. Designed for students who have mastered basic guidance skills with preschool children. The focus will be on developing more refined teaching techniques with learning materials.

352 Contemporary Family Forms in the United States Spring. 3 credits. S-U grades optional.

R 2–4:25 plus case study. H. Feldman.
Variations in family formation, organization, and functioning will be investigated with an emphasis on research findings about each of the family types. Family forms will range from the rural communal family to the more contemporary urban. The functions of each family form will be considered as they apply to the individual, the family, and to the society.

[354 The Family in Cross-cultural Perspective] Fall. 3 credits. Prerequisites: HDFS 115 or 116, Psychology 101 or Education 110, and HDFS 150 or Rural Sociology 100, or equivalent. S-U grades optional. Not offered 1980–81.

M W F 10:10. P. Moen.
The sociological study of families from a comparative perspective, looking at similarities and differences across cultures and across ethnic groups. A major focus is on the interdependence of the family system and social institutions.]

358 Theories of Adult Interpersonal Relationships Fall. 3 credits. S-U grades optional.

T 2:30–4:25 plus case study. H. Feldman.
Selective theories of the basic disciplines in social psychology, sociology, and psychology will be reviewed and their pertinence to understanding of adulthood examined. Students will generate hypotheses about these theories and test one of them through either a library or empirical paper. A notebook or journal will be kept to interrelate the concepts and to suggest practical justifications.

360 Personality Development in Childhood Fall. 3 credits. Prerequisites: HDFS 115 or Psychology 101, plus one other course in HDFS or psychology.

M W F 10:10. L. C. Lee.
Study of relevant theoretical approaches to and empirical findings regarding the development of the child's personality. The influence of parents and other environmental factors on the child will be examined.

Topics to be covered will be attachment, autonomy, identification, moral development, and social behavior.

361 The Development of Social Behavior Spring. 3 credits. Limited to 100 students. Prerequisite: HDFS 115 or Psychology 128.

M W F 10:10. J. Condry.
Issues in the development of social behavior are viewed from the perspective of theory and research. An attempt is made to apply our understanding of social behavior to education, childbearing, and group behavior. Likely topics include bases of social behavior in early childhood, the role of peers, the development of aggressive behavior, the development and functioning of attitude and value systems, conformity and deviation, and the function and limits of experimental research in the study of social development.

[365 The Study of Lives] Fall. 3 credits. Prerequisites: HDFS 115, 116, and 270 or equivalent. Not offered 1980–81.

M W F 9:05. J. Harding.
The study of personality development through the analysis of individual life histories. Biological, sociological, and psychodynamic influences will be given approximately equal emphasis. There will be extensive discussion of the development of motives, decision making, and personal relationships. The term paper will be a psychological analysis of a specific individual based on a published biography or autobiography.]

371 Behavioral Disorders of Childhood Spring. 3 credits. Prerequisites: Psychology 101 or Education 110, and a course in personality development (such as HDFS 270 or an equivalent).

M W F 12:20. E. Walker.
Considers the psychological disorders of childhood ranging from transient adjustment reactions to psychoses. The disorders will be studied in view of theories regarding etiology, treatment, and primary prevention.

372 Intellectual Deviations in Development Fall. 3 credits. Prerequisites: HDFS 115 and a personality course.

M W F 12:20. Staff.
Major forms of organic and familial retardation, perceptual and motor handicaps, and learning disabilities are considered with reference to problems of development, prevention, and remediation.

380 Aging in America Spring. 2 credits. Prerequisite: one social science course.

M W 9:05. J. Harding.
This course is a general introduction to social gerontology in America. Some attention is given to biological and psychological aspects of aging and considerable attention is paid to such problems as occupational retirement, bereavement, and the decline of physical health. The course also surveys social planning for the elderly and the provision of special medical, economic, and social services.

397 Experimental Child Psychology Fall. 4 credits. Prerequisites: one course in statistics and permission of instructor. Intended primarily for students interested in entering graduate programs involving further research training. Offered alternate years.

T R 10:10–11:40; lab, hours to be arranged.
L. C. Lee.
A study of experimental methodology in research with children. Includes lectures, discussions, and practicum experiences covering general experimental design, statistics, and styles and strategies of working with children.

398 Junior Honors Seminar Spring. 1–3 credits. Permission of the director of the honors program required for registration. Enrollment limited to students in the honors program.

Hours to be arranged. Staff.
Reports and discussion of selected thesis topics by honors students.

400–401–402–403 Special Studies for Undergraduates Fall or spring. Credits to be arranged. S-U grades optional.

Hours to be arranged. Department faculty. For advanced, independent study by an individual student or for study on an experimental basis with a group of students in a field of HDFS not otherwise provided through course work in the department or elsewhere at the University. Students prepare a multicopy description of the study they wish to undertake on forms available from the Counseling Office. This form must be signed by the instructor directing the study and the department chairman and filed at course registration or within the change-of-registration period after registration. To ensure review before the close of the course registration or change-of-registration period, early submission of the special studies form to the department chairman is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study:

400 Directed Readings For study that predominantly involves library research and independent study.

401 Empirical Research For study that predominantly involves data collection and analysis or laboratory or studio projects.

402 Supervised Fieldwork For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

403 Teaching Apprenticeship For study that includes assisting faculty with instruction.

410 Field Experience in Adolescent Development: The Individual in Community Settings Fall. 1–9 credits. Prerequisite: permission of instructor.

M 7:30 p.m. C. Howard.

411 Field Experience in Adolescent Development: Social Policy Toward Youth Spring. 3–9 credits. Enrollment limited by availability of fieldwork placements. Prerequisite or corequisite: HDFS 313 or HDFS 414, a skills training course or equivalent experience, and permission of instructor. S-U grades optional.

Lec, M 7:30 p.m., plus field study. C. Howard. Designed to give students experience in various settings (such as social, legal, educational, and helping agencies) working with typical and atypical adolescents. 410 focuses on the individual in community settings while 411 examines social policy toward youth.

414 Policies and Programs for Adolescents Spring. 3 credits. Prerequisites: HDFS 116, and HDFS 212 or 218, or permission of the instructor. S-U grades optional. Offered alternate years. Not offered 1980–81.

W F 2:30–3:20. S. Hamilton. Plans and practices intended to foster adolescent development are examined in the light of needs identified by theory and research. The key question is how societal and governmental institutions support or hinder the transition of adolescence to adulthood. Current practices of schools, youth-serving agencies, and workplaces are contrasted with proposals and pilot programs for increasing opportunities for adolescents to take responsible roles in their communities. The design, implementation, and evaluation of programs for this purpose are explored.]

418 Work and Human Development Fall. 3 credits. S-U grades optional. Prerequisites: background in adolescent and adult development or work-related courses, and permission of instructor. Offered every other year.

M 7:30. M. Basseches.

Explores the usefulness of developmental theory as a basis for enhancing understanding of the nature and meaning of work for both adolescents and adults. In exploring the work place as a context for human development, the course addresses itself to problems of vocational training and counseling, of workplace reorganization, and of improving the quality of working life.

431 Learning in Children Fall. 4 credits.

Prerequisite: HDFS 115 or equivalent.

W 12:20–2:15; lab and field experience to be individually arranged. M. Potts. Consideration of the theoretical and research literature in processes of learning. Includes the interrelations of learning and development, and learning and intelligence; examines theories and models of learning, as well as variables that affect the learning process. Application is made to the assessment and facilitation of specific learning processes through laboratory and field work.

432 Intellectual Development and Education

Spring. 3 credits. Prerequisite: HDFS 115 or equivalent. Not offered 1980–81.

T R 2:30. M. Potts.

This course will define basic cognitive processes that underlie education (e.g., linguistic processes that underlie language comprehension and production; numerical processes that underlie mathematics; reasoning processes that underlie logical inference, classification, and seriation); and will review basic and current research on the development and learning of these processes in young children. In addition, the course will consider the implications of theories of development to various approaches to education. (For example, the relevance of Piagetian developmental theory to standard and alternative education models.)]

434 Piaget's Theory of Cognitive Development

Spring. 4 credits. Prerequisite: HDFS 115 or equivalent. S-U grades optional. Offered alternate years.

Lecc, M W F 1:25–2:15. B. Lust.

This introduction to Piaget's theory of intellectual development is open to undergraduate and graduate students. The course is intended to provide students with a basic and critical knowledge of Piaget's theory of intelligence. The course will review Genevan research on object permanence, the development of logic, number, classification, and seriation, as well as formal operations of scientific thinking. Research on representation, through mental imagery and language, for example, will also be discussed, as will current attempts to extend Piagetian theory to educational practice. Related research in these areas also will be considered.

436 Language Development (also Psychology

436) Spring. 3 or 4 credits. Prerequisite: at least one course in cognitive psychology, cognitive development, or linguistics. Recommended: a linguistics course. Not offered 1980–81.

T R 10:10–12:05. B. Lust.

A survey of basic literature in language development. Major theoretical positions in the field will be considered in the light of studies in first language acquisition of phonology, syntax, and semantics, from infancy on. The acquisition of communication systems in nonhuman species such as chimpanzees and birds and the fundamental issue of relationships between language and cognition will also be discussed.]

437 Creative Expression and Child Growth Fall.

4 credits. Limited to 25 students.

T R 10:10–11:30. Saturday mornings should be free to provide time for participation with children.

Aimed at an appreciation and understanding of the creative process in art, music, dance, and drama in relation to the development of children.

441 The Development of the Black Child Fall.

4 credits. Limited to juniors, seniors, graduate students, and students who have permission of the instructor. Prerequisite: HDFS 115 or equivalent. S-U grades optional.

T R 12:20–2:15. L. Semaj.

Examines the development of black children as a primary population. Topics include the prenatal environment, infancy and weaning, cognitive development, intelligence, self-esteem, identity, language, and alternative models for socialization.

451 Innovative Programs of Parent Intervention

and Community Action Spring. 3 credits. Limited to 10 students. Permission of the instructor required before course enrollment.

T 2:30–4:25. Additional laboratory and field experiences to be individually arranged. H. Bayer. Emphasis on the theoretical bases and the empirical consequences of programs intended to change styles of parental behavior, whether by manipulation of individual action or of societal alternatives. Consideration of parent intervention and social action.

456 Families and Social Policy Fall. 3 credits.

Prerequisite: one course in the area of the family or in sociology. S-U grades optional.

T R 10:10–11:40. P. Moen.

An examination of the intended and unintended family consequences of governmental policies using case studies in areas such as social welfare, day care, and employment. The policy implications of changes in the structure and composition of families are also considered.

470 Field Experience in Atypical Development

Fall. 1–3 credits. Limited to students concurrently registered in HDFS 371 or 372. S-U grades only. Not offered 1980–81. T 2:30–4. Staff.]

490 Historical Roots of Modern Psychology

Spring. 4 credits. Prerequisites: 3 courses in the behavioral sciences or permission of instructor.

M W F 12:20–1:10. P. Carlson.

A survey of the major historical antecedents of contemporary psychology, including the philosophical tradition (from Aristotle through the Enlightenment), the medical-therapeutic tradition, and the rise of modern science and experimental psychology. Scholars from throughout the University will give presentations in their own specialties. Students will do concentrated work in their own areas of interest. Those who are registered in a college offering this course must register for the course through their own college.

499 Senior Honors Thesis Fall or spring. Credit to be arranged. Prerequisite: permission of thesis adviser and director of honors program. S-U grades optional.

Department faculty.

Topics Courses

415 Topics in Adolescent Development

435 Topics in Cognitive Development

445 Topics in Early Childhood Education and Development

455 Topics in Family Studies

465 Topics in Social and Personality Development

475 Topics in Atypical Development

485 Topics in the Ecology of Human Development

Fall or spring. 2–4 credits. Prerequisites and enrollment limits vary with topic being considered in any particular term. Permission of the instructor required.

Hours to be arranged. Department faculty. This series of courses provides an opportunity for advanced undergraduates to explore an issue, theme, or body of research in the areas of departmental concentration. Topics vary each time the course is offered. Descriptions are available at the time of course registration. Although the courses are usually taught as seminars, a subject may occasionally lend itself to lecture, practicum, or other format.

The Graduate Program

Human development and family studies graduate courses are open to undergraduates only with instructor's permission.

The following courses usually will be taught annually:

601 Research Design and Methodology Spring. 3 credits.

T R 10:10–12:05. B. Koslowski.

Seminar will consist of three components:

(1) discussion of representative literature on problems of research design, methodology, and data collection; (2) analysis of methodological issues involved in empirical studies employing different kinds of research designs and methods, both in laboratory and field settings; and (3) a practicum in which students will formulate research designs for their own problems, to be evaluated and criticized at each stage of development and pretesting.

[602 Research Design and Data Analysis Fall. 3 credits. Prerequisite: HDFS 601. Not offered 1980–81.

Hours to be arranged. Department faculty.

Students will carry out research projects designed in HDFS 601. While working with individual faculty members on these projects, the seminar will meet as a group to review and criticize progress reports of each other's research. The seminar also will discuss, through appropriate literature, problems involved in data analysis, interpretation, explanation, causal imputation, and writing research findings in publishable form.]

[603 Development in Context Fall. 3 credits. Not offered 1980–81.

T R 2:30–4:25. U. Bronfenbrenner.

This seminar examines issues of theory, substance, and research design related to human development in the actual contexts in which people live. Emphasis is placed on the interaction of processes (biological, psychological, and social) and social systems in the course of development in a variety of settings. The seminar is recommended for graduate students entering the field.]

700–706 Special Studies for Graduate Students Fall or spring. Credits and hours to be arranged. S-U grades at discretion of instructor.

Department faculty.

Independent, advanced work by graduate students recommended by their special committee chairman with approval of the instructor.

700 Directed Readings For study that predominantly involves library research and independent study.**701 Empirical Research** For study that predominantly involves collection and analysis of research data.**702 Practicum** For study that predominantly involves field experience in community settings.**703 Teaching Assistantship** For students assisting faculty with instruction. Does not apply to work for which students receive financial compensation.**704 Research Assistantship** For students assisting faculty with research. Does not apply to work for which students receive financial compensation.**705 Extension Assistantship** For students assisting faculty with extension activities. Does not apply to work for which students receive financial compensation.**706 Supervised Teaching** For advanced students who assume major responsibility for teaching a course. Supervision by a faculty member is required.**899 Master's Thesis and Research** Fall or spring. Credit to be arranged. S-U grades only. Prerequisite: permission of thesis adviser.

Department graduate faculty.

999 Doctoral Thesis and Research Fall or spring. Credit to be arranged. S-U grades only. Prerequisite: permission of thesis adviser.

Department graduate faculty.

These courses will be taught at least every other year:**[617 Adolescence** Fall. 3 credits. Not offered 1980–81.

W 1:25–4:25. M. Basseches.

Critical examination of some seminal theoretical writings on adolescent development, along with recent work relevant to intellectual development, ego development, and social development during late adolescence. Three approaches to human development that have stressed the importance of adolescence—psychoanalysis, structural developmental theory, and critical social theory—will be interrelated. Empirical research on specific questions chosen by students will be considered in the light of these approaches.]

631 Cognitive Development Spring. 3 credits.

T R 2:30–4. B. Koslowski.

Overview of current research and theoretical issues in cognitive development with special emphasis on the sorts of areas relevant to real world (as opposed to laboratory) behavior and on the sorts of cognitive phenomena that can be detected by human observers (rather than phenomena that can be detected only with the aid of technical equipment).

640 Infancy Spring. 3 credits.

R 10:10–12:35. H. Ricciuti.

Critical review of major issues of contemporary concern in the field of infant behavior and development, based on readings of selected research papers and review articles. The overall intent is to develop an analytic understanding of where the field stands at present with respect to various topical issues and to identify directions for future research.

[641 Early Childhood Education Fall. 3 credits. Not offered 1980–81.

M 12:20–2:15. M. Potts.

Survey of major issues in the theoretical and research literature of early childhood education.]

650 Contemporary Family Theory and Research Spring. 3 credits.

T R 12:20–2:15. P. Moen.

The uses of sociological theories and research in the study of the family, with particular reference to the relationship between the family and society and between the family and its individual members.

660 Personality and Socialization Spring. 3 credits.

W 2:30–4:25. J. Condry.

Major issues in personality development and socialization, with special emphasis on theoretical models and empirical issues.

670 Atypical Development Fall. 3 credits.

W 1:25–4:25. E. Walker.

Overview of current theories and empirical research on functional and organic disorders in childhood.

691 Research Practicum in the Ecology of Human Development Fall and spring. 3–4 credits.

Open to graduate students and upperclass students by permission of the instructor.

Hours to be arranged. U. Bronfenbrenner,

M. Cochran, W. Cross.

Students have the opportunity to participate in various phases of an ongoing five-nation study on the impact of family support systems on family function and the development of the child.

Topical Seminars

Seminars, offered irregularly, with changing topics and instructors. Content, hours, credit, and instructors to be announced. Seminars offer concentrated study of specific theoretical and research issues.

618 Seminar in Adolescence Topics include peer relations, parent-teen relationships, self-esteem identity formation, work, and moral development.**633 Seminar on Language Development** Topics include acquisition of meaning in infancy, precursors of language in early infancy, and atypical language development.**635 Seminar in Cognitive Development** Topics include early attention, perception, memory, and communication. Assessment and intervention in relation to these processes will be considered when possible.**645 Seminar on Infancy** Topics covered in depth include the role of emotions in early development, infant stimulation and early experience, and the assessment of infant developmental competencies.**646 Seminar in Early Childhood Education**

Topics include analysis of models and settings, design of assessment techniques, program evaluation, and early childhood in a cross-cultural context.

655 Seminar in Family Studies Topics include the marital dyad, the family in poverty, and the single-parent family.**665 Seminar in Personality and Social Development** Focuses on selected issues related to personality and social development. The issues selected vary each year according to current importance in the field and student interests.**675 Seminar in Atypical Development** Topics include learning disabilities, therapeutic interventions in atypical development, child abuse and maltreatment, and family factors in the etiology of functional disorders.**685 Seminar in Human Development and Family Studies** Topics include development of self-concept, sex-role identity, observational methods, and interviews in developmental research.**690 Seminar on Ecology of Human Development** Topics include the institutional setting as a determinant of behavior, the poor family, and the identification and measurement of ecological variables.

Human Service Studies

I. Lazar, chairman; M. Minot, graduate faculty representative; J. Allen, R. J. Babcock, D. J. Barr, H. Burris, E. Conway, A. Davey, D. Deshler, J. L. Ford, A. Hahn, C. C. McClintock, B. J. Mueller, L. A. Noble, W. Paine, C. Reed, C. Shapiro, L. Street, D. Tobias, B. L. Yerka, M. Zober, J. Ziegler

202 Structure of Community Services Fall or spring. 3 credits.

M W F 9:05. D. Deshler, D. Barr.

A lecture and discussion course designed as an introduction to the community base of services. The presence or absence of educational, social, and planning services, as well as their place and performance, are examined in the context of theoretical and empirical community dimensions. Examples of such dimensions include community complexity, differentiation, modernity, ethnicity, and community role.

203 Groups and Organizations Fall or spring. 3 credits. Should be taken after or concurrently with HSS 202.

M W F 10:10. R. Babcock, C. McClintock.

A basic course in the social psychology of small groups and human service organizations. Study of group processes will include self-perception and interpersonal perception of roles, norms, communication, power, and leadership. Students will apply what has been learned about small groups to the study of issues in human service organizations (for example, goals, evaluation, structure, technology, relationships between organizations and clients, environment, and change).

240 What is Teaching? Fall. 1 credit. Limited to freshmen and sophomores.

W 3:35. M. Minot.

This course is designed to provide students with a holistic approach to the examination of the multiple roles of a teacher and an opportunity to anticipate their ability to adapt to and carry out these roles. Each student will work with a teacher in the University or community setting and will observe or assist in carrying out a variety of responsibilities. The seminar will develop ideas gained from the mentor relationship.

246 Ecological Determinants of Behavior Fall. 3 credits. Preference given to HSS Option II students. Prerequisites: introductory sociology and psychology, a human development course, and permission of instructor.

M W F 2:30-3:45. C. Shapiro.

Biological, psychological, and social determinants of human behavior presented from the perspective of social work practice. Social role analysis, with emphasis on coping, mastery, and conflict resolution. A life-span perspective on individual and family developmental tasks, with emphasis on human diversity.

292 Research Design and Analysis Fall or spring. 3 credits. Limited to 50 students. Prerequisite: a basic course in psychology or sociology.

T R 2:30-3:45. Staff.

Students should develop skill in analyzing and evaluating research reports. Readings and periodic assignments and exercises focus on stating hypotheses, designing studies to test hypotheses, measuring variables, and interpreting findings. Major project is a research proposal that is critiqued before the final draft is submitted.

300 Special Studies for Undergraduates Fall or spring. Credit to be arranged.

Hours to be arranged. Department faculty. Special arrangement for course work to establish equivalency for training in a previous major or institution. Students prepare a multicopy description of the study they wish to undertake on forms available from the Counseling Office. This form, signed by both

the instructor directing the study and the head of the department, should be filed at course registration or during the change-of-registration period.

325 Health-Care Services and the Consumer Spring. 3 credits. S-U grades optional. Limited to 40 juniors and seniors.

T R 2:30-3:45. J. Ford.

Developments in the health field that affect the availability and kinds of health services. Emphasis is placed on interrelationships between institutions and agencies and the part each can play in prevention, diagnosis, and treatment of disease and disability.

330 Ecology and Epidemiology of Health Spring. 3 credits. S-U grades optional.

T R 12:20-1:35. J. Ford.

Ecological and epidemiological approaches to the problems of achieving human health within the physical, social, and mental environment. The course will introduce epidemiological methods to the student and will survey the epidemiology of specific diseases.

339 Ecological Approach to Instructional Strategies Fall or spring. 3 credits. Should be taken after or concurrently with Educational Psychology.

T R 12:20-2:15. Staff.

This laboratory course provides theoretical frameworks for observation, analysis, and practice of various teaching behaviors and their effects on learners. Similarities and differences in teaching youths and adults will be explored and the influence of the setting will be considered. Students will select age groups and settings in the community in which to use process skills, teaching, and interaction strategies. To facilitate learning, these will be videotaped and critiqued. Observations of schools or community learning activities will be arranged.

340 Clinical Analysis of Teaching Fall or spring. 1 credit. HSS majors in Option I have priority.

T 12:20-2:15 plus additional hours to be arranged. Staff.

A laboratory course that provides students with theoretical frameworks for observation, analysis, and practice of various teaching behaviors and their effects on learners. Course content includes analysis of verbal and nonverbal behaviors, patterns of verbal interaction, motivational techniques and planning and teaching for cognitive, affective, and psychomotor learning. Opportunity for observation, practice, self-evaluation, and improvement of various skills and strategies is provided in microteaching laboratories where students teach brief lessons to small groups in various community settings.

370 Social Welfare as a Social Institution Fall. 3 credits. Limited to HSS social work students or those who have permission of instructor. Prerequisite: HSS 202 or permission of instructor.

M W F 9:05. J. Allen.

A philosophical and historical introduction to social welfare services. The course reviews the social contexts from which programs and the profession of social work have evolved. It discusses the political and ideological processes through which public policy is formed and how policies are translated into social welfare programs. Basic issues in welfare are discussed in the context of present program designs, public concerns, and the interrelationships and support of services in the community.

400-401-402 Special Studies for Undergraduates Fall or spring. Credits to be arranged. S-U grades optional. Limited to HSS, interdepartmental, and independent majors.

Hours to be arranged. Department faculty. For independent study by an individual student in advanced work in a field of HSS not otherwise provided in the department or at the University, or for study on an experimental basis with a group of students in advanced work not otherwise provided in the department or at the University. Students prepare a multicopy description of the study they wish to undertake on forms available from the Counseling

Office. This form must be signed by the instructor directing the study and the department chairman and filed at course registration or within the change-of-registration period after registration. To ensure review before the close of the course registration or change-of-registration period, early submission of the special studies form to the chairman is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study.

400 Directed Readings For study that predominantly involves library research and independent readings.

401 Empirical Research For study that predominantly involves data collection and analysis or laboratory or studio projects.

402 Supervised Fieldwork For study that predominantly involves both responsible participation in a community or classroom setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

411 Introduction to Adult Education Fall or spring. 3 credits. Limited to 45 students. Preference given to HSS majors. S-U grades optional.

T R 10:10-12:05. H. Burris.

Focuses on the broad aspects of adult education, scope and history of adult education programs, philosophy and principles, perspective of the adult learner, media and methods of instruction, and program development. Opportunities will be provided for observation of adult education programs in community organizations and agencies.

413 The Adult Learner in Microperspective Fall. 3 credits.

W 7:30-10:30 p.m. H. Burris.

This research course examines a full range of adult learning activities by conducting in-depth interviews with selected adult learners. The interests, motivations, needs, and special problems of adult learners will be considered in relationship to adult learning theory. Skills in conducting interviews, analyzing qualitative data, and in presenting findings will be developed.

414 Practicum Fall or spring. 6 credits. Sec A limited to HSS Option I or III majors who have completed the prerequisites planned with their adviser; sec B limited to Interdepartmental Option I majors. Prerequisite: permission of the option adviser and agency field preceptor. Department faculty.

An opportunity for a student to assume a professional role and responsibilities under the guidance of a preceptor in a community service organization. Conferences involving the student, field preceptor, and college supervisor will be arranged in a block, scheduled throughout the semester, or completed in the summer session, depending on the nature and location of the student's fieldwork.

[415 The Adult Learner in Macroperspective Fall. 3 credits. Not offered 1980-81; next offered 1981-82.

Focuses on the variety of adult education programs in countries around the world. Literature on comparative adult education, international conferences on adult education, UNESCO adult education publications, and international community development will be analyzed in relationship to each student's exploration of adult education in a single country. Description of adult education in other countries will be shared by international students.]

416 The Helping Relationship Fall. 3 credits.

Each section limited to 20 students. S-U grades optional.
Lec, T 10:10-12:05; sec 1, R 2:30-4:25; sec 2, R 10:10-12:05. D. Barr.

The first half of the course concentrates on theory, research, and experimental exercises in interpersonal relationships. The second half focuses on ecological aspects of the helping relationship. The course is designed on the assumption that feelings and ideas can and should be taught together.

439 Program Planning in Community and Family Life Education Spring. 3 credits.

M W F 9:05. Staff.

Students will analyze factors that influence program planning and change and apply principles of program development to plan for and with groups or individuals in programs with different purposes and organizational structures. Plans should reflect a knowledge of clients, issues in the problem area, regulatory and legislative constraints, the philosophy of the specific program, organization, and of education, the psychology of learning, inter- and intra-organizational structures and cooperation, human and fiscal resources, and evaluation planning.

440 Program Planning Spring. 2 credits. Teaching majors in Option I should schedule this course prior to HSS 441-442.

T R 8; students must save a block of approximately three hours (between 9 a.m. and 3 p.m.) during the week for observation of or participation in educational programs, unless the program meets in the evening. M. Minot.

The student will analyze the factors that influence program planning and change and apply principles of program development to planning for a group or individuals in programs with different purposes and organizational structures. Plans should reflect a knowledge of clients, societal trends, issues in the problem area, the philosophy of the specific program and of education, the psychology of learning, and organizational structures. Plans will be critiqued by a panel of professionals.

441 The Art of Teaching Fall or spring; weeks 1-7. 2 credits. Prerequisites: HSS 340 and HSS 440. To be taken concurrently with HSS 442 and HSS 443. May involve some expense for field visits.

T R 10:10-12:05; plus additional hours arranged during the week of independent study following student teaching. E. Conway.

An orientation for the student teaching practicum. Major topics interrelated are: classroom atmosphere, discipline, and management; evaluation of the teaching-learning processes in relation to personal goals and unit objectives; philosophy, creativity, and teaching techniques; professionalism. Selected materials for the student teaching practicum are developed.

442 Teaching Internship Fall; student teaching full-time weeks 8-14. 6 credits. Prerequisite: HSS 440. To be taken concurrently with HSS 441 and HSS 443. Transportation and off-campus living costs need to be planned for in advance. Living arrangements are determined by the student; expenses may or may not be more than on campus depending on choice made.

M. Minot, E. Conway.

Guided student teaching experience with student assigned to cooperating public schools. Student teachers are required to live in the school communities and work under the guidance of local teachers and department faculty. Cooperating schools are located in different types of communities, represent a variety of organizational structures, and have comprehensive programs. Students should indicate their intent as early as possible to facilitate communication and scheduling.

443 Critical Issues in Education Fall and spring; weeks 1-7. 2 credits. Limited to 25 students; priority given to HSS Option I students. No students will be admitted to the class after the first session. S-U grades optional except for HSS Option I students.

F 12:20-2:15. R. Babcock.

An examination of current issues in education. Analysis of historical, philosophical, social, and political factors that affect these issues.

444 Career Environment and Individual Development Spring; weeks 8-14. 2 credits. No students will be admitted to the class after the first session.

F 12:20-2:15. R. Babcock.

An analysis of how work, jobs, and careers relate to and shape the behavior of individuals. Topics considered are theories of occupational choice, job satisfaction, structure of the labor force, manpower projection, and career planning. The course provides opportunities for students to examine their own vocational aspirations. Emphasis is on how the helping professional deals with clients or students in preparing for, adjusting to, and maintaining jobs and careers.

446 Teaching for Reading Competence: A Content Area Approach Fall. 2 or 3 credits. S-U grades optional.

T 7:30-9:30 p.m. E. Conway.

The teaching of reading through various content areas. Intended for future educators and community service professionals as well as those already working in these fields. The course will focus on (1) the need for improvement in reading, (2) evaluation of reading materials, (3) teaching reading skills basic to various content areas, and (4) development of materials to be used in a setting appropriate for the student. Opportunity to use the materials in a field setting, formal or informal, may be arranged if desired. If fieldwork is selected, the cost of transportation to the field setting is to be provided by the student.

471-472 Social-Work Practice I and II

Introduction to concepts and methods used in a generalist task-centered model of social work practice. Examination of the values and ethics of professional practice. Microcounseling skills are taught using role playing and video feedback. Class content is integrated with concurrent supervised fieldwork. Placements are made in social agencies in Tompkins, Tioga, Chemung, Cortland, Broome, and Schuyler counties. Students are encouraged to provide their own transportation, but car pools will be arranged for those who cannot. The department reimburses transportation costs when funds are available, but students may have to pay their own expenses. Each student must have a current driver's license.

471 Social-Work Practice I Fall. 9 credits. Limited to 25 social work students. Prerequisites: introductory psychology, introductory sociology, one course in human development, grades of C+ or better in HSS 246 and HSS 370, and permission of instructor before registration.

Lecls, M W 10:10-12:05; fieldwork, T R for 8 hours. Sec I, C. Shapiro; sec II, staff.

472 Social-Work Practice II Spring. 9 credits. Limited to 25 social work students. Prerequisite: grade of B- or better in HSS 471.

M W 10:10-12:05; fieldwork, T R for 8 hours. Sec I, C. Shapiro; sec II, staff.

473 Senior Seminar in Social Work Spring. 3 credits. Prerequisites: HSS 471-472. (HSS 472 may be taken concurrently.)

M 2:30-3:45; W 2:30-3:20. J. Mueller and staff. Building on the junior year practice courses, this seminar will integrate intermediate-level theory and practice content and examine recurring themes in professional practice.

474 Program Development in Social Services

Fall. 3 credits. Preference given to social work students. Prerequisite: permission of instructor before course registration. Social work students should take this course concurrently with HSS 471.

M W 3:35-4:50. M. Zober.

This seminar will be coordinated with HSS 471, "Social Work Practice I," and teach program development in the fields in which students have their placements.

475 Social Policy Spring. 3 credits. Prerequisites: HSS 370 or Government 111 or Sociology 141. S-U grades optional.

M W F 9:05. J. Allen.

An examination of the policy making process and the significance of national policies as they affect the distribution of social services. Frameworks for analyzing social policy will be used to evaluate existing social programs and service delivery systems. Implications for change in policies at the national, state, and local levels will be discussed. Students should have field or work experience in a human service program prior to or while taking this course.

The Graduate Program

Human Service Studies graduate courses are open to undergraduates only with instructor's permission.

The courses listed below will be taught regularly (annually or in alternate years).

600 Special Problems for Graduate Students Fall or spring. Credits to be arranged. For students recommended by their chairmen and approved by the instructor in charge for independent, advanced work. S-U grades optional.

Department faculty.

[601 Introduction to Human Service Studies Fall. 3 credits. Not offered 1980-81; next offered 1981-82.

Hours to be arranged. Staff.

The major topics to be dealt with, though not necessarily in a set order are: program evaluation and evaluative research, program planning and development, and higher education in human services. Emphasis will be placed on current viewpoints and related lines of research in each topic area, and particularly in interrelationships among the areas.]

[650 Teaching Human Services in Higher Education Fall. 3 credits. S-U grades optional. Not offered 1980-81; next offered 1981-82.

Basic strategies for planning and implementing instruction in human services in higher education. Types of issues examined by researchers will include variables involved in modes of learning, structure of content, and instructional settings. Will emphasize conceptualizing the teaching-learning process. Students will be expected to develop instructional plans related to interests in the human services and to develop a repertoire of teaching skills through microteaching and/or classroom teaching.]

651 Adult Development and the Provision of Human Services Spring. 3 credits. S-U grades optional.

W 7:30-10:30 p.m. D. Deshler.

Provides a survey of theories of adult development. Forces affecting the various periods, stages, passages, life tasks, or roles related to the adult's life cycle will be examined. Biological factors, interpersonal relationships, and social and cultural influences as well as historical events will be examined in relationship to perspectives on adult development. Opportunity for an empirical investigation of an adult population will be provided. Implications from theories and student-collected data will be examined in relationship to the provision of human services programs.

652 Preparing Professionals in the Human Services Spring. 3 credits. S-U grades optional.

M W F 11:15. M. Minot.

The student will analyze the assumptions and concepts that underlie preprofessional and continuing professional education for volunteers,

paraprofessionals, and professionals in the human services, for example, adult and continuing education, health, home economics, and social work education. A variety of pre- and in-service programs will be analyzed in terms of goals, means of implementation, and evaluation. Factors that influence programs will be examined, including educational setting, licensure, accreditation, legislation, evaluation of performance. Students will have opportunities to participate in pre- and in-service educational programs in human service professions and community education. Students may develop or modify a model for providing professional education at the pre- or in-service levels.

653 Consulting and Supervisory Roles in Human Services Fall. 3 credits. S-U grades optional. Not offered 1980-81; next offered 1981-82.

Analysis of theories and practices of consulting and supervision and their application in higher education and in human service agencies at the national, state, and local levels. There will be observations and application of consulting and supervisory skills in settings related to professional goals of students.]

654 Administration of Human Service Programs in Higher Education Fall. 3 credits. S-U grades optional.

M W F 11:15. D. Barr.
Issues that confront administrators of higher education and continuing professional education in the human services will be analyzed: policy in higher education, student selection and retention, program development, program evaluation, accreditation, finance, professional staff development. Issues will be developed by resource persons in the higher education community.

660 Public Policy and Program Planning in Human Services Fall. 3 credits. S-U grades optional.

M W 12:20-1:35. J. Allen.
A review of public policy process in education, health, and social welfare services as it pertains to program development. The course includes (1) the history, definitions, and boundaries of the policy process, (2) the relationships of the policy process to political economy, social structure, intergovernmental relations, and cultural values and beliefs, (3) theories of planning and program development in human services, (4) the role of evaluation in program planning and implementation with special emphasis on monitoring and feedback of effects into the policy and planning process, (5) selected current issues in policy and planning processes such as regulatory and legislative constraints, the respective roles of clients or consumers and professional planners and providers, problems and prospects in the coordination among the various human services.

661 Designing and Implementing Human Service Programs Spring. 3 credits. S-U grades optional.

M 2:30-4:30; W 2:30-3:30. I. Lazar.
A review of issues in the translation of research, resources, and policy in education, health, and social welfare services into programs for service to communities and individuals. The course includes issues in need analysis, organizational structure, staffing, budget preparation, fund raising, and community auspice development, as well as internally based program evaluation, administration, and change in the context of design and implementation.

664 The Intergovernmental System and Human Service Program Planning Spring. 3 credits. S-U grades optional.

W 3:35-5:45. A. Hahn, J. Ziegler.
An in-depth review of intergovernmental systems in America and their relevance to the formulation of human service policy and programs. Issues of decision making, fiscal arrangements, and public and private sector interactions will be explored as they are affected by intergovernmental relationships. The course will provide students with an analytic

framework for understanding these and other issues that review the relationships within and between various governmental levels.

690 Measurement for Program Evaluation and Research Fall. 3 credits.

T R 10:10-11:25. H. Nelson.
This course reviews measurement theory and its application to the evaluation of human service programs. Topics include validity, reliability, scaling methods, basic principles of instrument design, methods of data collection including interviewing strategies, testing, self-report, observation and content analysis, and data coding. Attention will be given to issues such as ethical and managerial concerns that arise in applied settings.

691 Program Evaluation and Research Design Spring. 3 credits.

T R 2:30-3:45. Staff.
Introduction to the theory of research design and its application to the evaluation of human service programs. Major topics include experimental, quasi-experimental, cross-sectional, and exploratory research designs: basic sampling theory; and the use of qualitative and quantitative methods. Attention will be given to issues that arise in the application of research designs to the evaluation of programs, including problems of randomization, causal inference, replication, and utilization of results. Skills to be learned include stating and testing hypothesis, critical analysis of research reports, and development of a research proposal.

[692-693 Program Evaluation in Theory and Practice 692, fall; 693, spring. 6 credits.

Prerequisites for 692: 690 and 691, or permission of instructor. Prerequisite for 693: 692. Students must register for both semesters. Not offered 1980-81; next offered 1981-82.
A two-semester practicum in which the class will conduct a program evaluation in the human services. Students will be involved in all phases of the evaluation from design through the production and dissemination of a final report. Emphasis will be on research methods in the social sciences. Application of skills developed in prerequisite courses will be stressed. For example, planning and managing the evaluation, ethics, methods of data collection, data processing, and strategies for analysis and feedback of results. Metaevaluation will be a theme throughout and will be applied in two ways: (1) An examination of the costs of the evaluation, relationship of costs to data quality, and decision making on allocation of resources among the various facets of the evaluation process; (2) A review of alternatives to primary evaluation with an emphasis on methods for secondary analysis of existing data. The discussion of secondary analysis will include attention to designs for aggregating data vs. findings, acquiring, documenting, and manipulating data sets, and the development of program evaluation archives.]

695 Strategies for Policy and Program Evaluation Fall. 3 credits. Prerequisites: 690 and 694 or equivalent.

M 2:30-4:30; W 2:30-3:20. C. McClintock.
This course examines methods of analysis that are designed to influence policy and program decisions. Cases will be reviewed that represent quantitative and qualitative research, historical research, cost accounting and administrative review strategies, peer review, adversary proceedings, and legislative analysis. Perspectives for understanding the pros and cons of each approach will be drawn from the following topics: history of the interdependence of social science and public policy, influence of various institutional settings on the performance of policy and program analysis, and research on the use and impact of policy and program analysis.

696 Qualitative Methods for Program Evaluation Spring. 3 credits. Prerequisites: 690 and 694 or equivalent.

M W F 10:10. L. Street.
This course will explore the issues related to qualitative research methodology and the evaluation of human service programs. Topics include the underlying epistemological assumptions, questions of entry into setting, data collection, data analysis, confidentiality of participants, and the ethics of qualitative research approaches. It is the further aim of the course to delineate those settings and researchable questions where such a methodology is or is not appropriate, as well as the benefits and limitations inherent in employing it.

704-705 Internship in Human Service Studies

Fall, spring or summer. 1-15 credits. S-U grades optional.
Hours to be arranged. Graduate faculty.
Internship placement in human services will be determined by availability and students' academic and professional goals. Opportunities are available in public and private human service organizations at the national, state, and local level in positions consistent with student needs and desires. The duration of an internship is negotiated between the students and the agencies, while course credit and residence units are arranged between the students and their special committee members in the Field of Human Service Studies.

790 Seminar in Evaluation Spring. 3 credits. S-U grades optional.

Hours to be arranged. C. McClintock.
Intended for students with competence in program planning and program evaluation (equivalent to at least one course of the HSS 660 series and three of the HSS 690 series) plus statistics through multiple regression. The seminar will focus on analysis and appraisal of current literature on program evaluation and evaluative research, with emphasis on design and measurement concerns. Attention will be given to two or more service areas (education, health, social welfare) and to applications across these areas.

899 Master's Thesis and Research Fall and spring. Credit to be arranged. Prerequisite: permission of the chairperson of the graduate committee and the instructor. S-U grades optional.

Hours to be arranged. Department graduate faculty.

999 Doctoral Thesis and Research Fall and spring. Credit to be arranged. Prerequisite: permission of the chairperson of the graduate committee and the instructor. S-U grades optional.

Hours to be arranged. Department graduate faculty.

Topical Seminars and Practica

Seminars and practica, offered irregularly, based on faculty and student interest, with changing topics and instructors. Content, time, credits, and instructors to be announced. Seminars and practica offer concentrated study in a specific human service area or in the education, planning, or evaluation processes within human services.

610 Seminar in Adult and Community Education

Topics include citizen participation educational outreach for adults, postsecondary education, and cross-cultural programs.

611 Seminar in Home Economics Education

Topics include history and philosophy, legislation and policy, research, ecological approaches to programming, and secondary education programs.

612 Seminar in Social Welfare Services Topics include services to children, aging, families, income-maintenance programs and reforms, corrections.

613 Seminar in Health and Mental Health

Services Topics include alcohol and drug problems, developments in health and mental health policy and planning, community mental health services.

658 Practicum in Higher Education in Human

Services Activities include college teaching, in-service education, and other efforts related to the preparation of professionals in the human services.

659 Seminar in Higher Education in Human

Services Topics include professional versus agency belief systems, teacher education, developments in higher education in the human services. Two or more human services will be examined.

668 Practicum in Program Planning and

Development Activities include preparing plans, organizational change, developing resources and community support.

669 Seminar in Program Planning and

Development Topics include microlevel program planning, third sector organizations, intergovernmental influences on program planning, policy formation, program implementation, and mainstreaming. Two or more human services will be examined.

698 Practicum in Program Evaluation and

Evaluative Research Activities include performing policy and agency evaluations, needs assessments, and research studies related to evaluation of programs.

699 Seminar in Program Evaluation and

Evaluative Research Topics include sunset legislation, planning for evaluation, utilization, methodological and conceptual developments, social science and public policy. Two or more human services will be examined.

Continuing Education for Professionals

These courses are not a part of the department's regular graduate offerings but are designed to provide continuing education for professionals through the Extramural Division.

603 Groups and Organizations Spring, 3 credits.

Limited to extramural students.

T 7:30–10:30 p.m. W. Paine.

A course in the social psychology of small groups and human service organizations. Study of group processes will include self-perception and interpersonal perception roles, norms, communication, power, and leadership. Students will apply what has been learned about small groups to the study of issues in human service organizations.

607–608 Professional Improvement I and II Fall,

spring, or summer. Variable credit. Enrollment will be determined by various factors including nature of content, funding, resources, facilities, and instructor. S-U grades optional. Intended for extramural (evening) and off-campus instruction.

Series of special problem seminars, classes, and activities designed for in-service and continuing education of practitioners in helping professions, such as home economics teachers, social workers, public health planners, adult educators. Specific content of each course will vary with group being served but will include amount of work and class time appropriate to number of credits. May be repeated with the permission of the instructor.

629 Research Design and Analysis Fall,

3 credits. Limited to extramural students.

T 7:30–10:30 p.m. W. Paine.

Students should develop skill in analyzing and evaluating research reports. Readings, exercises, and periodic assignments focus on stating hypotheses, designing studies to test hypotheses, measuring variables, and interpreting findings.

637 Social Welfare as a Social Institution Fall,

3 credits. Limited to extramural students.

W 7:30–10:30 p.m. Staff.

A philosophical and historical introduction to social welfare services. The course reviews the social contexts from which programs and the profession of social work have evolved. It discusses the political and ideological processes through which public policy is formed and how policies are translated into social programs. Basic issues in welfare are discussed in the context of present program design, public concerns, and the interrelationships and support of services in the community.

646 Ecological Determinants of Behavior Fall,

3 credits. Limited to extramural students.

M 7:30–10:30 p.m. P. Grote.

An introductory course concerning the identification of some major determinants of human behavior and their interaction. Students will examine (through readings, papers, and discussion) different "ecological perspectives" of behavior and attempt to integrate these perspectives into a human services framework. For example, the implications of an ecological perspective for the planning and delivery of services will be emphasized.

674 Program Development in Social Services

Spring, 3 credits. Limited to extramural students.

W 7:30–10:30 p.m. W. Paine.

Deals with program development in the fields in which students are or will be working.

675 Organization and Structure for Delivery of

Social Services Spring, 3 credits. Limited to

extramural students.

M 7:30–10:30 p.m. Mark Zober.

A framework for assessing and understanding the range of issues posed in the current organization and delivery of various social services. Concepts of social policy analysis will be used to evaluate different social service systems, new models of service delivery being developed, and proposals for change being made at national, state, and local levels. Students should have some form of field or work experience in human services prior to or concurrent with this course.

Independent Interdisciplinary Centers and Programs

Africana Studies and Research Center

See p. 126.

Center for International Studies

M. J. Esman, director

The Center for International Studies, 170 Uris Hall, supports and coordinates Cornell's programs of international and comparative studies. By serving as a focal point for ideas, information, and advice about the University's wide range of international offerings, the center contributes to their further development. The center places particular emphasis on strengthening inquiry into issues that cut across disciplinary, professional, and regional concerns, and on providing a continuing source of innovation and experimentation in international studies. The center and its constituent programs promote interdisciplinary teaching and research in international and comparative studies. These programs are:

Area Programs

China-Japan Program (140 Uris Hall).

Committee on Soviet Studies (140A Uris Hall).

See p. 131.

Latin American Studies Program (190 Uris Hall).

See p. 129.

South Asian Program (130 Uris Hall).

Southeast Asia Program (120 Uris Hall).

Problem-Oriented Programs

International Population Program (372 Uris Hall)

Participation and Labor-Managed Systems (490 Uris Hall)

Peace Studies Program (180 Uris Hall)

Science, Technology, and Development Program (170 Uris Hall)

Rural Development Committee (170C Uris Hall)

Western Societies Program (130C Uris Hall)

Professional School Programs

International Agriculture (261 Roberts Hall)

International Business and Public Administration (526 Malott Hall)

International and Comparative Labor Relations (294 Ives Hall)

International Education Program (N227 Martha Van Rensselaer Hall)

International Legal Studies (404 Myron Taylor Hall)

International Nutrition (127 Savage Hall)

International Planning (200 West Sibley Hall)

Program on Science, Technology, and Society

The Program on Science, Technology, and Society (STS) is an interdisciplinary unit that promotes teaching and research on the interaction of science and technology with political and social institutions. The program draws its students, faculty, and research staff from departments in all colleges of the University. Topics of special concern include science, technology, and public policy; biology and society; technology assessment; citizen participation in

technical decision making; arms control and national defense policies; energy policy; environmental law and ethics; and biomedical ethics.

STS courses are normally cosponsored by University academic departments. A list of courses is on p. 131. Further information on courses and the STS Program, as well as a list of STS-related courses offered throughout the University and information concerning individualized courses of study, can be obtained from the program office, 632 Clark Hall (256-3810).

New York State School of Industrial and Labor Relations

Collective Bargaining, Labor Law, and Labor History

J. Gross, chairman; G. Brooks, J. Burton, D. Cullen, C. Daniel, R. Doherty, R. Donovan, H. Finch, M. Gold, K. Hanslowe, R. Keeran, M. Kelly, M. Kennedy, G. Korman, D. Lipsky, J. Morris, A. Nash, C. Rehms, P. Ross, R. Seeber, J. Windmuller

100 History of Industrial Relations in the United States

Fall or spring. 3 credits.
C. Daniel, R. Keeran, G. Korman, J. Morris.
This review of the history of industrial relations in the United States emphasizes developments in the twentieth century. The course concentrates on the American worker, both union and nonunion, labor movements, and the environmental forces that have shaped industrial relations in the United States. Readings are selected from scholarly accounts and original sources.

101 Special Studies in the History of Industrial Relations in the United States

Fall or spring. 3 credits. Prerequisite: I&LR 100 for ILR students; no prerequisite for out-of-college students.

C. Daniel, H. Finch, R. Keeran, G. Korman, J. Morris.
Several instructors will offer undergraduate classes, each on a particular aspect of the history of industrial relations in the United States. Students will choose among classes that may vary from year to year and cover topics such as: industrial relations in the Age of Jackson and in other periods of American History such as the Gilded Age, the two World Wars, or the Great Depression; the role of industry and organized labor in politics; and radicalism and dissent in the American labor movement.

200 Collective Bargaining

Fall or spring. 3 credits.
J. Burton, D. Cullen, D. Lipsky, P. Ross.
A comprehensive study of collective bargaining, the negotiation and scope of contracts, the day-to-day administration of contracts, the major substantive issues in bargaining, including their implication for public policy, and the problem of dealing with industrial conflict.

201 Labor Relations Law and Legislation

Fall or spring. 3 credits.
M. Gold, J. Gross, K. Hanslowe, M. Kennedy.
A survey of the law governing labor relations. The legal framework in which the collective bargaining relationship is established and takes place is analyzed. Problems of the administration and enforcement of collective agreements are considered, as are problems of protecting individual employee rights in the collective labor relations context. Also serves as an introduction to the legal system and method, and to legal and constitutional problems of governmental regulation of industrial and labor relations.

301 Labor Union Administration

Fall. 3 credits.
Prerequisites: I&LR 100 and 201.
G. Brooks, C. Daniel, R. Keeran.
A review of the operations of American unions, including a general theoretical framework, but with major emphasis on practical operating experience. Topics include the formal government of unions; organizational or institutional purposes and objectives and how these are achieved; underlying structure and relationship among members, locals, and national organizations; the performance of the

primary functions of organizing; negotiating; contract administration; and the effect of the Landrum-Griffin Act.

303 Research Seminar in the Social History of American Workers

Fall. 4 credits. Limited to upperclass students who have demonstrated their ability to undertake independent work and who have received permission of the instructor.
G. Korman.
An examination of a different subject each year.

304 Seminar in the History, Administration, and Theories of Industrial Relations in the United States

Fall or spring. 4 credits. Prerequisite: permission of instructor.
C. Daniel, R. Keeran, G. Korman, J. Morris.
Designed to explore the social, economic, and political background of industrial relations in the history of the United States. Examines a different subject each year.

306 Research Seminar in the American Labor Movement and Politics

Fall or spring. 3 credits.
Prerequisite: I&LR 101. Limited to upperclass students who have demonstrated ability to undertake independent work and who have received permission of the instructor.
J. Morris.

Students choose a research topic, using any disciplinary approach (such as law, history, behavioral or political science), within the subject matter area. Group meetings are devoted to (1) discussion in depth of special problems such as compulsory membership and union political spending, the adequacy of the law governing union political action, and labor's partisan ties with the Democratic party, and (2) exchange of research problems and reports. Some time normally devoted to group meetings is scheduled for individual consultations.

307 Industrial Relations Biographies

Fall. 4 credits. Limited to juniors and seniors. Prerequisite: permission of instructor.

J. Morris.
A study of American industrial relations history through the lives of some of the outstanding people who have helped make it — men and women of business, government, and the law as well as leaders of labor and their allies among the intellectuals. While economic forces, institutional developments, and social values are important in shaping history, so also is the role of individual personality. Readings and discussions focus on biographies and autobiographies, supplemented in some cases with tapes and films. There will be written assignments but emphasis will be on the weekly discussion.

380 Famous Trials in American Labor History

Spring. 4 credits. Limited to juniors and seniors. Prerequisites: I&LR 100 and permission of instructor.

J. Morris.
Some of the famous criminal trials involving union leaders, radicals, and ordinary workmen who were unknown before they faced the bar. Among the defendants or cases which may be considered (charges range from fraud to murder) are Jimmy Hoffa, Sacco and Vanzetti, Mooney and Billings, the Centralia tragedy and trial, the great IWW trials of World War I, the case of Joe Hill, the Haymarket anarchists, the trial and execution of the Molly Maguire leaders, and the triple case of Moyer, Haywood, and Pettibone.

381 Jewish Workers in Europe and America, 1789–1948

Spring. 4 credits. Open to sophomores, juniors, and seniors.

G. Korman.
This course in comparative history examines the complex experiences of the Yiddish-speaking immigrant workers and their families. A special subject of interest is the extraordinary history of the Jewish working classes between 1924 and 1948.

400 Union Organizing

Spring. 2 credits.
This class will meet twice a week for seven weeks. There will be an exam and a research paper.

D. Cullen, R. Donovan.
This course will explore various aspects of unions' attempts to organize workers: why some workers join unions and others do not; the techniques used by both unions and employers during organizing campaigns; and the present law of organizing and proposed amendments to that law.

401 Collective Bargaining Structures

Fall. 3 credits. Prerequisite: I&LR 200.
D. Lipsky.
An examination of the conduct of collective bargaining with emphasis on the size and scope of the bargaining unit and the locus of decision making in collective negotiations. The relation between bargaining structure and product market structure, public policy, and union structure is studied. Industry and case studies of various bargaining structures, including pattern bargaining, coalition bargaining, and multiemployer bargaining are used to illustrate general principles. Wage patterns and the economic effects of bargaining structures are also examined. A seminar course.

407 Contemporary Trade Union Movement

Spring. 3 credits. Prerequisites: I&LR 100 or 502 or permission of instructor.

C. Daniel, R. Keeran.
An examination of the contemporary history, administration, policies, and problems of American trade unions. Each semester the course focuses on particular aspects of the labor movements.

[495 Honors Program Fall and spring (yearlong course). 3 credits each term. Admission to the ILR Senior Honors Program may be obtained under the following circumstances: (a) students must be in the upper 20 percent of their class at the end of their junior year; (b) an honors project, entailing research leading to completion of a thesis, must be proposed to an ILR faculty member who agrees to act as thesis supervisor; (c) the project, endorsed by the proposed faculty sponsor, is submitted to the Committee on Academic Standards and Scholarships.

Accepted students embark on a two-semester sequence. The first semester will consist of determining a research design, familiarization with germane scholarly literature, and preliminary data collection. The second semester will involve completion of the data collection and preparation of the honors thesis. At the end of the second semester, the candidate is examined orally on the completed thesis by a committee consisting of the thesis supervisor, a second faculty member designated by the appropriate department chairperson, and a representative of the Academic Standards Committee.

498 Internship

Fall or spring. 4–9 credits.
Designed to grant credit for individual research under the direction of a faculty member by mature upperclass undergraduates who have been selected for an internship. All requests for permission to register for 498 must be approved by the faculty member who will supervise the project and the chairman of the faculty member's academic department before submission for approval by the Committee on Academic Standards and Scholarship.

499 Directed Studies

Fall or spring. 3 credits.
For individual research, conducted under the direction of a member of the faculty, in a special area of labor relations not covered by regular course offerings. Registration is normally limited to seniors who have demonstrated ability to undertake independent work. Eligible students should consult with a counselor in the Office of Resident Instruction at the time of course registration to arrange for formal submission of their projects for approval by the Academic Standards Committee.

500 Collective Bargaining Fall or spring. 3 credits. Open only to graduate students. It is recommended that 501, Labor Relations Law and Legislation, be taken prior to or concurrently with 500. D. Cullen, D. Lipsky.

A comprehensive study of collective bargaining with special emphasis on philosophy, structures, process of negotiations, and administration of agreements. Attention is also given to problems of handling and setting industrial controversy, the various substantive issues, and important developments and trends in collective bargaining.

501 Labor Relations Law and Legislation Fall or spring. 3 credits. M. Gold, J. Gross, K. Hanslowe.

A survey and analysis of the labor relations law which examines the extent to which the law protects and regulates concerted action by employees in the labor market. The legal framework within which the collective bargaining takes place is considered and analyzed. Problems of the administration and enforcement of the collective agreement are considered as are problems of protecting the individual member-employee rights with the union.

502 Labor Union History and Administration Fall or spring. 3 credits.

C. Daniel, R. Keeran, G. Korman, J. Morris. A presentation of the history of labor in America with emphasis on post-Civil War trade union development. Includes an analysis of the structure and functions of the various units of labor organization, ranging from the national federation to the local union, and some consideration of special problems and activities, such as democracy in trade unions and health and welfare plans, as well as of various types of unions, such as those in construction, maritime trades, entertainment, transportation, and basic industry.

600 Advanced Seminar in Labor Arbitration Spring. 3 credits. Limited to juniors, seniors and graduate students. Prerequisite: I&LR 602 or equivalent and permission of instructor.

J. Gross, K. Hanslowe. An advanced seminar in labor arbitration emphasizing the practical aspects of current labor arbitration techniques and problems. Subjects considered range from laboratory exercises in the presentation of an arbitration case, the preparation of prehearing and posthearing briefs, and the writing of an arbitration opinion and award, to the investigation and evaluation of the experience of labor arbitrators with selected case problems arising in state and federal employment and public education as well as in the private sector.

601 Integration of Industrial Relations Theories Fall or spring. 3 credits. Open to second-year graduate students and seniors.

An exploration of the similarities and differences among the (1) normative premises, (2) theoretical frameworks, (3) substantive issues, and (4) methodological approaches found in the various areas of study in industrial relations. The areas studied include (1) collective bargaining and union-management relations, (2) organizational behavior and personnel, and (3) labor economics and manpower policy. An effort is made to explore the potential for integration among these various areas by discussing some issues or problems that cut across the traditional lines of study.

602 Arbitration Fall or spring. 4 credits. Prerequisites: undergraduates, I&LR 200; graduate students, I&LR 500. J. Gross.

A study of the place and function of arbitration in the field of labor-management relations, including an analysis of principles and practices, the law of arbitration, the handling of materials in briefs or oral presentation, the conduct of an arbitration hearing, and the preparation of an arbitration opinion.

603 Governmental Adjustment of Labor Disputes Fall or spring. 4 credits. Prerequisites: undergraduates, I&LR 200; graduate students, I&LR 500. D. Cullen.

An examination of the various governmental techniques for dealing with labor disputes in both the private and public sectors, including mediation, fact finding arbitration (both voluntary and compulsory), the use of injunctions, and seizure. The course also examines the application of these techniques under the Railway Labor Act, Taft-Hartley Act, and various state acts.

604 Readings in the Literature of American Radicalism and Dissent Fall or spring. 3 credits. Limited to seniors and graduate students.

R. Keeran. Each term concentration is on a different historical aspect of American radicalism and dissent. Some examples of areas and writers who might be selected for study are: agrarian reform — Thomas Skidmore, George Henry Evans, and Ignatius Donnelly; anarchism — Josiah Warren, William D. Haywood, Emma Goldman, and Paul Goodman; communism — John Reed, Jay Lovestone, and William Z. Foster; economic dissent — Henry George, Thorstein Veblen, and Francis Everett Townsend; equal rights for Negroes and black nationalism — William E. B. DuBois and Marcus Garvey.

605 Readings in the History of Industrial Relations in the United States Fall. 3 credits. Limited to seniors and graduate students. Prerequisites: seniors, I&LR 100 and 101; graduate students, I&LR 502.

C. Daniel, R. Keeran, G. Korman, J. Morris. A seminar covering, intensively and in historical sequence, key documents, studies, legislative investigations, and memoirs concerning American industrial relations systems. Primarily designed to aid students in orienting themselves systematically and thoroughly in the field. Among the authors and reports covered are E. P. Thompson, John R. Commons, Norman Ware, Lloyd Ulman, the Abram Hewitt hearings, the Henry W. Blair hearings, the United States Industrial Commission, Philip Taft, Paul F. Brissenden, and the United States Commission on Industrial Relations.

606 Theories of Industrial Relations Systems Fall or spring. 3 credits. Limited to seniors and graduate students. Prerequisites: seniors, I&LR 100 and 101; graduate students, I&LR 502.

C. Daniel, R. Keeran, G. Korman, or J. Morris. An examination of the leading theories concerning the origins, forms, organization, administration, aims, functions, and methods of industrial relations systems. Among the theories studied are those formulated by Karl Marx, Mikhail Bakunin, Georges Sorel, Vladimir Lenin, Lujo Bretano, Beatrice and Sidney Webb, Herbert Croly, Antonio Gramsci, Selig Perlman, Frank Tannenbaum, the Guild Socialists, Karl Polanyi, Clark Kerr, Frederick Harbison, John Dunlop, and Charles A. Myers.

607 Arbitration and Public Policy Spring. 3 credits. Limited to 10 ILR students and 10 law students. Prerequisite: permission of instructor.

J. Gross, K. Hanslowe. The impact of law and public policy on the arbitration of labor disputes in both the private and public sectors. Some of the topics covered include the law of arbitration, the scope of judicial review, the interaction between Title VII and arbitration, and individual rights to due process in the handling of grievances. Students prepare briefs, argue cases, and write awards. As opportunity permits, students are invited to attend actual arbitration hearings and to write mock awards. Each student also writes a research paper on a topic within the general scope of the course and presents it in summary form to members of the seminar for criticism and evaluation.

608 Special Topics in Collective Bargaining, Labor Law, and Legislation Fall or spring. 3 credits. Prerequisites: undergraduates, I&LR 201; graduate students, I&LR 502. Staff.

The areas of study are determined each semester by the instructor offering the seminar.

609 Public Policy and Labor Relations Fall. 3 credits. Prerequisites: one term of labor law and some course work in statistics. D. Lipsky.

This seminar examines the application of public policy in labor relations with particular emphasis on the empirical, nonlegal analysis of the impact of national and state laws on the behavior of managements, unions, and workers. Several important public policy questions are examined in the course: What is the real impact of duty to bargain requirements on the behavior of the parties in negotiations? How effective are NLRB remedies in actually changing the behavior of the parties? What are the determinants of certification of election outcomes? What evidence is there on the impact of right-to-work laws on union organizing and bargaining?

680 Problems in Union Democracy Fall or spring. 3 credits.

M. Gold, P. Ross. Unions are considered as an example of private government, and union democracy is examined by standards and customary practices in both public and private governments. Included are such elements as elections, self-government by majority, rights of minorities, the judicial process including impartial review, local-national relationships, constituency and representation, the legislative process, and executive power and functions. The regulation of private government by the state will be considered.

681 Labor Relations Law Spring. 3 credits. Prerequisite: I&LR 201 or 501 or equivalent. An advanced course in labor law, concentrating on problems of administering the National Labor Relations Act; the Landrum-Griffin Act; Title VII of the Civil Rights Act of 1964, as amended; the Fair Labor Standards Act, as amended; the Equal Pay Act; the Age Discrimination in Employment Act; the Occupational Safety and Health Act; and state workmen's compensation and unemployment insurance systems.

682 Seminar in Labor Relations Law and Legislation Fall or spring. 3 credits. Prerequisite: permission of instructor. Limited enrollment.

K. Hanslowe. Legal problems in public employment and other areas of labor relations affecting the public interest.

683 Special Topics in the History, Administration, and Theories of Industrial Relations Fall or spring. 3 credits. Prerequisites: undergraduates, I&LR 100 and 101; graduate students, I&LR 502.

G. Brooks, C. Daniel, R. Keeran, G. Korman, or J. Morris. The areas of study are determined each semester by the instructor offering the seminar.

684 Employment Discrimination and the Law Fall or spring. 4 credits. Prerequisite: I&LR 201 or 501 or equivalent.

M. Gold. An examination of legal problems involving employment discrimination based on race, color, religion, sex, national origin, or age. The impact of developing principles of law on preemployment inquiries and testing, seniority and promotions, and other personnel policies, practices, and procedures are discussed. The requirements of affirmative action under Executive Order 11246, as amended, are analyzed. Special attention is given to the role of state law in resolving employment discrimination claims.

and the procedural framework for raising and adjudicating such claims before administrative agencies and the courts.

685 Collective Bargaining in Public Education Spring. 3 credits. Limited enrollment. Prerequisite: permission of the instructor.

R. Doherty.

The seminar consists of a study of the legal, financial, administrative and educational problems raised by collective bargaining in the public schools. Major attention will be directed at existing statutes covering the employment arrangement for public school employees, the content and the administration of collective agreements, the ideological postures of teacher organizations, and the resolution of negotiating impasses. Individual and group research projects will be required.

686 Collective Bargaining in the Public Sector

Fall or spring. 3 credits. Prerequisites: undergraduates, I&LR 200 and 201, graduate students, I&LR 500 and 501.

J. Burton, R. Donovan, P. Ross.

An examination of the development, practice, and extent of collective bargaining between federal, state, and local governments and their employees. The variety of legislative approaches to such matters as representation rights, unfair practices, scope of bargaining, impasse procedures, and the strike against government are considered along with implications of collective bargaining for public policy and its formulation.

687 Current Issues in Collective Bargaining Fall or spring. 3 or 4 credits. Prerequisite: I&LR 200 or 500.

D. Cullen, D. Lipsky, P. Ross.

An intensive study of the most significant current issues and problems facing employers and unions in their relations with each other, with particular emphasis on the substantive matters in contract negotiations and administration of the provisions of collective bargaining agreements. A major research paper is usually required.

689 Labor Education Spring. 3 credits. Limited to 15 students.

A. Nash.

An examination will be made of labor education, its origin, development, scope, form, functions, curricula, goals, issues, and roles in universities, unions, and other organizations. Attention will be devoted to various practical aspects associated with the administration of programs and to labor education as an occupation. The course will involve students in field activities in connection with current Extension Division programs.

703 Theory and Research in Collective Bargaining

Spring. 3 credits. Open to graduate students who have had 500 and 723 or their equivalents. Recommended: A statistics course beyond the level of I&LR 510.

D. Lipsky.

This is a second-level course in collective bargaining that builds on the institutional research covered in 500. The existing literature in the area of collective bargaining is appraised for its theoretical and empirical content. Efforts are made to explore the appropriate role for theory and empirical analysis in moving research in collective bargaining toward a more analytical perspective, and to identify and appraise the underlying paradigms used to study collective bargaining related issues.

707 Research Seminar in Public Sector Collective Bargaining Spring. 3 credits. Prerequisites: basic familiarity with statistical analysis (correlational and multivariate techniques) and interest in theoretical and empirical research on issues related to public sector labor relations.

P. Ross.

(1) Discussion of the role of theory in collective bargaining research. Issues such as what is a theory,

how is a theory constructed and made operationally testable, and what kinds of theoretical frameworks have been used in public sector research are addressed. (2) Determination of what alternative research strategies have been used and might be used in collective bargaining research. (3) Evaluation of existing theoretical and empirical research in the public sector. (4) Analysis of current and future research needs. Each student submits a seminar paper.

708 Industrial Relations in Health Care Institutions Spring. 3 credits.

G. Brooks, P. Ross.

A study of the laws, institutions, and practices that characterize this rapidly changing field, and of the special complexities of the nonprofit sectors as they appear in health care. Attention is given to the character of the unions in the industry, to the problems of collective bargaining that flow from the nature of the industry and its work force, and to the contractual relations that have developed. The principal economic problems that have complicated the collective bargaining relationship are also discussed. Where appropriate, distinctions are made among public, nonprofit, and proprietary institutions.

798 Internship Fall or spring. 1-3 credits.

Designed to grant credit for individual research under direction of a faculty member by graduate students who have been selected for an internship. All requests for permission to register for I&LR 798 must be approved by the faculty member who will supervise the project.

799 Directed Studies Fall or spring. Credit to be arranged.

For individual research conducted under the direction of a member of the faculty.

980 Workshop in Collective Bargaining, Labor Law, and Labor History

Fall and spring. 2 credits. Enrollment limited to M.S. and Ph.D. candidates in the department. S-U grades only.

Staff.

This workshop is designed to provide a forum for the presentation of current research being undertaken by faculty members and graduate students in the Department of Collective Bargaining and by invited guests. All M.S. and Ph.D. candidates in the department who are at work on their theses are strongly urged to enroll. Each student in the course will be expected to make at least one presentation during the year, focusing on the formulation, design, execution, and results of that student's thesis research.

Economic and Social Statistics

P. McCarthy, chairman; I. Blumen, I. Francis, P. Velleman

210 Statistics (Statistical Reasoning) Fall or spring. 3 credits.

An introduction to the basic concepts of statistics: description of frequency distribution (averages, dispersion, and simple correlation) and introduction to statistical inference. Prerequisite to certain of the specialized courses on applications of statistics offered in various departments.

211 Economics and Social Statistics Spring. 3 credits. Prerequisite: I&LR 210.

Application of statistical techniques to the quantitative aspects of social studies. A programming language is taught and students use the computer throughout the course. A continuation of I&LR 210. Topics include statistical description and inference, multiple regression and correlation, index numbers, elements of time series analysis, and the design of sample surveys.

310 Design of Sample Surveys Spring. 3 credits.

Prerequisite: one term of statistics.

Application of statistical methods to the sampling of human populations. A thorough treatment of the concepts and problems of sample design with respect to cost, procedures of estimation, and measurement of sampling error. Analysis of nonsampling errors and their effects on survey results (for example, interviewer bias and response error). Illustrative materials are drawn from such fields as market research and attitude and opinion research.

311 Statistics II Fall. 4 credits. Prerequisite: I&LR 210 or permission of instructor.

An intermediate nonmathematical statistics course emphasizing the concepts associated with statistical methods. Includes a treatment of estimation and tests of hypotheses with reasons for choice of various methods and models. Application to problems involving percentages, means, variances, and correlation coefficients with an introduction to nonparametric methods, analysis of variance, and multiple regression and correlation.

410 Techniques of Multivariate Analysis Fall. 3 credits. Prerequisite: I&LR 311.

The techniques of multivariate statistical analysis, the associate assumptions, the rationale for choices among techniques, and illustrative applications. Some matrix algebra and related mathematics are introduced. Includes regression, correlation, principle components, multivariate tests on means, variances and covariances, relations between sets of variates and discriminatory analysis.

411 Statistical Analysis of Qualitative Data Spring. 3 credits. Prerequisite: I&LR 311.

I. Blumen.

An advanced undergraduate and beginning graduate course. Includes treatment of association between qualitative variates, paired comparisons, rank-order methods, and other nonparametric statistical techniques, including those related to chi-squared.

499 Directed Studies For course description, see p. 195.

510 Introductory Statistics for the Social Sciences Fall or spring. 3 credits.

P. Velleman.

A nonmathematical course for graduate students in the social sciences without previous training in statistical method. Emphasis is on discussion of technical aspects of statistical analysis and on initiative in selecting and applying statistical methods to research problems. The subjects ordinarily covered include analysis of frequency distributions, regression and correlation analysis, and selected topics from the area of statistical inference.

610 Seminar in Modern Data Analysis Fall. 3 credits. Prerequisite: I&LR 311 or equivalent.

P. Velleman.

An advanced survey of modern data analysis methods. Topics include exploratory data analysis, robust methods, and regression methods, and diagnostics. Extensive outside readings cover recent and historical work. Participants should have some knowledge of multiple regression, including the use of matrices (Statistics and Biometry 416 may be taken concurrently), and some experience using a computer.

711 Seminar in Statistical Methods Spring. 3 credits.

I. Francis.

The philosophical problems of drawing inferences from observational data and the use of computer programs in the statistical analysis of behavioral social science data. Exact contents may vary from term to term. A detailed description is available before registration.

712 Theory of Sampling Fall. 3 credits.

Prerequisite: calculus and at least one semester of mathematical statistics.

A companion course to I&LR 310, Design of Sample Surveys, stressing the development of the fundamentals of sampling theory. Attention is paid to recent progress in the field. Occasional illustrative material is given to indicate the application of the theory.

799 Directed Studies For course description, see p. 197.

International and Comparative Labor Relations

J. Windmuller, chairman; M. Clark, G. Fields, W. Galenson

330 Comparative Industrial Relations Systems I

Fall and spring. 3 credits (in some cases 1 additional credit may be arranged with the instructor). Open to juniors and seniors.

J. Windmuller.

An introductory course concerned with the contemporary structure, institutional arrangements, and philosophy of the labor relations systems of several countries in advanced stages of industrialization. Countries to be examined include: Great Britain, France, Germany, Sweden.

331 Comparative Industrial Relations Systems II

Spring. 3 credits (in some cases 1 additional credit may be arranged with the instructor). Open to juniors and seniors.

J. Windmuller.

A study of the industrial relations systems of non-Western countries in various stages of economic development and in various political contexts, including Japan, the Soviet Union, Yugoslavia, India, and two or three others selected from Latin America and Africa. The emphasis will be on the role of government and trade unions in industrial relations. The course will also include a review of international organizations (ILO, international trade unions, multi-national companies) that affect industrial relations in less developed countries.

332 Labor in Developing Economies Spring.

3 credits.

G. Fields.

The economic problems of labor in less developed nations. Among the subjects included are: determinants of income and wage structures in less developed countries; labor demand and unemployment; labor supply and migration; human resource policy; and development strategy and employment growth.

430 European Labor History Fall. 3 credits.

J. Windmuller.

The development of trade unions in major European countries, especially Great Britain, France, and Germany between 1850 and 1950. Patterns of organization, political party—trade union links, the growth of industrial relations systems, and the evolution of public policies toward labor are emphasized.

499 Directed Studies For course description, see p. 195.

530 Comparative Industrial Relations Systems I

Fall and spring. 3 credits.

J. Windmuller.

Students in this course attend the lectures in ILR 330 (see description above). If enrollment warrants, they will also meet separately at a time to be arranged for discussion of topics in ILR 330 and related topics.

531 Comparative Industrial Relations Systems II

Spring. 3 credits. Not offered 1980–81.

J. Windmuller.

Students in this course will attend the lectures in ILR 331 (see description above). If enrollment warrants, they will also meet separately at a time to be arranged for discussion of topics in ILR 331 and related topics.

532 Labor in Developing Economies Spring.

3 credits.

G. Fields.

Students in this course attend the lectures in I&LR 332 (see description above). If enrollment warrants they will also meet separately at a time to be arranged for discussion of topics in I&LR 332 and additional topics.

630 Seminar in International and Comparative Labor Problems

Spring. 3 credits. Prerequisite: I&LR 330 or 331, 530 or 531, or permission of instructor. Intended for students with some background in international and comparative labor relations.

J. Windmuller.

An opportunity for organized reading and research on one or two central themes which change from year to year. In recent years emphasis has been on labor aspects of the multinational corporation, worker participation in management, international labor movements, and American labor and world affairs.

799 Directed Studies For course description, see p. 197.

Labor Economics

R. Ehrenberg, chairman; R. Aronson, J. Burton, R. Butler, G. Clark, G. Fields, W. Galenson, R. Hutchens, O. Mitchell, R. Smith, J. Svejnar

140 Development of Economic Institutions

Spring. 3 credits. Prerequisite for non-ILR students: permission of instructor.

G. Clark.

Designed to give the student an understanding of the historical development of our economic institutions and the nature of the problems incident to economic change and development as part of the background for understanding and analysis of important present-day issues. Attention is focused on the agricultural, commercial, and industrial revolutions, tracing their development from their beginnings in Western Europe to the present.

240 Economics of Wages and Employment Fall

or spring. 3 credits. Prerequisites: Economics 101–102 or equivalent.

An introduction to the characteristics of the labor market and to analysis of wage and employment problems. Among topics studied are the composition of the labor force, job-seeking and employment practices, methods of wage determinations, theories of wages and employment, economic effects of unions, the nature and causes of unemployment, and programs to combat joblessness and poverty.

340 Economic Security Fall. 3 credits.

R. Hutchens, R. Butler.

History, philosophies, and the economic and social effects of social security measures. Analysis of programs offering protection against economic loss due to industrial accident, temporary and permanent disability, illness, old age, premature death, and unemployment, as well as private and voluntary efforts to provide security, and the problems of integrating public and private programs. An examination is made of proposals for amending or modifying economic security measures, including guaranteed income proposals.

341 Protective Labor Legislation Spring.

3 credits. Open to juniors and seniors.

R. Butler.

A survey of the nature of the problems and the basis for state and federal legislation in areas such as discrimination in employment, migratory labor, industrial health and safety, minimum wages and maximum hours, and child labor. Special attention is given to the problem of maintaining a proper balance among the efforts of industry, organized labor, and government in the development of labor standards. Proposals for amending existing legislation are discussed.

343 Problems in Labor Economics Fall or spring.

4 credits. Prerequisites: I&LR 240 or Economics 311, and background in statistics through regression analysis, or permission of the instructor.

R. Ehrenberg.

An advanced course dealing with the theory and empirical analysis of labor markets and their applications to policy issues. The specific topics covered vary. The course is designed to increase students' competence in applying microeconomic theory and econometrics to policy issues. Each student completes an econometric research project as part of the course.

344 Comparative Economic Systems: Soviet Russia

Spring. 4 credits.

G. Clark.

A comparative analysis of the principles, structure, and performance of the economy of Soviet Russia. Special attention is devoted to industry and labor.

346 Economics of Collective Bargaining Fall or

spring. 3 credits.

D. Lipsky, J. Svejnar.

Economic aspects of the negotiation, terms, and effects of union-management agreements at the individual firm, industry, regional, and national levels. Topics examined include forces influencing contract demands and terms; employer adaptation to higher wages and benefits; interindustry differences in competitiveness, firm size, and markets; regional location of industry; international competition; government regulations; labor supply; inflation, recession, and unemployment.

347 Capitalism and Socialism Fall. 4 credits.

Prerequisite: permission of instructor. Enrollment limited.

A reading seminar in some of the basic literature of the subject.

440 Health, Welfare, and Pension Plans Spring.

3 credits. Open to juniors, seniors, and graduate students.

O. Mitchell.

An analysis and appraisal of private health, welfare, and pension plans. Consideration of the origin and development of employer, union, and joint programs; a critical examination of the financing, administration, and general effectiveness of the plans.

441 Income Distribution Fall. 3 credits. Open to

upperclass and graduate students.

G. Fields.

Explores income distribution in the United States and the world. Topics to be covered include: functional and size distributions of income, wage structure, income-generating functions and theories, discrimination, poverty, public policy and income distribution, international comparisons, and changing income distribution and growth.

495 Honors Program Fall and spring (yearlong

course). 3 credits each term. For course description, see p. 195.

498 Internship Fall or spring. 4–9 credits. For

course description, see p. 195.

499 Directed Studies For course description, see

p. 195.

540 Labor Economics Fall or spring. 3 credits. Required of graduate students majoring or minoring in labor economics and income security and M.I.L.R. candidates. Prerequisites: Economics 101-102 or equivalent.

R. Aronson, R. Smith.

Economic issues in the employment and compensation of labor. Topics discussed include labor force growth and composition, structure and functioning of labor markets, unemployment, wage theories, wage levels and structures, the economic influence of unions, income distribution, and the problem of poverty.

541 Social Security and Protective Labor Legislation Fall. 3 credits. Normally required of graduate students majoring or minoring in labor economics and income security and required of M.I.L.R. candidates.

J. Burton.

The fundamental aspects of employee protection and income security. Emphasis is on state and federal minimum wage and hour laws, antidiscrimination legislation, employee benefit programs, social insurance, and public welfare programs. The underlying causes of the legislation, the legislative history, the administrative problems and procedures, and the social and economic impact of the legislation is studied.

640 Economics of Manpower Fall. 3 credits. Prerequisite: I&LR 540 or equivalent; open to qualified undergraduates.

R. Aronson.

Survey of the economic background and selected issues in manpower policy and planning. Labor market processes and behavior involved in the development and implementation of manpower programs are treated systematically. Special topics are arranged in accordance with student interests.

641 Comparative Economic Systems: Soviet Russia Fall or spring. 3 credits. Prerequisite: I&LR 344.

G. Clark.

Preparation and discussion of individual papers on selected topics concerning the Soviet economy.

642 Work and Welfare: Interactions Between Cash Transfer Programs and the Labor Market Fall. 3 credits. Prerequisite: some familiarity with microeconomics.

R. Hutchens.

Emphasizes policy issues in analyzing the relationship between the labor market and cash transfer programs such as social security, public assistance, and unemployment and wages in determining the level and distribution of cash transfers. Investigates the connection between cash transfers and labor supply. Topics include determinants of cash transfer demand and supply, the negative income tax experiments, and program incentives for withdrawal from the labor force (for example, incentives for early retirement implicit in Old Age Insurance). A paper on a specific program is required.

643 Special Topics in Labor Economics Fall or spring. 3 credits.

Devoted to new policy issues and to recent literature in the field. The specific content and emphasis varies in response to the interests of the faculty member teaching the course.

644 The Economics of Occupational Safety and Health Spring. 3 credits.

R. Smith.

The course analyzes the problem of occupational injuries and illnesses in the United States. The first section concentrates on legal requirements, judicial interpretations, and legal implications of the Occupational Safety and Health Act, then shifts to such questions as the need for, and appropriate goals of, the act; the stringency of safety standards

considered in a benefit-cost framework; the difficulties in enforcing the act; and estimates of the impact of the act.

645 Economics of the American System of Private Enterprise (also Economics 355/555) Fall. 4 credits.

A critical examination of the private sector of the United States economy; its history, some leading current relevant issues, and its relation to the theoretical and philosophical interpretations of the market economy.

646 Professional and College-Trained Manpower: Labor Market Issues and Analysis Spring. 3 credits.

R. Aronson.

Explores the nature and behavior of labor markets for highly qualified manpower, including the principal human service and technological professions. Focuses on the supply-demand relationships in these markets and the social, political, and economic institutions affecting the compensation, development, and utilization of professional and technical workers.

647 Evaluation of Social Programs Spring. 4 credits.

R. Ehrenberg.

An introduction to the methodologies used by economists to evaluate the impacts of social action programs and legislation. General evaluation methodology, cost-benefit analysis, and econometrics are discussed. Case studies are considered to illustrate the uses of these techniques, to acquaint the student with major current government programs and legislation, and to estimate these programs' economic impacts. Throughout, the primary analytic framework used by the instructor is microeconomics.

648 Economics of the American System of Private Enterprise (also Economics 356/556) Spring. 4 credits.

A continuation of I&LR 645, although 645 is not a prerequisite to 648.

649 Seminar on Investment in Man Spring. 3 credits. Prerequisite: 540 or equivalent.

R. Butler.

This course will examine activities that influence monetary and psychic income by changing the "human capital" of individuals. The theoretical models employed will be developed heuristically, with equal emphasis given to their empirical implementation. We begin looking at life cycle models of earnings in which the demand for and effects of education, on-the-job training, and health care are derived. In the last part of the course, we will discuss the role that changing levels of educational opportunity and market discrimination have played in the recent dynamic trends in black labor market status.

744 Seminar in Labor Economics Fall. 3 credits. I&LR 744 and 745 constitute the Ph.D.-level sequence in labor economics.

R. Ehrenberg.

Reading and discussion of selected topics in labor economics. Applications of economic theory and econometrics to the labor market and human resource areas.

745 Seminar in Labor Economics (also Economics 642) Spring. 3 credits.

W. Galenson.

Reading and discussion of selected topics in labor economics in the fields of theory, institutions, and policy.

746 Economic Theory and Labor Market Issues Spring. 3 credits. Prerequisite: I&LR 540 and permission of the instructor.

R. Smith.

This seminar course is intended as a follow-up to I&LR 540 and is designed for students who want a general exposure to economic theory and its applicability to a variety of labor market issues. The

first part of the course emphasizes student analyses of assigned topics; during the second half students analyze topics of their own choosing. Topics discussed in the past include day care and labor supply, insurance issues in the labor market, wage and price controls, issues in coal mine safety, immigration policy, and jobs and the environment.

798 Internship For course description, see p. 197.

799 Directed Studies For course description, see p. 197.

940 Workshop in Labor Economics Fall or spring. 3 credits. Intended for Ph.D. students who have started to write their dissertations. Focus is on the formulation, design, and execution of dissertations. Preliminary plans and portions of completed work are presented for discussion.

Organizational Behavior

L. Gruenfeld, chairman, H. Aldrich, S. Bacharach, T. Hammer, S. Kirmeyer, N. Rosen, R. Stern, H. Trice, L. Williams

120 Society, Industry, and the Individual I Fall. 3 credits.

H. Aldrich, R. Stern.

The relationship between industry and the economy as a whole and its implications for other social institutions in American society (including stratification, politics, and American values) is discussed. The nature of industrial organizations and of complex organizations in general, emphasizing authority relations, goals, the division of labor, and bureaucracy.

121 Society, Industry, and the Individual II Spring. 3 credits.

L. Williams.

Deals with the relationship between the individual and the organization and such basic psychological processes as need satisfaction, perception, attitude formation, and decision making. The individual is described and examined as a formal and informal group member. Within this area, particular emphasis is placed on leadership, problem solving, and conflict resolution.

221 Social Issues and Social Theory in Industrial Society Spring. 3 credits.

H. Aldrich.

A survey of the literature on organization-environment and interorganizational relationships.

222 Studies in Organizational Behavior: Regulating the Corporation Fall. 3 credits.

R. Stern.

The course will examine public and private power from an organizational perspective. The resource dependence approach to organization-environment relations provides a framework for interpreting government attempts at the regulation of corporate behavior. Topics cover the structure and functioning of government regulatory agencies and corporate responses to regulation including corporate strategy, change, and political influence. The role of interest groups such as consumer or citizens organizations is also considered. Research and case materials focus upon the implementation of environmental protection, occupational health and safety, equal opportunity, anti-trust, and rate-setting regulations.

320 The Psychology of Industrial Engineering Fall. 4 credits.

T. Hammer.

A study of the human factors in the industrial engineering of work, work places, tools, and machinery. The course examines the aspects of individual and social psychology that operate in the work setting and that should be taken into account in the design of jobs. These include limitations of the

human sensory system; individual difference in skills, abilities, motives, and needs; group dynamics; intrinsic motivation; job satisfaction; conflict.

321 Stress at Work Fall and spring. 4 credits.

S. Kirmeyer.
Explores the impact of the social psychological demands of work environments on employee stress. Among the topics to be discussed are (1) conceptual models of stress, (2) social, situational, and personal factors mediating the effects of stressors, and (3) adaptive coping processes. Readings will focus on the person-environment fit in the work setting, social support networks as well as on environmental stressors such as noise, high density, job structure, and unemployment. Specific attention will be given to the stressors faced by employees in service occupations.

322 Cross-cultural Studies of Organizational Behavior Fall. 3 credits. Prerequisite: I&LR 120-121 or equivalent introductory courses to the behavioral sciences including sociology and social psychology.

Comparisons of organizations in terms of cultural similarities and differences. Organizational processes in both industrially advanced and developing societies are examined. Varying attitudes toward work, achievement, and authority are compared. The implications of these differences for the transfer of technological and organizational change are highlighted. Sociological and social-psychological theories and constructs provide the framework for discussion.

323 Introduction to the Study of Attitudes Fall. 4 credits. Open to juniors and seniors.

T. Hammer.
Designed to acquaint the student with what is known about (1) origins of human attitudes, (2) the determinants of attitude change, and (3) the measurement of attitude differences. Studies employing clinical, experimental, and survey techniques are discussed. Each student designs, executes, and analyzes a research study of his or her own.

324 Organizations and Deviant Behavior Spring. 3 credits. Limited to 40 students. Prerequisite: one or more courses in both sociology and psychology.

H. Trice.
Focus is on the relationship between organizations and deviant behavior. Covers (1) the nature and etiology of psychiatric disorders, particularly schizophrenia, the psychoneuroses, and psychosomatic disorders; (2) organizational factors related to these disorders and to the more general phenomena of role conflict and stress; (3) an examination of alcoholism as a sample pathology, in terms of personality characteristics and precipitating organizational factors; (4) evaluation of organizational responses to deviance; (5) the nature of self-help organizations such as Alcoholics Anonymous; and (6) the structure and functioning of the mental hospital.

325 Organizations and Social Inequality Spring. 4 credits.

H. Aldrich.
Examines the central role that organizations in industrial societies play in allocating income, status, and other resources to individuals. Marxist conceptions of class and Weberian conceptions of job authority will be examined to see what additional power they add to the explanation of social inequality, particularly in regard to income attainment. As the central unit of analysis in the course will be organizations, a historical section will be included which deals with the evolution of current control and compensation structures in large scale organizations.

326 Sociology of Occupations Fall. 3 credits.

Prerequisite: one or more courses in sociology.
H. Trice.
Focuses on (1) the changing character of American occupations within the context of social change; (2)

occupational status—differences in income, prestige, and power and the resultant general phenomenon of social stratification; (3) vertical and horizontal occupational mobility; (4) recruitment and socialization into occupational roles; (5) the process of professionalization; and (6) comparison of personnel occupations with the career and organizational patterns of other occupations. A major sociological theme is the relationship between occupational structure and workplace structure.

327 Psychology of Industrial Conflict Fall. 4 credits.

N. Rosen.
An application of frustration theory to the analysis of conflict and stress in organizations and society. Comparisons are made between industrial relations, race relations, international relations, and other settings. Readings include behavioral research findings from a variety of studies in industry. Relevant contributions from experimental, social, and clinical psychology are also considered.

328 Cooperation, Competition, and Conflict Resolution Spring. 4 credits. Prerequisite: two courses in social psychology or equivalent.

An examination of theory and empirical evidence relating to the resolution of interpersonal, intergroup, and international conflict. Specific attention is devoted to studying factors that contribute to the development of cooperative or competitive bonds between parties to a conflict. The following topics are studied: the availability and use of threat; the credibility, intensity, and costs of threat; fractioning and escalating conflict. Personality and situational factors that regulate conflict intensification are stressed.

329 Sociological Analysis of Organizations Fall. 3 credits. Prerequisites: I&LR 120 and 121 or equivalent.

S. Bacharach.
This course attempts to introduce students to the basic issues involved in the sociological analysis of organizations. It traces organizational theory from Max Weber to the most recent research. Among the themes to be discussed are: internal structure of organizations, communication in organizations, decentralization, organizational change, organizational technology, and organizational environment.

370 The Study of Work Motivation Fall. 4 credits.

Open to juniors and seniors with permission of instructor.
T. Hammer.
Designed to acquaint the student with the basic concepts and theories of human motivation with implications for organizational change and job design. Focus is on theories of worker motivation and on research approaches and results as these apply to individuals and groups in formal organizations. Readings are predominantly from the field of organizational psychology, supplemented by relevant contributions from experimental, social, and clinical psychology. Each student will design, execute, and analyze a research study of his or her own.

371 Individual Differences and Organizational Behavior Fall. 4 credits. There are no formal prerequisites for this course. Some acquaintance with the substance and methods of behavioral or social science will be helpful.

L. Gruenfeld.
This course considers several related theories of personality relevant to an understanding of behavior and experience in organizations. The emphasis is on comparative systems of work cultures and corresponding social character types. A unit on the assessment of personality and a strategy for verification of theories of personality are presented to highlight research findings relevant to motivation, leadership styles, conflict, and stress in organizations.

373 Organizational Behavior Simulations Spring, weeks 1-7. 2 credits. Prerequisite: I&LR 120 and 121 or equivalent.

R. Stern.
Basic principles of organizational behavior are studied through readings and participation in two simulation games. The first game, *The Organizational Game: Design, Change, and Development* by Miles and Randolph, simulates traditional organization, while the second, *The Fuzzy Game* by Paton and Lockett, simulates a cooperative. Organizational design, decision making, and conflict are the central topics of discussion. The contrasting bases of power in the two organizations permits the study of the assumption underlying organization structure and process.

420 Group Processes Fall. 4 credits.

L. Gruenfeld.
Several conceptual and methodological approaches are applied to the observation of personality in groups. Students observe, analyze, and quantify behavior in ongoing groups. Emphasis is on systematic observation of interpersonal behavior in open field groups, rather than contrived experimental groups.

421 Social Organization of the Urban Community Fall. 4 credits.

H. Aldrich.
An examination of the social organization of the urban community, focusing on ethnic and racial ghettos, the police, and business, industrial, political, and educational organizations. The urban community is treated as a group of specialized activity systems, with a view toward studying the interrelation among the various systems. Special attention is given to community conflict such as civil disorders. Students take part in a research project dealing with an urban issue and write a term paper based on the project.

422 Groups in Work Organizations Fall. 4 credits.

Enrollment limited. Prerequisite: permission of instructor.
N. Rosen.
This is an applied social psychology course that emphasizes the building, maintenance, and renewal of purposive groups working in formal organizations. The course deals with models and variables that interact with group cohesion and performance. Structural, environmental, task, motivational, and interpersonal variables are considered. This is not intended as a sensitivity training lab; the course work is substantive and includes observation and analysis of live work groups in the field.

423 Evaluation of Social Action Programs Fall. 3 credits.

H. Trice.
A consideration of the principles and strategies involved in evaluation research; experimental research designs, process evaluation, and adaptations of cost benefits and cost efficiency to determine the extent to which intervention programs in fields such as training and therapy accomplish their goals. The adaptation of these strategies to large social contexts, such as child guidance clinics, mental health clinics, and programs in the poverty areas such as Head Start is considered. Includes fieldwork and emphasizes assessment of program implementation.

424 Study of Public Sector Bureaucracy Spring. 3 credits. Prerequisite: permission of instructor.

S. Bacharach.
Field research in public sector organizations, such as a school bureaucracy or a social welfare bureaucracy. Students conduct a major study into which they integrate themes from organizational theory. Theoretical issues such as decentralization, participation, and communication are discussed in the seminar.

425 Sociology of Industrial Conflict Spring.

4 credits.

R. Stern.

The focus is on the variety of theoretical and empirical evidence available concerning social, economic, and political causes of industrial conflict. The manifestations of conflict such as strikes, labor turnover, absenteeism, and sabotage, and the influence on the environments in which they occur is emphasized.

426 Theories of Industrial Society Fall. 4 credits.

Prerequisite: I&LR 120 and permission of instructor.

S. Bacharach.

Concentrates primarily on the works of Weber and Marx, and will consist of readings in the original texts.

427 The Professions: Organization and Control

Fall. 4 credits.

R. Stern.

The professions (including medicine, law, and several others) are the cases used in this course to examine issues of occupational organization and control. Professional associations attempt to set standards of ethics and practice, regulate educational programs, maintain specific images, and control the supply of entrants to professions. How do such associations function and how successful is their attempt at regulation of professional conduct? How might the potential transformation of some professional associations into union-style organizations be interpreted? These issues are considered in the context of the role of professions in contemporary society.

473 Ecological Psychology: Behavior Setting Analysis within the Organizational Context Fall. 3 credits.

S. Kirmeyer.

The origins, methods, and central concerns of ecological psychology. Ecological psychology is one of the areas of specialization in psychology that has developed a theoretical framework and research technique for the study of behavior in everyday environments. Methods used to develop observation records as well as techniques used to divide the behavior stream into structural units will be examined. The primary focus of the course will be the more recent concerns of ecological psychology, namely, the study of community and organizational behavior settings. Assigned reading will provide an overview of the theory of behavior settings, the methods used to identify and describe settings, as well as practical applications in organizational psychology. Behavior-setting theory will be used as a point of departure in examining selected topics in organizational psychology, these include: person-environment fit in the work setting, the impact of organizational size of social climate, work-life quality and job enrichment programs, and overload stress and staff "burn-out" in service settings.

475 Organizational and Political Behavior in School Districts Fall. 4 credits. Enrollment limited.

Prerequisite: permission of instructor.

S. Bacharach.

This course is intended to provide students with research experience through the study of the administrative and governance processes in school districts. The students will be required to work with school district and union personnel while investigating the following areas: (a) structure and process of decisionmaking in urban and rural school districts, (b) organizational conflict as reflected in school board meetings, (c) the variations in and effect of leadership style as evidenced by different superintendents' advisory techniques, (d) the collective bargaining process as reflected in both contracts and actual negotiations, (e) the effect of the Taylor Law on the structure and process of decision making in school districts, (f) the effects of administrative law on conflict in school districts. Students will be responsible for the collection of data and the presentation of a final report of their project.

476 Unions and Public Policy in School Districts

Spring. 4 credits. Enrollment limited. Prerequisite: permission of instructor.

S. Bacharach.

A continuation of 475, but 475 is not a prerequisite. This course is strictly a research field seminar. Students will be required to work with school districts and union personnel while investigating the following areas: (a) labor contracts with school districts, (b) relations between teachers unions, school boards, and superintendents, (c) teacher unions' involvement with school district policies.

495 Honors Program Fall and spring (yearlong course). 3 credits each term. For course description, see p. 195.**498 Internship** Fall or spring. 4-9 credits. For course description, see p. 195.**499 Directed Studies** For course description, see p. 195.**520 Organizational Behavior I** Fall. 3 credits.

L. Williams.

Survey of concepts, theories, and research from the fields of organizational and social psychology as these relate to the behavior of individuals and groups in organizations. Job attitudes, motivation, performance, leadership and power, group formation, perception, and organizational climate. A preliminary course for advanced work in organizational behavior.

521 Organizational Behavior II Spring. 3 credits.

S. Bacharach.

Formal organizations are studied from the perspectives of classical organization theory, human relations theory, and comparative and cross-cultural analysis. Contemporary theories and quantitative approaches to organizational structure are also considered in some detail. Intended to be preliminary to more intensive work in organizational behavior.

620 Theories of Organizational Change, Innovation, and Evaluation Fall. 4 credits

Prerequisite: two organizational behavior courses at the 300 level, or advanced courses in sociology or psychology.

H. Trice.

This seminar examines the dynamics of individual, structural, and environmental factors operating in organizational change in general, and in the implementation and use of innovations within formal organizations in particular. The role of evaluative research in assessing the effectiveness of the implementation of innovations and in determining organizational effectiveness are analyzed. Several case studies of organizational change in government, unions, and private industry are examined. The emphasis is on conceptual frameworks for analyzing organizational change and mounting evaluative research on innovations. Readings are interdisciplinary and include sociology, psychology, and political science.

621 Growth of the World Capitalist-Industrial System Spring. 4 credits. Enrollment limited.

Prerequisite: permission of instructor.

H. Aldrich.

This course examines the origins of the world-scale capitalist system from the sixteenth century through the beginnings of large-scale industrialization in the U.S. in the late nineteenth century. Emphasis is on concepts and methods for world-systems analysis rather than on detailed historical knowledge of a specific era. The relevance of world-systems analysis for current international sociopolitical phenomena, including underdevelopment and the rise of multinational corporations, is discussed. Students play major role in leading class discussions and in choosing topics for discussion.

622 The Organization and its Environment

Spring. 3 credits. Prerequisites: two organizational behavior courses at the 300 level, or advanced courses in sociology or psychology.

H. Aldrich.

A survey of the literature on organization-environment and interorganizational relationships. Emphasis is on two tasks: developing typologies of inter-organizational relations, and exploring methods of measuring or quantifying such relations. Students in the seminar will be expected to write a research paper in which they apply an organization-environment or interorganizational perspective to a particular set of organizations.

623 Theories of Industrial Society Spring.

4 credits. Prerequisite: permission of instructor.

S. Bacharach.

This course will concentrate on technology, bureaucracy, and the state, with a specific focus on alienation.

625 Labor and Monopoly Capital: The Growth of Large United States Firms in the Past Century

Spring; course meets for only 7 weeks. 2 credits.

H. Aldrich.

A critical review of two recent books with very different explanations for the rise of large, hierarchically differentiated corporations in the United States: Harry Braverman, *Labor and Monopoly Capital*, and Alfred D. Chandler, *The Divisible Hand*. These books are supplemented by articles on patterns of industrializations and internal structural transformation of large firms in the United States economy.

627 Leadership in Organizations Spring.

3 credits. Prerequisites: two organizational behavior courses at the 300 level, or advanced courses in sociology or psychology.

N. Rosen.

An examination of theories and research findings from the behavioral sciences that are relevant to leadership and the influence process in groups and organizations. Personality, situational factors, intergroup processes, interpersonal perception, as well as motivation to lead and to follow, will be discussed. The implications for leadership training, organization development, and action research are explored.

628 Cross-cultural Studies of Organizational Behavior Fall or spring. 3 credits. Designed for graduate students interested in research and sociopsychological theory at the workplace.

Undergraduates; with permission of instructor.

L. Gruenfeld.

How organizational behavior is affected by age (generational), sex, social class, and cultural variables. Both theoretical and research-related issues pertaining to these variables are explored to illustrate the social, psychological, and cultural explanations for age differences in a job satisfaction and performance. What can be inferred from studies that ignore age (sex, social class, and cultural) differences? What are the causes and patterns, both subjective and objective, for age and other kinds of discrimination.

629 Personality in Organization Fall and spring.

4 credits. Prerequisite: I&LR 520 or equivalent.

S. Kirmeyer.

The aim of this course is to train students in the skills required to use observational methods. The topics to be covered are: (1) reasons for choosing an observational method, (2) specific techniques used to study nonverbal communication, verbal interaction, and molar activity patterns, and (3) the steps involved in collecting and analyzing observational data.

670 Sociological Study of Power Fall. 3 credits.

S. Bacharach.

The empirical, conceptual, and theoretical issues involved in the study of power. Power is analyzed within the context of an interaction paradigm and

thus, while the major emphasis of this course is on the examination of power dispersion in organizations and communities, relevant social-psychological literature is also drawn upon. Among the various works to be considered are those of Gamson, Blau, and Dahl.

672 Urban Politics and Public Policy Fall. 3 credits.

S. Bacharach.
The relationship between community processes and structures and public policy outputs. Focus is on such issues as the limitations of the classic elitist/pluralist debate and the recent controversy concerning centralization or decentralization of local government and the delivery of social services. Treatment of these stresses the value of applying sociological theory to questions of public policy. A primary concern is the integration of organizational and community theory.

673 Cross-cultural Explorations of Individual Differences Fall. 3 credits.

A data-bank analysis of the relationship between socioeconomic status, socialization values, ethnicity, and various indices of individual differences such as interpersonal trust, propensity to take risks, self-concept, cognitive style, and job preferences.

674 Social Regulation and Control of Institutions Spring; course meets for only 7 weeks. 2 credits. Prerequisites: two organizational behavior courses at the 300 level, or advanced courses in sociology or psychology.

R. Stern.
Interorganizational relations are examined in terms of networks of control agents and target objects. The dynamics of control relationships based on political bargaining, the distribution of power, economic rewards and costs, and historical circumstances are examined in the context of their evolution through organizational adaptation to the environment. Subject matter includes theories of organizational change and application of a control perspective to the institutions of American business, government regulations, athletics, and education.

677 Seminar in Field Research Spring. 3 credits. Enrollment limited. Prerequisite: permission of instructor.

H. Trice.
Recent research efforts are examined and the dynamic nature of the research process is emphasized. The realities of field research are explored, including problems of gaining and sustaining rapport, the initial development of research interviews and observation data, and their conversion to quantitative instruments. Participants to share in the exploration of appropriate theories and concepts and the possibility of actual field participation in an on-going research project is explored.

722 Theories of Organizational Behavior Fall. 3 credits.

L. Gruenfeld.
A proseminar of current topics in organizational psychology. Discussions based on current research and theoretical innovations in the field.

723 Behavioral Research Theory, Strategy, and Methods I Fall. 4 credits. Designed to meet the needs of M.S. and Ph.D. candidates majoring in organizational behavior, but other graduate students may enroll.

L. Williams.
Material studied in I&LR 723 and 724 includes: (1) theoretical, conceptual, and ethical questions; (2) survey research and attitude scaling procedures; (3) laboratory research methods; (4) participant observation and interview methods; (5) use of documents and qualitative data analysis. Provides students with important philosophical background for doing research and exposes them to a well-balanced, interdisciplinary set of quantitative and qualitative research tools.

724 Behavioral Research Theory, Strategy, and Methods II Spring. Variable credit. Prerequisite: permission of instructor. Must be taken in sequence with I&LR 723 except by petition. Designed to meet the needs of M.S. and Ph.D. candidates majoring in organizational behavior but other graduate students may enroll.

T. Hammer.
See I&LR 723 for course description.

725 Analysis of Published Research in Organizational Behavior Fall. 3 credits. Prerequisites: I&LR 520-521 and one year of statistics.

N. Rosen.
An advanced research methods course that examines critically published research papers in the field of organizational behavior in terms of research design and method as well as theory.

726 Organizational Behavior III Spring. 3 credits. Prerequisite: I&LR 520-521 or equivalent.

S. Bacharach.
A team-taught comparison of different disciplinary approaches to organizational analysis and models. Emphasis is on integrating different disciplinary approaches to selected organizational phenomena such as change and innovation, decision making and information processing, reward structures, or conflict resolution.

727 Work and Industrial Conflict Spring, weeks 7-14. 2 credits.

R. Stern.
A concentrated examination of the sociology of industrial conflict. The seminar focuses on classic formulations of conflict theory in sociology, then the social, political, and economic causes of industrial conflict. Forms of conflict to be studied include strikes, turnover, absenteeism, and sabotage. Some discussion of the implications of various types of worker management of firms for industrial conflict will be included.

728 Seminar on Work Motivation Spring. 2 or 4 credits. Prerequisite: I&LR 520-521.

T. Hammer.
Two independent but sequence-connected minicourses.
(1) *Theories of Work Motivation*: 7 weeks. 2 credits. This course will provide an overview of basic concepts of human motivation with implications for theory and research. Intended to provide a basic understanding of theoretical issues involved in work motivation and knowledge of basic research approaches as these apply to individuals and groups in formal organizations.
(2) *Seminar on Job Design*: 7 weeks. 2 credits. In the seminar, theories underlying the design of jobs are examined together with empirical research available in the job design area. The course will cover early theories and research in job design, from scientific management and later developments, with particular attention paid to the recent emphasis on job design through job enlargement and job enrichment.

798 Internship For course description, see p. 197.

799 Directed Studies For course description, see p. 197.

Personnel and Human Resource Management

L. Dyer, chairman; V. Briggs, T. DeCotiis, G. DeLaCruz, R. Eder, J. Farley, F. Foltman, W. Frank, G. Milkovich, F. Miller, S. Mueller, R. Risley, W. Wasmuth, W. Wolf

260 Personnel Management Fall and spring. 3 credits. Open only to ILR students. Non-ILR students may take 151.
Staff.

An introductory overview of the personnel function and the management of human resources from an institutional perspective. Topics include human resource decisions dealing with the roles of personnel, human resource, planning, recruitment, selection, induction and orientation, performance appraisal, talent identification, career planning, training, compensation, and organizational development. Emphasis is on (a) problem-solving and decision-making approaches, (b) operational methods, technologies, and practices, (c) application of relevant behavioral science theory and research, and (d) legislation and other environmental constraints having an important bearing on "the effective utilization of human resources" by an enterprise.

261 Public Policy and the Development of Human Resources Fall and spring. 3 credits. Open to sophomores, juniors, and seniors.

V. Briggs, F. Foltman, S. Mueller.
A review of contemporary labor market trends and theories pertaining to labor market intervention through public policy measures. Changes in the "older" programs of apprenticeship, vocational education, and vocational rehabilitation, as well as the "new" programs of the "CETA era" are studied. Special policy issues pertaining to youth, rural workers, welfare reform, public service employment, and worker relocation will be examined. Comparison will also be made with European initiatives.

262 Urban Problems and Public Policy Programs Fall. 4 credits. Prerequisite: I&LR 261 or equivalent, or permission of instructor.

R. Risley.
A seminar concerned with selected urban problems and service programs developed to cope with them. Consideration is given to both public and private programs, their organization, and comparative methods of operation. Each student is required to conduct a study of a selected organization involving field research.

361 Effective Supervision Fall. 3 credits. Prerequisite: I&LR 260 or equivalent.

W. Wasmuth.
This course covers twenty-five major topics that make a critical difference in the life of a newly appointed or experienced supervisor. Theoretical and real-life case examples are provided from office, factory, union, nonunion, large, and small organizations and cover technical, psychological, social, and political issues at the supervisory level.

363 Techniques and Theories of Training in Organizations Fall. 3 credits.

F. Foltman, W. Frank.
A course directed toward (1) examination of basic psychological formulations of learning relevant to the training of personnel in organizations. (2) review of the methods available for use in organizational training.

364 Communication in Organizations Fall. 3 credits.

W. Frank.
Devoted primarily to the study and analysis of organizational communication. Emphasis is on the examination of the communication process, models, meaning and language, channels and networks, and interpersonal and intergroup issues.

365 New York State — Human Resource and Employee Relations Issues and Policies Fall and spring. 3 credits. Open to ILR students participating in an Albany internship.

J. Sloum.
This seminar will consider functions, current issues and policy development in New York State human resource development and employee relations. The role of the State in protective labor law administration; human resource programs; its function as a neutral party in labor disputes in the public and private

sector; and legislation affecting employee-employer relations and economic development will be reviewed. Students will be assigned individual research topics which will be discussed in the seminar and developed into a term paper.

367 Organization Development: Strategy and Practice Fall. 3 credits. Open to graduate students. F. Foltman.

The study of models, theories, and methods used in changing entire organizations or major organizational subunits. Consideration is given to current methods and strategies for improving individual or group performance including laboratory training, consultancy, sensitivity training, grid training, and other planned interventions. Organization development approaches are compared and contrasted with classical individual training models.

368 Human Resources and State Legislative Process Spring. 4 credits. Upperclass students with permission of instructor. R. Risley.

This course is designed to provide students with an understanding of the legislative process in New York State and current issues in the area of human resources and related topics being considered by the legislature. Each student works with a legislator to research an assigned topic and prepare appropriate legislative memoranda as a major part of the course work.

369 Social Contract, 1964-1980 Fall and spring. 3 credits. Open to ILR students participating in Washington, D.C., internship. S. Levitan.

The seminar will examine labor market development and their measurements with emphasis on current social strategies to ameliorate social problems. The systematic relationships between the elements of various programs, their purposes, the institutional structures designed to carry them out and the clients they were designed to serve will be explored. Topics stressed will relate to current national issues and priorities. Students will engage in individual projects on topics approved by the instructor.

461 The Social Tensions of Labor Market Reform Spring. 3 credits. S. Mueller.

Examines the social implications of recent changes in traditional work roles among minority groups, adult women, rural migrants, and youths. Special emphasis is given to market adjustments brought about by the equal opportunity, welfare reform, and human resource legislation of the 1960s and 1970s.

462 Occupational Analysis and Human Resource Planning Spring. 3 credits. Prerequisite: I&LR 260 or equivalent. F. Miller.

The course combines a practicum aspect—intensive practice in job analysis observations and interviews—with systematic study of how occupational information so obtained can be used in human resource planning at the level of the community or the work organization.

463 Planning Area-wide Employment and Training Programs Fall. 3 credits. S. Mueller.

Study of the design and delivery of local programs for the unemployed and "hard-to-employ." The following general areas will be analyzed: the present delivery system, decentralization and subcontracting, analyzing the job requirements of the local labor market and the needs of the unemployed, and program evaluation and techniques.

465 Sectoral Variations in Human Resource Policy Fall. 3 credits. S. Mueller.

Provides an overview of economic and social issues involved in national human resource policies and their applications to particular industrial or occupational

labor markets. Students study an industry or occupation of their choice, to show how labor is allocated within this market, what the social impacts of these processes are, and how existing public and private employment policies affect these outcomes.

467 Job Creation: Policy Emergence and Current Issues Fall. 3 credits. V. Briggs.

The evolution of public policy initiatives designed explicitly to create jobs. Most of the attention is given to developments in the United States but related efforts in other nations will also be examined. The reasons why job creation was a late addition to human resource policy are explored. Special attention is given to the associated policy issues: among these are targeting, substitution, job restructuring, union attitudes, and participation of community-based institutions.

469 Human Resources and Immigration Policy in the United States Spring. 3 credits. V. Briggs.

The role that immigration has played as a source of human resource development in the United States. The primary focus is on developments since the Immigration Act of 1965. In addition to legal immigration, the topic of illegal immigration and its effects are also examined. Public policy aspects of the issue are explored in depth.

495 Honors Program Fall and spring (yearlong course). 3 credits each term. For course description, see p. 195.

498 Internship Fall or spring. 4-6 credits. For course description, see p. 195.

499 Directed Studies For course description, see p. 195.

560 Personnel Management Fall and spring. 3 credits. T. DeCotiis, L. Dyer, W. Wolf.

A survey course covering the major areas of the management of human behavior in work organizations. Consideration is given to such aspects of personnel work as job attitudes, motivation, human resource planning, recruitment and selection, training, management development, organization development, and compensation. Emphasis is on the application of theory and research to the solution of personnel problems.

659 Career Planning and Development Fall. 3 credits. F. Foltman.

Consideration of the individual's career planning and development as well as career planning and development from the organization's perspective.

660 Seminar in Personnel or Human Resource Management Fall or spring. 3 credits. Staff.

A "floating" seminar designed to give faculty and students an opportunity to pursue specific topics in detail. Topics vary from semester to semester. Interested students should consult current course announcements for details.

662 Management Training Simulation: Public Policy Issues in Social Agencies Spring. 3 credits. Prerequisite: I&LR 260 or equivalent. W. Wasmuth.

Techniques of simulation are applied to a vocational rehabilitation facility, a community hospital, and a hotel banquet operation. Although much of the material relates to health services management, simulation as an approach to training managers has wider and growing importance to all types of organizations. Students are provided with realistic problem-solving situations involving boards of directors, community resources, public policy issues, state and federal agencies, labor unions, and changing economic conditions.

663 History of Contemporary Management Thought Fall. 3 credits. W. Wolf.

A critical review of the works of the major contributors in terms of the development of their ideas and their impact. Tape recorded interviews with Barnard, Simon, Drucker, Urwick, and others are studied.

664 Management and Leadership Development Fall. 3 credits. Prerequisite: I&LR 260 or equivalent. T. DeCotiis, L. Dyer, F. Foltman.

Consideration is given to both individual and organizational determinants of managerial effectiveness and methods used to influence these determinants. Topics include defining and measuring managerial effectiveness, motivation theory, staffing at the managerial level, individual training and development, and organization analysis and development.

665 Case Studies in Personnel Administration Fall. 3 credits. T. DeCotiis, F. Foltman, W. Wasmuth.

An analysis of personnel management activities and their impact on organizational objectives and administration. Cases, incidents, and field data, derived from a variety of institutional settings, provide a framework for examining and explaining the various roles played by personnel managers. When it is appropriate, attention is given to the evolution and formalization of personnel activities within growing small business organizations. Students with a special interest in personnel are encouraged to use this course as a "capstone" to their studies.

666 Administrative Theory and Practice Spring. 3 credits. Prerequisites: advanced undergraduates, I&LR 120-121 or its equivalent and permission of instructor; graduate students, I&LR 520 or permission of instructor. W. Wolf.

A general survey of the theory and practice of administration. Attention focuses on organizational differentiation and its implication for managerial practices. Taught around cases and field studies. Topics include theories and approaches to administration, organizational diagnosis, managerial practices, and organizational dynamics.

667 Current Issues and Research in Human Resources Development Fall or spring. 3 credits. F. Foltman.

A graduate seminar centering on selected issues and relevant research involved in the development of managerial and work-force skills (particular emphasis is determined by the seminar group). Papers and class discussions might concentrate on such topics as management development, impact of technological change on training programs, development of scientific and professional personnel, or labor union education.

668 Staffing: Employee Selection and Utilization Fall. 3 credits. Prerequisites: I&LR 260 or equivalent and one semester of statistics; working knowledge of factor analysis, item analysis, regression analysis, and ANOVA. T. DeCotiis, L. Dyer.

An analysis of the staffing process as applied to employing organizations. Topics examined include sources of personnel, methods used to assess individual differences, methods used to assess organizational job requirements, problems associated with person-job matching, career planning, employee separations, and the relationship between the staffing process and other organizational processes.

669 Administration of Compensation Spring. 3 credits. Prerequisite: I&LR 260 or equivalent. L. Dyer, R. Risley.

The development and administration of wage and salary programs. Major emphasis is given to the role of compensation in attracting, retaining, and motivating employees. Topics investigated include

motivation theory, factors influencing compensation levels, job evaluation, forms of compensation, including incentive plans and fringe benefits, special issues of managerial compensation, and problems of compensation control.

690 Top Management Personnel Strategies and Policies Spring. 3 credits.

W. Wolf.

Personnel management policies and strategies from the perspective of top management. Vice presidents of personnel of major United States corporations are invited as guest lecturers, providing students with an opportunity to get to know these people and to find out what they and their companies are doing. Areas covered include the job of the top personnel officer, formal and informal organization relative to managing the personnel function, current issues, and problems of top-level personnel managers.

691 Human Resource Planning Spring. 4 credits

Prerequisites: I&LR 260 or 560 or the equivalent and one course in statistics.

L. Dyer.

The process of human resource personnel planning as practiced by public and private employers. Included are topics such as: forecasting human resource needs, programming, techniques to meet forecasted needs, and methods of controlling an organization's supply of human resources. The seminar is organized around a computer simulation game in which students make policy and program decisions for a fictional organization. Decisions are evaluated on the basis of their contributions to the organization's human resource and profit objectives.

692 The Appraisal and Diagnosis of Organizations Fall. 3 credits Prerequisite: I&LR 120 and 260

W. Wolf.

This seminar focuses upon the understanding of organizations in a holistic framework. It deals with the process of diagnosis, techniques for gathering data, analysis of the functional areas of management, and interpretation and synthesis of findings. Field study and laboratory training are emphasized. The point of view taken is that of the administrator or consultant.

693 Design and Administration of Training Programs Fall. 3 credits. Limited to 25 students.

Prerequisites: I&LR 260 or equivalent and permission of instructor.

F. Foltman, W. Frank.

An analysis and exploration of the training and retraining function as applied in business, government, and industrial organizations. Consideration is given to learning theory as well as to the concept framework and practical approaches with which learning activities are developed at the workplace at all levels.

694 Seminar on the Theory and Practice of Organization Development Spring. 3 credits.

W. Wolf.

Organization practices for self-renewal and conflict management. The point of view taken is that of a third party interventionist and the course focuses on techniques for diagnosis and treatment of organizational problems. Topics include: the third party's role and entry dynamics; clinical diagnosis of functioning organizations; confrontation; goal setting; mirror exercises; force field analysis; team building exercises; structural changes and job design issues. Emphasis is on experimental learning.

695 Local Government Human Resource Planning and Administration Spring. 4 credits.

Students should have previous academic courses and/or experience in local government or human resource programs.

R. Risley.

A seminar devoted to the study of local government human resource planning and administration. Students study federal and state functions and the

activities of local governments, particularly counties in New York State, in the implementation of human resource programs.

696 Personnel Administration and Government Regulations Fall. 3 credits.

R. Risley.

A survey and analysis of government regulations affecting personnel management in nongovernment organizations, examining the framework within which management must operate. Government agencies' methods of enforcement of such regulations and the firm's responsibilities for failure to comply with these legal requirements are considered.

699 The Debate Over Full Employment Spring. 3 credits.

S. Mueller.

Focus is on alternative points of view regarding what constitutes a satisfactory level of employment consistent with social justice and economic stability, as well as the pros and cons of various policies aimed at maintaining "satisfactory" employment levels. Class discussions will concentrate on such topics as the 1946 Employment Act, the Equal Opportunity and Full Employment (Humphrey-Hawkins) Act, the relationship between national employment policy and social problems, and the relative success of various European employment programs.

761 Human Resource Economics and Public Policy Fall. 3 credits.

V. Briggs.

A review of contemporary labor market trends and theories pertaining to labor market intervention through public policy measures. Changes in the "older" programs of apprenticeship, vocational education, and vocational rehabilitation as well as the "new" programs of the "CETA era" are studied. Special policy issues pertaining to youth, rural workers, welfare reform, public service employment, and worker relocation will be examined. Comparison will also be made with European initiatives.

798 Internship For course description, see p. 197.

799 Directed Studies For course description, see p. 197.

Examines the background and recent experience of large-scale plant shutdowns and job losses, which have led to various proposals for government intervention to deal with the employment and community impacts. Business, organized labor, and government at all levels have a substantial interest in the problems and their resolution. The course will explore the extent and scale of employment dislocation, the sources and underlying factors, and the experience of the various groups affected. Most of the meetings will be led by guest speakers representing management, unions, government, and academic specialists. To the maximum extent possible, these individuals will have been involved in actual cases of plant shutdowns and efforts to cope with their affects. Human resource policy alternatives to dislocation, including current policies and programs in the United States and abroad.

650 Human Resource and Collective Bargaining Problems in the Construction Industry Spring. 3 credits. Open to seniors and graduate students, and non-ILR students with permission of the instructor.

D. Cullen, F. Foltman.

Selected human resource and collective bargaining problems in the construction industry are examined, such as supply and demand of construction manpower; black workers and the building trades; skilled human resource forecasting and planning; skill requirements; education and training; personnel management policies and practices; the wage-price issue; the closed shop; featherbedding; jurisdictional disputes; and problems of bargaining structure. Individual research is required.

Interdepartmental Courses

150 Labor Problems in American Society Fall or spring. 3 credits.

R. Aronson, O. Mitchell.

A survey for students in other divisions of the University. An analysis of the major problems in industrial and labor relations; labor union history, organization, and operation; labor market analysis and employment practices; industrial and labor legislation and social security; personnel management and human relations in industry; collective bargaining and the settlement of industrial disputes; and the rights and responsibilities of employers and employees.

151 Personnel Management for Managers Fall and spring. 3 credits. Not open to ILR students.

W. Frank, F. Miller, W. Wasmuth, W. Wolf.

A study of the personnel function in work organizations with special emphasis on the responsibilities of managers and supervisors. After reviewing evidence from behavioral science research on factors affecting work behavior, such major personnel areas as recruitment, selection, and placement; training; compensation and benefits; and discipline are considered.

455 Plant Shutdowns and Job Loss: Worker and Community Effects Fall. 3 credits. Limited to 25 students.

R. Aronson, F. Foltman.

Law School

First-Year Courses

- 500 Civil Procedure
- 502 Constitutional Law
- 504 Contracts
- 506 Criminal Justice
- 508 Practice Training I
- 509 Practice Training II
- 512 Property
- 515 Torts

Second-Year Electives

- 552 Agency and Partnership
- 554 Commercial Law
- 556 Commercial Paper and Banking Transactions
- 558 Corporations
- 560 Economics for Lawyers
- 562 Enterprise Organization
- 564 Evidence
- 567 Federal Income Taxation
- 569 Process of Property Transmission
- 571 Trusts and Estates I
- 572 Trusts and Estates II

Second- and Third-Year Electives

- 600 Administrative Law
- 607 American Legal History
- 610 Antitrust Law
- 616 Collective Bargaining in the Public Sector
- 618 Comparative Law
- 621 Conflict of Laws
- 623 Contemporary Legal Theory
- 625 Criminal Procedure
- 628 Debtor-Creditor Law
- 631 Employment Discrimination and the Law
- 632 English Legal History
- 633 Environmental Law
- 635 Estate and Gift Taxation
- 637 Family Law
- 639 Federal Courts

- 646 Insurance
- 647 Intellectual and Industrial Property
- 648 International Human Rights
- 649 International Law
- 656 Labor Law
- 658 Land Financing
- 660 Land-use Planning
- 663 Law of the European Community
- 664 Law Practice Dynamics
- 666 Law, Society, and Morality
- 670 Legislation
- 672 Local Government
- 674 Native American Law
- 676 New York Practice
- 678 Regulated Industries
- 682 Securities Regulation
- 683 Social Security Law
- 684 Supervised Writing or Teaching
- 685 Taxation of Corporations and Shareholders
- 686 Taxation of Partnership Income
- 689 Trial Practice
- 691 Trial Techniques

Seminars and Problem Courses

- 700 American Legal Theory
- 710 Comparative Law Seminar
- 711 Constitutional Criminal Procedure
- 712 Constitutional Theory
- 714 Consumer Law
- 720 Corporate Practice
- 735 Equal Protection Seminar
- 740 Ethics of Corporate Practice
- 747 Family Law Clinic
- 750 Fiduciary Administration
- 755 International Business Transactions
- 763 International Tax Planning
- 769 Labor Arbitration
- 770 Land-use Planning Seminar
- 772 Law and Medicine
- 775 Legal Aid I
- 776 Legal Aid II

- 786 Prisoners' Legal Services
- 787 Problems in Corporate Litigation
- 788 Problems in Environmental Law
- 790 Problems in Legislation
- 793 Problems in Urban Development
- 796 Science, Technology and Law
- 799 Water-Waste-Toxic Materials

Division of Nutritional Sciences

M. C. Nesheim, director; M. M. Devine, associate director for academic affairs; L. D. Wright, graduate faculty representative; M. Morrison, division honors chairperson; J. Appgar, G. Armbruster, R. E. Austic, D. Bauman, A. Bensadoun, C. A. Bisogni, M. Brink, T. C. Campbell, G. F. Combs, W. L. Dills, A. Gillespie, J. D. Haas, J.-P. Habicht, R. Holmes, M. Immink, M. N. Kazarinoff, R. Klippstein, J. M. L. Koch, L. P. Krook, S. Kumanyika, C. Lanciault, M. C. Latham, D. A. Levitsky, B. A. Lewis, M. Mapes, D. Miller, N. Mondy, C. Olson, M. Pimentel, J. M. Rivers, D. A. Roe, D. Sanjur, R. Schwartz, M. Stipanuk, E. Thorbecke, V. Utermohlen, D. VanCampen, P. J. VanSoest, R. G. Warner, R. H. Wasserman, R. J. Young, D. B. Zilversmit

115 Ecology of Human Nutrition and Food Fall and spring. 3 credits. S-U grades optional. Prerequisites: *fall*: high school biology (juniors and seniors with advanced biological science background must have permission of the instructor); *spring*: a one-semester college biology course or permission of the instructor. Cost of handouts and pamphlets, \$3.

Fall: M W F 9:05; spring: M W F 11:15. M. Devine. An introduction to the field of human nutrition and food that focuses on the mutual relationships between individuals and their biological and physical environment. Includes study of human nutritional needs, problems encountered in providing food to meet nutritional needs, relationships among physiological needs, sociocultural systems, food and the significance of these relationships to the attainment of health.

146 Introductory Foods Fall and spring. 3 credits. Each section limited to 16 students. Prerequisite: NS 115 or concurrent registration and permission of instructor during course registration (permission of instructor forms may be obtained from and returned to 335 Martha Van Rensselaer Hall).

Lec, fall: M 11:15; spring: M 10:10. Labs, W F 10:10–12:05 or T R 10:10–12:05 or 2:30–4:25. M. Pimentel.

Criteria for evaluating the practice of the science of food and nutrition. Lab includes an introduction to the physicochemical properties of food and the relationship of these properties to preparation, techniques, and food quality. Some meal preparation, focusing on human nutritional needs and the management of money and time, is included.

222 Maternal and Child Nutrition Spring. 3 credits. Prerequisites: NS 115 and a college biology course. S-U grades optional.

M W F 11:15. V. Utermohlen. Involves a study of the nutritional requirements in pregnancy, lactation, and growth through adolescence. Topics include the relationship between maternal diet and pregnancy outcome; analysis of different methods of infant feeding; and nutritional status of pregnant women, children, and adolescents in the United States and in developing countries.

246 Introduction to Physicochemical Aspects of Food Fall or spring. 4 credits. Each section limited to 18 students. Prerequisites: a college course in organic chemistry or biochemistry, NS 146, and permission of instructor during course registration (permission of instructor forms may be obtained from and returned to 335 Martha Van Rensselaer Hall). S-U grades optional.

Lecs, T R 9:05; labs, T R 10:10–12:35 or M W 2–4:25. Staff.

A study of (a) the colligative properties of solutions, (b) colloidal systems—sols, gels, foams, and emulsions; (c) physical and chemical properties of

the major groups of foods, the effect of basic methods of food preparation and preservation on these properties and their relation to food quality—especially color, flavor, and texture. Labs in comparative cookery introduce the experimental study of food and illustrate the function of ingredients and effect of treatment on food quality.

300 Special Studies for Undergraduates Fall or spring. Special arrangements to establish equivalency for courses not transferred from a previous major or institution. Students prepare a description of the study they wish to undertake on forms available from the Counseling Office, N105 Martha Van Rensselaer Hall. The form, signed by both the instructor directing the study and the associate director for academic affairs, is filed at course registration or during the change-of-registration period.

301 Nutritional Aspects of Raw and Processed Foods (also Food Science 301) Spring. 3 credits. Prerequisite: NS 115 or permission of the instructor. M W F 9:05. D. Miller.

An evaluation of the nutritional qualities of human foods with an emphasis on changes that occur during processing and storage. Topics, including food processing methods, dietary trends, vegetarian diets, fabricated foods, fast foods, and food additives, will be discussed in the context of their potential impact on nutrition and health.

302 Orientation to Field Study in Extension Fall. 2 credits. Limited to 10 juniors and seniors. Prerequisites: NS 115, 146, and permission of instructor. S-U grades only.

F 12:20–2:20; field trips to nearby counties are arranged as student schedules permit. R. Klippstein.

The selection and preparation of appropriate food and nutrition information for specific lay audiences. Participants complete an individual project using two different mass media teaching tools. When appropriate, the project is taught to established county audiences. The major project is a group project presenting programs to a scheduled extension audience. Additional experiences include a field visit to a county extension office and review of extension organization and resources. Understanding the needs of audiences, informal teaching techniques, and self-critiquing and group critiquing are stressed.

325 Sociocultural Aspects of Food and Nutrition Fall. 3 credits. Limited to juniors and seniors. Prerequisites: NS 115 and a college course in anthropology or sociology.

M W F 2:30. D. Sanjur. The course offers a cross-cultural perspective for understanding the environmental and sociocultural parameters affecting the development of food consumption patterns. Emphasis is on theories on formation of food habits, dietary methodologies, ethnicity and food habits and educational programs in nutrition, in national and international contexts.

331 Physiological and Biochemical Bases of Human Nutrition Spring. 3 credits. Prerequisites: Biological Sciences 330 or 331 and NS 115 or equivalent. S-U grades optional.

M W F 10:10. M. C. Nesheim and T. C. Campbell. The biochemical and physiological bases for human nutrition requirements, including digestion and absorption, energy metabolism, food intake regulation, protein amino acids, minerals, vitamins, and determination of nutritional status.

332 Laboratory in Nutrition Fall and spring. 3 credits. Each section limited to 18 students. Prerequisites: NS 331 or concurrent registration and permission of instructor during course registration (permission of instructor forms may be obtained from and returned to 335 Martha Van Rensselaer Hall).

Lec, T 8; labs, M W 1:25–4 or T R 1:25–4. M. Stipanuk.

Introduction to principles and procedures of experimental design, analytical techniques, and data analysis in human nutrition. Emphasis on methods of analysis of nutrients and metabolites in food, tissues, and body fluids. Application of these methods in assessing physiological and biochemical responses to alterations of nutrient intake in animal and human studies.

346 Consumer Food Issues Fall. 2 credits. Limited to 30 juniors and seniors. Prerequisites: NS 115 and 146 or permission of instructor. S-U grades optional.

T R 11:15. C. Bisogni.

An examination of selected consumer issues related to the availability, safety, and quality of food. Current legislative and regulatory proposals will be investigated in terms of relevant research and potential impact on consumers and the food supply.

347 Human Growth and Development: Biological and Social Psychological Considerations (also HDFS 347) Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent; HDFS 115 or Psychology 101 and NS 115 or equivalent.

M W F 1:25. J. Haas and H. Ricciuti.

A review of major patterns of physical growth from the fetal period through adolescence, with consideration of biological and socioenvironmental determinants of growth, as well as physical and psychological consequences of variations in growth patterns. An examination of normal patterns of growth will be followed by an analysis of major sources of variations in growth (normal and atypical).

361 Biochemistry and Human Behavior (also Psychology 361) Fall. 3 credits. Prerequisites: Biological Sciences 101–102, Chemistry 103–104, Psychology 123, or permission of instructor. A fundamental knowledge of human biology and chemistry is essential. S-U grades optional.

M W F 11:15. D. Levitsky.

A survey of the scientific literature on the role of brain and body biochemical changes as determinants of human behavior. The topics covered include action and effects of psychopharmacologic agents, biochemical determinants of mental retardation, biochemical theories of psychosis, and effects of nutrition on behavior.

378 Management Principles in Food Service Operation Spring. 4 credits. S-U grades optional. Prerequisites: NS 246, Agricultural Economics 220, Hotel Administration 211, I&LR 121, I&LR 151, I&LR 260, I&LR 363 or equivalent, or permission of instructor. Estimated cost, \$5.

T R 10:10–12:05. R. Holmes.

Applications of management principles to food service operations involved in production, distribution, and service of quality food in quantity. Includes layout, design, menu planning, food cost control, purchasing, sanitation, and safety.

398 Honors in Nutritional Sciences Fall. 1 credit. Limited to students admitted to the division honors program. S-U grades only.

T 2:30. M. Morrison, coordinator.

Research design. Delineation of honors research problem in consultation with a faculty adviser.

400–401–402 Special Studies for Undergraduates Fall or spring. Credits to be arranged. S-U grades optional.

Division faculty.

For advanced, independent study by an individual student or for study on an experimental basis with a group of students in a field of nutritional sciences not otherwise provided through course work in the department or elsewhere at the University. Students prepare a description of the study they wish to undertake on forms to be signed by the instructor directing the study and the associate director of academic affairs. The forms, available from the Counseling Office, are filed at course registration or within the change-of-registration period. To ensure

review before the close of the course registration or change-of-registration period, students should submit the special studies form to the associate director for academic affairs as early as possible.

400 Directed Readings For study that predominantly involves library research and independent reading.

401 Empirical Research For study that predominantly involves data collection and analysis or laboratory or studio projects.

402 Supervised Fieldwork For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading and writing. Academic credit is awarded for this integration of theory and practice.

441 Nutrition and Disease Fall. 4 credits. Prerequisites: NS 331 and a human physiology course. S-U grades optional. Cost of handouts and pamphlets, \$5.

M W F 10:10 and F 8. J. Rivers.
Study of the physiologic and metabolic anomalies in chronic and acute illnesses and the principles of nutritional therapy and prevention. The topics covered are diabetes mellitus, starvation, obesity, nutritional assessment, nutritional pharmacology, severe injury, infection, cancer, gastrointestinal diseases, liver disorders, renal diseases, cardiovascular diseases, and pediatrics. Original research papers, books, review papers, and publications of professional organizations are used throughout the course.

442 Diet Formulation and Analysis Fall. 2 credits. Limited enrollment. Prerequisites: NS 246, coregistration in NS 441 (or equivalent background), and permission of the instructor. S-U grades optional. Lec, M 11:15; lab, M 2:30–4:25 or T 11:15–1:10. C. Lanciult.

Development of skills in formulation and analysis of therapeutic dietary regimens. Various sources of information on food composition, diet planning, and enteral and parenteral nutrition supplements are used.

445 Community Nutrition and Health Spring. 3 credits. S-U grades optional. Prerequisites: NS 331 or concurrent enrollment in 331. Recommended: NS 325. The field project component of this course may involve off-campus activity. Students are responsible for their own transportation or bus fare.

Lecs, M W 1:25; disc, W 2:20–4:30. S. Kumanyika.
Study of human nutrition and health problems from a community perspective: programs and policies related to nutrition at local, state, and federal levels; approaches and techniques of effective application and dissemination of nutrition knowledge in communities.

446 Physicochemical Aspects of Food Fall. 3 credits. Prerequisites: NS 246 and a college course in biochemistry, which may be taken concurrently. S-U grades optional.

M W F 9:05. G. Armbruster.
The relation of food quality to (a) rheological properties of food systems, (b) oxidation and reduction reactions, and (c) enzymatic and nonenzymatic browning. Covers physical and chemical factors accounting for the color, flavor, and texture of natural and processed foods.

447 Physicochemical Aspects of Food—Laboratory Fall. 1 credit. Limited to 16 students. Prerequisite: NS 446 or concurrent registration. S-U grades optional.

T 1:25–4:25. G. Armbruster.
Laboratory experiments designed to illustrate the effect of varying ingredients and treatment on the quality of food products. Objective testing methods are used to determine food quality characteristics.

448 Physicochemical Aspects of Food—Laboratory Fall. 1 credit. Limited to 16 students. Prerequisite: NS 446 or concurrent registration. S-U grades optional.

R 1:25–4:25. G. Armbruster.
Laboratory experiments designed to illustrate (a) the physicochemical behavior of colloidal systems, (b) chemical reactions of some food components, and (c) effects of temperature, pH, moisture, inorganic salts, and enzymes on physicochemical changes in natural foods, food components, and food mixtures.

456 Experimental Foods Methods Spring. 3 credits. Limited to 16 students. Prerequisites: NS 446, 448, and a course in statistics recommended.

Labs, T R 1:25–4:25. G. Armbruster.
Application of the scientific method in the design and performance of experimental food problems and the interpretation and evaluation of results. Evaluation of the use of instruments and chemical and sensory methods in the measurement of food properties. Independent problems.

457 National and International Food Economics Spring. 3 credits. Prerequisites: college course in economics and junior standing or permission of instructor. S-U grades optional.

M W F 9:05. E. Thorbecke.
Examination of individual components essential for an understanding of the United States and world food economies. Analysis of the world food economy. Review and analysis of (a) the major economic factors determining the demand for food, the composition of food consumption, and nutritional intake and (b) the major economic factors affecting food production and supply. Examination and evaluation of the effectiveness of various food policies and programs in altering food consumption patterns. Principles of nutritional planning in developing countries within the context of the process of economic and social development.

488 Applied Dietetics in Food Service Systems Fall and spring. 3 credits. Limited to 30 students per semester. Prerequisite or corequisite: NS 378 and permission of instructor before course registration. S-U grades optional. Estimated cost, \$5.

Lec. M 8; lab, one sec, M–F 2:30–7. J. M. L. Koch.
Lab will be arranged through Cornell Dining. Other experiences may be possible in community food service operations. Students will gain experience in care and use of institutional equipment, job analysis, volume food production, applied sanitation, and recipe development and evaluation as well as other management skills required to operate a food service program. Possible field trip.

498 Honors in Nutritional Sciences Spring. 1 credit. Limited to students admitted to the division honors program. Students may register in NS 499 concurrently.

R 9:05. M. Morrison, coordinator.
Informal presentation and discussion of current topics in food and nutrition in which all members participate. Written reports on topics discussed may be requested.

499 Honors Problem Fall and spring. Credits to be arranged. Open only to students in the division honors program.

Hours to be arranged. Division faculty; M. Morrison, coordinator.
An independent literature, lab, or field investigation. Students should plan to spread the work over two semesters.

600 Special Problems for Graduate Students Fall or spring. Credit to be arranged. Limited to graduate students recommended by their chairperson and approved by the instructor in charge. S-U grades optional.

Hours to be arranged. Division faculty.

Emphasis on independent, advanced work. Experience in research laboratories in the division may be arranged.

601–604 Advanced Nutrition Series A series of nutrition courses offered jointly by the Division of Nutritional Sciences and the Departments of Animal Science and Poultry Science. Prerequisites: courses in nutrition, physiology, and biochemistry, including intermediary metabolism, or permission of instructor.

601 Proteins and Amino Acids in Nutrition (also Animal Science 601) Fall. 2 credits. Prerequisites: courses in physiology, biochemistry, and nutrition or permission of instructors.

W F 10:10. R. E. Austic and M. A. Morrison.
Advanced course in amino acid and protein nutrition with emphasis on the dynamic aspects of protein digestion, amino acid absorption, protein synthesis, amino acid metabolism, and nitrogen excretion. Discussion will include nutritional interrelationships, amino acid and protein requirements, evaluation of protein quality and bioavailability of amino acids. Emphasis is on basic principles and their applications to animal and human nutrition.

602 Lipids Fall. 2 credits.

T R 11:15. A. Bensadoun.
Advanced course in biochemical, metabolic, and nutritional aspects of lipids. Emphasis is on critical analysis of current topics of lipid methodology, lipid absorption, lipoprotein secretion, structure, and catabolism; mechanisms of hormonal regulation of lipolysis and fatty acid synthesis; and cholesterol metabolism and atherosclerosis.

604 The Vitamins Fall. 2 credits. Register in Animal Science 604.

T R 10:10. G. F. Combs, Jr.
Lectures on nutritional aspects of the vitamins, including recent developments in nutritional and biochemical interrelationships with other nutrients and metabolites.

606 Carbohydrate Chemistry Spring. 2 credits. Prerequisite: organic chemistry. Recommended: biochemistry. S-U grades optional.

T R 11:15. B. A. Lewis.
The chemistry and physicochemical properties of simple carbohydrates, polysaccharides, and their complexes with lipids, proteins, and inorganic ions. The functional role of the carbohydrates in food systems and their nutritional implications will be discussed as well as applications of carbohydrates in food processing.

611 Molecular Toxicology Spring. 2 credits.

Prerequisite: full-year 400-level course in biochemistry or equivalent. S-U grades optional. Offered alternate years.

T R 11:15. C. Wilkinson, C. Campbell, A. Aronson, and others.

A study of fundamental biochemical mechanisms of absorption, transport, metabolism, and excretion of drugs, carcinogens, and toxicants. Emphasis on oxidative and conjugative pathways of metabolism and of environmental and nutritional factors that influence toxicant metabolism and disposition. Methods of evaluating *in vivo* and *in vitro* metabolism.

612 Methods of Assessing Physical Growth in Children Spring. 2 credits. Limited to graduate students and students who have permission of the instructor. S-U grades optional.

Lec, T 1:25; labs, T R 1:25–4:25. J. Haas.
A lab course to train students in methods and techniques used to assess the physical growth and development of growing children. The methods explored will be those applicable for field or community studies and will cover anthropometry, body composition, skeletal age, maturity indicators, physical fitness, and physiological responses to environmental stress.

616 Readings in Food Fall. 2 credits. Prerequisite: organic chemistry. Recommended: biochemistry. S-U grades optional. May be repeated for credit with permission of instructor.

M 7:30–9:25 p.m. N. Mondy.

Critical review of selected topics in the current literature. Emphasis on experimental data and basic scientific principles underlying modern theory and practice relative to food quality.

617 Teaching Seminar First half of semester during fall or spring. 1 credit. Limited to division graduate students and students who have permission of the instructor. S-U grades only.

S 9–12. M. Devine and N. Yaghlian.

A series of workshops focusing on development of teaching skills for guiding classroom learning in lec, disc, and lab settings. Preparation of content, presentation, and interaction techniques and evaluative methods are emphasized in relation to the student's specific teaching assignment. Videotape simulations provide opportunity for practice and analysis of teaching behaviors.

618 Teaching Experience Fall or spring.

Noncredit. Limited to division graduate students and students who have permission of the instructor.

To be arranged. Division faculty, M. Devine, coordinator.

Designed to provide experience in teaching nutritional sciences by direct involvement in college courses under supervision of a faculty member. The aspects of teaching and the degree of involvement vary depending on the needs of the course and the experience of the student.

619 Field of Nutrition Seminar (also Animal

Science 619) Fall or spring. Noncredit. S-U grades only.

M 4:30. Faculty and guest lecturers.

Lectures on current research in nutrition.

621 General Nutrition Spring. 3 credits.

Prerequisites: NS 331, Biological Sciences 331, and Veterinary Medicine 346; or equivalent course work with permission of instructor. Intended for graduate students with a major or minor in nutrition and undergraduate nutrition majors with the necessary background.

M W F 10:10. D. Roe.

An in-depth treatment of nutritional science with human application. Topics will include historical perspectives, nutritional physiology, assessment of nutritional status, human nutritional requirements, and nutritional disease due to diet, disease, or drugs.

[625 Seminar in Food Habits Research Fall.

3 credits. Limited to 12 graduate students.

Prerequisite: statistics or research design course. Offered alternate years. Not offered 1980–81.

W F 3:35. D. Sanjur.

Emphasizes a critical review of the literature and development of a research proposal using sociological theories and techniques as applied to nutritional data.]

626 Special Topics in Food Spring. 2 credits.

Hours to be arranged. G. Armbruster and

B. A. Lewis.

Current research related to food will be reviewed in the context of basic principles and their application to the quality of food.

627 Special Topics in Food Spring. 2 credits.

Prerequisite: organic chemistry. Recommended: biochemistry. S-U grades optional.

M 7:20–9:25 p.m. N. Mondy.

Current research related to food production and processing will be reviewed. May be repeated for credit with permission of instructor.

630–633 Advanced Nutrition Laboratory Spring.

1–5 credits. Limited to 12 students.

T R 2:15–5:15. Division faculty.

Study of the anthropometric, dietary, clinical, and biochemical assessment of human nutritional status. The individual courses are taught in sequence over the entire semester. Any or all of the modules may be taken for credit.

630 Anthropometric Assessment 1 credit.

Prerequisites: NS 331 or equivalent and permission of instructor.

J. Haas.

Study of methods and procedures for anthropometric, radiographic, and energetic assessment of children and adults in clinical, research, and survey settings.

631 Dietary Assessment 1 credit. Prerequisites: statistics and NS 331 or equivalent, and permission of instructor.

D. Sanjur.

Study of methods and techniques for assessing dietary intakes at the individual and household levels.

632 Clinical Assessment 1 credit. Prerequisites:

NS 630, 631, 441, Biological Sciences 330 or 331, and either NS 332 or Biological Sciences 430, and permission of instructor.

V. Utermohlen and division faculty.

Study of methods and techniques for clinical assessment of nutritional status and diagnosis of nutritional disorders.

633 Biochemical Assessment Weeks 9–14;

interested students must enroll with the instructor during the first 2 weeks of the term. 2 credits.

Prerequisites: NS 331, Biological Sciences 330 or 331, either NS 332 or Biological Sciences 430, a course in human physiology, and permission of instructor.

M. N. Kazarinoff and division faculty.

Biochemical assessment of nutritional status. Experiments are selected to exemplify measurements of intake, use, and output of primary nutrients and their metabolites.

[634 Vitamins and Coenzymes (also Biological

Sciences 634) Spring. 2 credits. Prerequisites: organic chemistry 253 or 357–358 and Biological Sciences 331 or 330, or their equivalents in biochemistry. Offered alternate years. Not offered 1980–81.

T R 10:10. M. N. Kazarinoff.

The chemical, biochemical, and nutritional aspects of the vitamins and coenzymes.]

635 Enzymology and Metabolic Regulation (also

Biological Sciences 635) Spring. 2 credits.

Prerequisites: Chemistry 357–358 and either Biological Sciences 330 or 331 or permission of the instructor. Recommended: physical chemistry.

T R 9:05. W. L. Dills and division faculty.

Lectures only. The study of enzymes and the molecular mechanisms of metabolic regulation.

637 Epidemiology of Nutrition Fall. 2 credits.

Limited to graduate students. Prerequisites: Statistics and Biometry 602 or 604 or equivalent; NS 331, 441, 601, 603, 630, and 631, or equivalent, and permission of instructor. S-U grades optional.

Hours to be arranged. J-P. Habicht.

In the context of designing and evaluating population interventions to improve protein-calorie nutrition, students will (a) review past evidence of effectiveness and efficiency of intervention, (b) attempt to quantify sensitivity and specificity of outcome measures, and (c) design methods to improve interventions and evaluations.

638 Epidemiology of Nutrition Spring. 2 credits.

Limited to graduate students. Prerequisites: Statistics and Biometry 602 or 604 or equivalent; NS 331, 441, 601, 603, 630, and 631, or equivalent, and permission of instructor. S-U grades optional.

Hours to be arranged. J-P. Habicht.

In the context of designing national nutrition surveillance, students will review (a) principles

underlying surveillance, (b) prerequisites of indicators, and (c) current surveillance proposals to identify strengths and weaknesses. The role of evaluation of programs in nutrition surveillance also will be reviewed.

645 Seminar on United States Nutritional

Services and Programs Spring. 2 credits. Limited to graduate students with a major or minor in human nutrition. S-U grades optional.

M W F 1:25. S. Kumanyika.

Students will be guided in the study and discussion of United States food and nutrition programs, community settings for nutrition service delivery, and linkages of these settings to acute care. Participants will be responsible for preparing and presenting relevant material in class.

646 Seminar in Physicochemical Aspects of

Food Spring. 3 credits. Prerequisite: a college course in organic chemistry or biochemistry. S-U grades optional.

T R 9:05; disc, hours to be arranged.

An introduction to physicochemical aspects of food for graduate students who have had limited or no work in this area. The seminar uses the lectures of NS 246 as a basis for supplementary readings and critical review of research on selected topics.

650 Clinical and Public Health Nutrition Spring.

3 credits. For graduate students with a major or minor in nutrition and undergraduate nutrition majors in their senior year. Prerequisite: NS 331 or equivalent.

M W F 9:05. D. Roe.

Lectures will cover social, environmental, and disease variables that influence the nutrition of infants, children, and adults. Endemic nutritional problems (such as obesity, dental caries, and anemias) of public health importance in the United States will be discussed. Student presentations will be made in class. Limited field experience will be offered.

651 Nutrition and the Chemical Environment

Fall. 3 credits. Prerequisite: NS 331 or equivalent.

M W F 11:15. D. Roe.

The relationship between nutrition and the effects of foreign chemicals. Students will be offered an overall view of compounds to which we are exposed, including natural food toxicants, food additives, water pollutants, pesticide residues, and radioactive wastes, as well as medications and illegal drugs. A factual and scientific background will be developed so students can interpret information and misinformation circulated in the news media.

652 Nutrition Counseling Spring, weeks 1–7.

2 credits. Limited to students in the Clinical Nutrition Program. Prerequisites: NS 441, 442, and permission of instructor. S-U grades only.

T R 8–10. C. Lanciault.

Principles and procedures of nutritional counseling in clinical practice. Emphasis on subject matter and process skills necessary to develop, implement, and evaluate nutritional care plans for individuals and groups. Includes workshops, simulation techniques, and work with clients in selected settings.

659 The Nutrition and Physiology of Mineral

Elements (also Veterinary Medicine 759) Fall.

2 credits. Prerequisites: basic physiology, intermediate biochemistry, and general nutrition.

T R 8. R. Wasserman, R. Schwartz, and

D. VanCampen.

Lectures on nutritional aspects and physiological, biochemical, and hormonal relationships of the prominent macro- and micro-elements, with emphasis on recent developments. Included will be information on methodologies of mineral research and the chemistry of ions and complexes as well as essentiality, requirements, transport, function, homeostasis, interrelationship, and toxicity of various mineral elements.

660 Special Topics in Nutrition Fall or spring. 3 credits maximum each term. Registration by permission of the instructor.

Hours to be arranged. Division faculty.

Designed for the student who wishes to become informed in any specific topic related directly or indirectly to nutrition. The course may include individual tutorial study, experience in research laboratories, a lecture series on a special topic selected by a professor or a group of students, and/or selected lectures of another course already offered. Topics may be changed so that the course may be repeated for credit.

669 Field Seminar Spring; offered during January intersession or immediately following final examinations spring semester. 1 credit. Limited to 12 students. Required for graduate students in clinical nutrition. Open to other graduate students in nutrition with permission of instructor.

J. Rivers and M. Devine.

Overview of policy decision making and implementation of nutrition programs at the state and national levels. Seminars alternate between Washington, D.C. (even years) and Albany, N.Y. (odd years). Provides opportunities to meet and confer with staff members of selected governmental and private agencies. Upon return to campus an integrated summary report is required prior to group discussion.

670 Clinical Field Studies Spring-summer.

15 credits maximum. Limited to graduate students in clinical nutrition. Prerequisites: NS 441, 442, 652, 630, 631, 632, and 633. S-U grades only.

Full-time study at off-campus clinical sites.

C. Lanciault, R. Holmes, V. Utermohlen, and J. Rivers.

The delivery of nutritional care in hospitals, outpatient clinics, and community settings.

680 International Nutrition Problems, Policy and Programs Fall. 3 credits. Prerequisite: permission of instructor.

T R 11:15 - 12:30. M. Latham.

Designed for graduate students who wish to learn about the important nutritional problems of developing countries. The major forms of malnutrition related to poverty and their underlying causes will be discussed. Emphasis will be placed on programs and policies that can assist poor countries and communities to improve their nutritional and health status.

690 Seminar in Nutrition and Behavior Spring.

3 credits. Prerequisite: at least one course in biopsychology, physiology, and nutrition and permission of instructor. S-U grades optional.

Hours to be arranged. D. Levitsky.

Selected topics include the effect on diet on the developing brain and its effect on behavior, physiological basis of feeding and drinking behavior, and control of obesity.

695 Seminar in International Nutrition and Development Policy Spring. 2 credits. Prerequisite: NS 680 or equivalent. S-U grades optional.

T R 10:10 - 12. M. Latham and division faculty.

The role of nutrition in national development. Emphasis will be on the interdisciplinary nature of the programs and policies needed to solve the food and nutrition problems of low-income countries and communities. Planning of programs and evaluation of alternate strategies designed to improve nutrition will be discussed, using examples from particular countries.

699 Special Topics in International Nutrition Fall and spring. 3 credits maximum each term.

Registration by permission of the instructor.

International nutrition faculty.

This option is designed for the graduate student who wishes to become familiar with some specific topic related to international nutrition. The instruction will

usually consist of individual tutorial study involving extensive use of existing literature. In certain semesters it may consist of a lecture or seminar course on a subject such as nutrition and parasitology or the nutritional problems of some geographic region. On occasions it may involve laboratory or field studies. Because the topics may change, this course may be repeated for credit.

703 Seminar in Nutritional Science Fall or spring. 1 credit. S-U grades only.

T 12:20 or W 12:20. Division faculty.

899 Master's Thesis and Research Fall or spring.

Credit to be arranged. Prerequisite: permission of the chairperson of the graduate committee and the instructor. S-U grades optional.

Hours to be arranged. Division graduate faculty.

999 Doctoral Thesis and Research Fall or spring.

Credit to be arranged. Prerequisite: permission of the chairperson of the graduate committee and the instructor. S-U grades optional.

Hours to be arranged. Division graduate faculty.

Officer Education

Aerospace Studies Courses

161 United States Military Forces Fall. 1 credit.

1 class each week. J. Pallay.
A study of current United States military forces with emphasis on the analysis of the doctrine, mission, and organization of the United States Air Force. Current factors affecting today's professional military officers will be considered. Special emphasis will be placed on the role of human rights in the Department of Defense. The elements of strategic offensive and defensive forces will be explored.

162 Aerospace Operations Spring. 1 credit.

1 class each week. G. R. Fisher.
The aerospace forces of the United States will be studied, with emphasis on the mission, resources, and operations of tactical air forces throughout the world. Army and Navy operations and functions as contributions to the total national defense will be reviewed. Through the case-study method, aerospace budgetary decision making will be introduced.

211 Development of Military Aviation Fall. 1 credit.

1 class each week. C. A. Houston.
Factors leading to the development of aviation and the concepts and doctrine for the employment of air power will be studied. Topics that will be reviewed and analyzed include the history of manned flight, the effects of World War I on the uses of aviation, and the development of pre-World War II aircraft and the political struggles for an independent United States air arm. The role of air power in World War II, including strategic bombing, tactical air power, and the role of air superiority in warfare will be examined.

212 American Air Power Since 1947 Spring. 1 credit.

1 class each week. C. A. Houston.
The employment of the Air Force since World War II in military and nonmilitary operations to support national objectives. Effects of technology on defense policy and strategy will be reviewed. The part played by the air arm in activities such as the Berlin Airlift and national and international relief missions will be discussed. The role of air power in the Korean conflict, the Cuban crisis, and the Vietnam War will be examined from the viewpoint of technology and tactical doctrine.

331 Leadership and Communicative Skills Fall. 3 credits.

2 or 3 classes each week. R. F. Kozma.
Leadership responsibilities at the junior officer level including the responsibility, authority, and functions of a military commander and his staff will emphasize management research and theory. Recent approaches to leadership models and the importance of communicative skills in any leadership role are considered. Case study exercises and oral and written assignments will be required.

332 Management in the Armed Forces Spring. 3 credits.

2 or 3 classes each week. R. F. Kozma.
Management at the junior officer level. Basic concepts of management and decision-making process, including planning, organizing, coordinating, directing, and controlling. Evaluation process and techniques used by management will be studied. Position of management in world of power and politics, including managerial strategy and tactics will be considered. Case studies and oral and written assignments will be required.

405 Principles of Air Navigation and Aircraft Systems Fall. 3 credits.

2 classes each week. R. F. Kozma.
Basic principles of weather elements, aerodynamics, aircraft systems, engine systems, and navigation systems. The study of these systems is integrated with chart projections, navigational aids, flight instruments, and avionics. Use of flight computer will be covered. This will prepare student for F.A.A. Private Pilot Ground School Test.

461 Military and American Society Fall. 3 credits.

2 or 3 classes each week. G. R. Fisher.
The functions and roles of the professional officer in a democratic society and how they relate to the socialization processes, prevailing public attitudes, and value orientations associated with professional military service will be examined. Changes within the military will be analyzed, including such topics as the all-volunteer service, race relations, and the impact of women in the armed forces. Will review the essential feature of the military justice system as it functions to protect basic human rights and organizational order. The formation and implementation of defense policy including political, economic, and social constraints will be studied.

462 American Defense Policy Spring. 3 credits.

2 or 3 classes each week. J. Pallay.
The prerequisites for maintaining adequate national security forces will be explored and the impact of technological and international development upon strategic preparedness and the overall defense policymaking process will be assessed. An investigation of basic contemporary nuclear strategy, its evolution, control, and future. Alternatives to nuclear war including arms control, limited wars, wars of revolution, and insurgency will be examined. Governmental processes and relationships that determine the contemporary military environment and provide a perspective for the future of defense policymaking in the United States.

Leadership Laboratory Courses

141-142 Initial Military Experiences

Introduction to the responsibilities, life, and work of an Air Force officer. Basic knowledge of drill and ceremonies, military courtesies, and the wearing of the uniform. Field trip to local military installation.

241-242 Intermediate Military Experiences

Will develop skills in giving commands for drill and ceremonies. Introduction to Air Force base environment in which the USAF officer functions. Will include a look at career areas available based on academic majors. Students will experience and participate in leadership situations through military drills and ceremonies.

341-342 Junior Officer Leadership

Cadets will assume leadership responsibilities similar to those of a junior officer. Emphasis will be on comprehending the importance of applying effective human relations in dealing with superiors, peers, and subordinates. Relationship between Air Force Specialty Codes and academic majors. The importance of basic health habits to leadership.

441 Advanced Leadership Experiences

Command leadership in operating a military organization. Cadets will apply effective leadership and managerial techniques with individuals and groups and will participate in self-analysis of leadership and managerial abilities.

442 Precommissioning Laboratory

Factors that will facilitate transition from civilian to military life are reviewed. The need for military security, base services and activities, personal finances, travel regulations, and social obligations will be introduced.

Military Science Courses

101 United States Organization for Defense Fall. 1 credit. Required.

Staff.
Students will examine the United States defense apparatus in terms of organization, mission, personnel, and relationships among military forces and between the military forces and various branches and departments of the government. The United States Army force structure will be examined at all levels. The complexities and magnitude of operating the defense organization will be studied to provide a framework for subsequent instruction.

201 American Military History Fall. 1 credit. Required.

Staff.
The student will be introduced to the origin and growth of the United States Army as an institution maintained by the nation to protect its interests and secure its way of life. The principles and theories of war will be examined and their application illustrated by examples drawn from American military history. The foreign and military policies of the United States and the basic causes that have led to the various conflicts in which the United States has participated will be explored.

221 Mapping: Land Navigation Fall. 1 credit. Required.

Staff.
The course will provide a practical knowledge of the various forms of topographic representation. The student will develop, interpret, and utilize maps in terrain association and land navigation. Knowledge of topography will be complemented by an orientation on significant environmental influences from political, social, and climatic factors. Portions of the course will offer practical experience in land navigation and orienteering.

231 Social and Organizational Psychology in the Military Environment Spring. 1 credit. Required.

Staff.
This course will allow the student to develop a basic understanding and appreciation of the theories of social and organizational psychology and behavior as they apply to the military setting. Attention will be given to leader types, the source and exercise of authority, and the impact of varying styles of leadership on motivation and organization effectiveness. The student will be introduced to the concepts of integrity, ethics, and professionalism.

322 Leadership in Small Unit Operations Spring. 2 credits. Required.

Staff.
This course will provide an understanding of the nature of decision making and the tactical application of the military team. Through the use of conferences and extensive practical exercises, the student will develop familiarity with the factors influencing the leader's decisions; the processes of planning, coordinating, and directing the operations of military units to include troop-leading procedures; and development of operation plans and orders.

332 Theory and Dynamics of the Military Team Fall. 2 credits. Required.

Staff.
After an initial introduction to techniques of presenting briefings, the student will be provided with a broad understanding of the principles and application of teamwork in military organizations. Particular emphasis will be given to leadership responsibilities of the commander as the team coordinator. Additionally, the student will have an opportunity to develop an understanding of the roles and contributions of the various branches of the Army in support of the military team.

424 Contemporary Military Environment I Fall.
2 credits. Required.
Staff.

A detailed examination of the functions and activities of military organizations, their commanders, and their staff. Discussion will focus on students' past experiences and future expectations in examining such aspects of the military environment as the chain of command, decision making, command and staff relations actions, and the various elements of small unit administration.

461 Contemporary Military Environment II
Spring. 2 credits. Required.
Staff.

As a continuation of the material presented in Mil S 424, students will examine carefully the leadership environment of an Army officer. Conferences and seminars are used to examine the techniques of effective military leadership, the sociological and psychological environment, the nature of military law, and above all, the professional ethics, responsibilities, and obligations of an Army officer.

Practical Leadership Training

141-142 Leadership Laboratory I

Fall Spring
Mil S 141 Mil S 142

Mil S 1 cadets will select either rifle marksmanship, orienteering, or rappelling. These interesting and challenging activities will not receive academic credit but may be used for physical education credit if adequate hours have been accrued.

242 Leadership Laboratory II

Fall Spring
Not offered Mil S 242

Cadets will meet for two hours each week as members of the cadet organization to participate in practical leadership exercises. Types of practical activities will include familiarization in rifle marksmanship, orienteering, drill and ceremonies, signal communications, physical fitness training, tactics and field exercises.

341-342 Leadership Laboratory III

Fall Spring
Mil S 341 Mil S 342

Cadets will meet for 1½ hours a week to prepare for a six-week summer camp that follows the junior year. Emphasis will be on the development of individual skills in leadership techniques and practical skills. Cadets rotate among leadership positions to develop an ability to apply decision-making processes to a myriad of situations. Cadets also will acquire technical expertise and proficiency in signal communications, physical fitness, drill and ceremonies, rappelling, orienteering, tactics, water survival, and other military skills.

441-442 Leadership Laboratory IV

Fall Spring
Mil S 441 Mil S 442

Senior cadets will plan and operate the Leadership Laboratory programs for Mil S I-III cadets. Emphasis is placed on the development of planning and supervisory skills. Cadets will have an opportunity to practice leadership skills developed during previous ROTC training and summer camp experiences.

Naval Science Courses

101 Fundamentals of Naval Science Fall.
Noncredit.

One hour class each week (lecture-recitation).
Navy staff.

A study of fundamental aspects of naval science, including its conceptual contributions to sea power, factors involved in the physical development of naval forces, resources which must be managed, and prospects for the future.

102 Naval Ship Systems (also Engineering M&AE 101) Spring. 3 credits.

3 classes each week (lecture-recitation).
R. L. Wehe.

The course will introduce primary ship systems and their inter-relationship. Basic principles of propulsion, control, internal communications, structure, and other marine systems are considered.

201 Seapower—Maritime Affairs Spring. 1 credit.

One seminar weekly. Navy staff.
Discussions will explore the meaning and modern applicability of seapower concepts, including such components as naval power, ocean science, ocean industry, ocean commerce, and international law.

211 Armed Conflict and Society Fall. 3 credits.

3 classes each week. Presentation by Marine Corps and Navy instructors with guest lecturers, primarily from government and history departments.

A study of modern warfare that will examine the relationship of military strategy to geography, economics, sociology, technology, and national political realities and values; the evolution of warfare, including principles of war, weapons, and associated equipment, and the effects of nuclear weapons and guerrilla warfare on traditional concepts of national strategy.

305 Principles of Navigation (also Agricultural Engineering 305) Fall. 4 credits.

4 classes each week (lecture-recitation-project work).
The course will cover coordinate systems, chart projections, navigational aids, instruments, compass observations, tides and currents, and soundings. It will also include celestial navigation, time, spherical trigonometry, motion of the stars and sun, star identification, position fixing, use of the nautical almanac, electronic navigation systems, and air navigation.

311 Amphibious Warfare Spring. 3 credits.

3 lecture-recitations each week.
Marine Corps staff.
The history of the development, theory, techniques, and conduct of amphibious operations during the twentieth century. Special emphasis will be on amphibious operations conducted in the Central Pacific during World War II.

321 Naval Operations Spring. Noncredit.

One one-hour class each week. Navy staff.
The course will cover the application of command and control principles and the integration of sensors and weapons systems in the conduct of naval operations. Visual and electronic communications methods, data systems employment, tactical disposition of forces, and fleet logistics support will be studied. Topics in shiphandling will also be discussed.

431 Naval Leadership, Organization, and Management Spring. Noncredit.

W or R 1:25-4:00 (seminar given simultaneously with Nav S 441). Navy staff.
Principles and functions of management relevant to the naval environment and the structure of the naval organization. Theories and research of the behavioral sciences pertinent to the leadership role of the junior officer in the Navy or Marine Corps will be explored, with particular emphasis on self-development and individual responsibility. Through the use of assigned readings, experiential exercises, situation problems, and case studies, students will interact with peers to develop their individual leadership style. Members of the class will take part in a team project based upon an actual leadership situation.

451 Naval Weapons Systems Fall. 3 credits.

Prerequisites: Mathematics 192 or 112 and Physics 208 or 214.
Lecture-recitations: M W F 8. Navy staff.

The course will examine the principles and theories used in the development of naval weapons systems. Initially, extensive study will be made of sensing and detection systems, especially radar and sonar, followed by discussions of ancillary systems for computing, tracking, stability, and weapons control and delivery. The latter part of the course will cover the formal derivation of the fire control problem and development of an algorithmic solution method applicable to the digital computer.

Naval Professional Laboratories

Nav S 141-142, 241-242, 341-342, or 441-442

All students in the Naval program participate in one ninety-minute laboratory session each week. The sessions are held from 2:30 until 4:00 on either Wednesday or Thursday afternoon. These periods will be planned and implemented for the most part by the midshipmen officers in the battalion organization and will consist of both drill and professional information briefings and underway training aboard the unit's fifty-foot seagoing sail training ketch. Students will gain experience in actual leadership situations and at the same time will learn the fundamentals of seamanship, military formations, movements, commands, discipline, courtesies, and honors. During information briefings, special emphasis is given to applied leadership as it relates to the administrative and managerial aspects of a Navy or Marine Corps officer's duties.

Physical Education

Enrollment is limited by the number of places in each class and by the locker space available; other restrictions are included in the course descriptions. All courses are coeducational unless otherwise indicated. The time and place of class meetings, as well as information about fees, are available at physical education registration at the beginning of each semester.

Courses offered "fall I," "fall II," "spring I," or "spring II" are given in six-week units; unit I courses are offered during the first half of the semester and unit II courses during the second half.

Courses Offered through Teagle Hall

Introductory Backpacking Fall and spring. Coed section is open to men and women; section for women only has same format but is led by experienced woman instructors. Fee charged. In-class sessions leading to a full weekend "on the trail" in a local wilderness area.

Badminton Fall and spring.
Two classes each week.
Beginning and intermediate levels. Equipment is provided.

Equitation Fall and spring. Fee charged.
One class each week. Class days and hours assigned at registration.
Class meets at Oxley Polo Arena.

Fencing Fall and spring. Fee charged.
Two classes each week.
Beginners are provided with all necessary equipment.

First Aid Fall and spring.
One class each week.
American Red Cross standard first aid course.

Golf

Instructional Golf Fall and spring. Fee charged.
Two classes each week.
Instruction by P.G.A. professionals is geared to all levels of experience and ability. The objective is to give beginners enough skill and experience to play and to give more advanced players direction to their thinking, practice, and play through a thorough understanding of fundamentals. Equipment is provided.

Recreational Golf Fall and spring. Prerequisite: golfing experience. Fee charged.
Nine holes twice a week for six weeks.
Class meets at Moakley golf course. Students must provide their own clubs.

Basic Hockey Fall and spring. Fee charged.
Two classes each week.
Stick handling, passing, and shooting are stressed. Participants must provide their own skates and sticks.

Hunter Safety Spring.
Hours to be arranged.
Instruction in hunter safety leads to New York State hunter certification for bow or gun.

Ice Craft (Climbing) Spring. Fee charged.
Limited to students experienced in mountain climbing. Prerequisite: permission of instructor.
Hours to be arranged.

Jogging Fall and spring.
Two classes each week.
A program to meet the needs of each individual. Progress from jogging a few hundred yards to a capacity of three miles at the end of twelve weeks.

Karate Fall and spring. Fee charged.
Two classes each week.
Beginning course with professional instruction.

Basic Mountaineering (Rock Craft) Fall and spring. Fee charged for equipment, travel, and incidentals.
One class each week.
Basic instruction and practical experience in the technical aspects of mountaineering: rock climbing, rappelling, knot craft, rescue techniques, and related subjects.

Nautilus Fall and spring. Enrollment limited. Fee charged.
Two classes each week.
Advanced weight lifting on specifically designed apparatus.

Outdoor Leadership Training Fall and spring. Fee charged.
A combination of in-class sessions and outings designed for the more experienced outdoor person (backpacker, cyclist, canoeist).

Racquetball Fall and spring. Fee charged.
Two classes each week.
Instruction at all levels. Equipment is furnished.

Recreational Games Fall and spring.
Two classes each week.
A survey of group games that may be used for camp, school, or recreational groups.

Advanced Rock Climbing Fall and spring.
Prerequisite: Basic Mountaineering or permission of instructor.
Hours to be arranged.

Sailing

Principles of Sailing Fall and spring. Fee charged.
One class each week.
Instruction in basic sailing skills and safety principles using both small and large boats.

Intermediate Sailing Fall and spring. Fee charged.
One class each week.
Advanced techniques of sailing using both small and large boats.

Introduction to Scuba Diving Fall and spring. Fee charged.
Two classes each week.
Beginning course — general certification only. All equipment is provided, including tanks, regulator, snorkel, and vest.

Skating Fall and spring. Fee charged.
Three classes each week.
For beginning or intermediate skaters. Students provide their own hockey skates or rent them at Lynah Rink.

Skeet and Trap Fall and spring. Fee charged.
One class each week.
Beginning course includes lectures and shooting at the Tompkins County Rod and Gun Club range. Guns and shells are furnished.

Skiing Spring. Fee charged.
For registration or more information contact the Physical Education Office in Teagle Hall.

Squash Fall and spring. Fee charged.
Two classes each week.
Beginning course. Equipment is provided.

Swimming

Swimming (Beginners) Fall and spring. Enrollment limited to men.
Instruction in beginning (survival) swimming for nonswimmers.

Swimming Conditioning Fall and spring.
Two classes each week.
Analysis of basic swimming strokes for intermediate and advanced swimmers.

Outdoor Tennis Fall.
Three classes each week.
For intermediate and advanced players. Tennis instruction outdoors on Upper Alumni Field courts. Equipment is provided.

Volleyball Fall and spring.
Two classes each week.
Beginning and intermediate levels. Fundamentals and team play are stressed.

Water Safety

Advanced Life Saving Fall and spring. Students should be in good physical condition.
One class each week.

ARC Water Instructor Course Spring. Prerequisite: advanced life saving certification.
Classes start in late March and are held until the course is completed (approximately thirty-two hours).

Water Safety Instructor Refresher Course Spring. Prerequisite: current WSI certification. Students should come prepared to be tested for required swimming skills and physical endurance.

Weight Lifting Fall and spring.
Two classes each week.
Beginning and intermediate classes include instruction in correct lifting techniques. Each student will be assigned a series of exercises designed for his or her individual needs.

Winter Camping Spring. Prerequisite: camping or mountaineering experience. Fee charged. Further information is available at registration.

Courses Offered through Helen Newman Hall

Archery Fall I and spring II.
Two classes each week.
Beginning — Instruction in the care of equipment; seven basic steps for shooting; scoring; and practice shooting at twenty, thirty, and forty yards.
Intermediate — Review of basic skills followed by instruction in intermediate shooting skills, clout shooting.

Badminton Fall II and spring I.
Two classes each week.
Beginning — Instruction and practice in rules, doubles play, strategy, and basic skills, including clearing, serving, drop shots, smash. Class competition.
Intermediate — Review of basic skills followed by instruction in strategy for doubles; presentation of intermediate shots and skills; drive serve, around-the-head, crosscourt shots; advanced systems of play. Class competition.

Basketball Fall II and spring I.
Two classes each week.
Beginning — Instruction and practice in the basic skills of passing, catching, dribbling, shooting, defense and offense, rules and strategy.
Intermediate — Emphasis on and practice of shooting skills, alternate offenses and defenses, advanced team strategy.

Bowling Fall and spring. Fee charged (students bowl two lines; shoe rental included).

Two classes each week.

Instruction in spot-bowling techniques, use of the hook-ball delivery, scoring, and converting spares.

Canoeing Fall and spring. Fee charged.

One class each week.

Basic skills of flat-water canoeing.

Conditioning Fall I, fall II, spring I, and spring II.

Two classes each week.

Vigorous exercise is performed to condition and stress the cardiovascular and respiratory systems. Entails running and exercising at various levels of intensity to increase endurance, strength, and flexibility.

Cycling Spring II.

One class each week.

Includes basic instruction in bicycle care. Students tour the Ithaca area during classes and must provide their own bicycles.

Dance

Two classes each week.

Classes in dance techniques are intended to develop strength, flexibility, coordination, and the ability to perceive and reproduce phrases of dance movement with rhythmic accuracy and clarity of body design. The more advanced classes require mental and physical ability to perform more complex phrases in various styles.

The courses listed below are offered both fall and spring:

Modern Dance: Dance Fundamentals

Elementary Modern

Intermediate Modern

Advanced Modern

Dance Composition

T'ai Chi

Ballet I

Ballet I+

Ballet II

Ballroom Dance Fall and spring.

Two classes each week.

Instruction in social or ballroom dancing. Dances include the waltz, Charleston, rumba, calypso, tango, and variations.

Folk Dance Fall and spring.

Two classes each week.

Introduction to basic folk-dance steps and dances of many countries.

Equitation Fall and spring. Fee charged.

One class each week. Class days and hours assigned at registration.

Class meets at Oxley Polo Arena.

Exercise and Figure Control Fall I, fall II, spring I, and spring II.

Two classes each week.

Exercise and discussion sessions introduce the purpose of each exercise, the ways in which exercise may be used in weight control, the relationship of dieting and energy expenditure to weight control, design of an individual exercise program, and participation in vigorous exercise and running.

Field Hockey Fall I.

Two classes each week.

Instruction and practice in basic hockey skills: dribbling, passing, dodging, tackling, team play, and strategy.

Figure Skating Fall II and spring I. Students must provide their own skates. Fee charged.

Three classes each week.

Beginning — Instruction and practice in figure-skating techniques: forward and backward crossovers, turns, spirals.

Intermediate — Review of basics followed by instruction and practice in intermediate techniques, including lunges, jumps, spins.

First Aid Fall and spring.

One class each week.

American Red Cross standard first aid course.

Golf

Instructional Golf Fall and spring. Fee charged.

Two classes each week.

Instruction by P.G.A. professionals is geared to all levels of experience and ability. The objective is to give beginners enough skill and experience to play and to give more advanced players direction to their thinking, practice, and play through a thorough understanding of fundamentals. Equipment is provided.

Recreational Golf Fall and spring. Prerequisite:

golfing experience. Fee charged.

Nine holes twice a week for six weeks.

Class meets at Moakley golf course. Students must provide their own clubs.

Gymnastics

Gymnastics I Fall I and spring I.

Two classes each week.

Basic instruction in tumbling, dance for gymnastics, balance beam, and trampoline.

Gymnastics II Fall II and spring II.

Two classes each week.

Basic instruction in uneven parallel bars, vaulting, and trampoline.

Intermediate Gymnastics Fall and spring.

Prerequisites: Gymnastics I and II or equivalent, or permission of instructor.

Two classes each week.

Jogging Fall and spring.

Two classes each week.

A program to meet the needs of each individual. Progress from jogging a few hundred yards to a capacity of three miles at the end of twelve weeks.

Lacrosse Fall I and spring II.

Two classes each week.

Instruction and practice in basic skills (cradling, passing, catching, goal shooting, checking) and team play and strategy.

Physical Fitness and Conditioning Fall and

spring. Prerequisite: a medical examination by the individual's personal physician.

Two classes each week.

A scientifically managed exercise program for faculty, staff, students, and alumni.

Recreational Sports and Games Fall and spring.

Two classes each week.

A potpourri of games that can be used in schools, at camps, and on playgrounds.

Riflery Fall and spring. Fee charged.

Two classes each week.

Instruction and practice in the techniques of target riflery from various shooting positions.

Scuba Diving — National Certification Fall and spring. Fee charged.

One class each week.

Basic scuba program includes classroom discussions, skill training in the pool, and open-water training in Cayuga Lake. Internationally recognized basic certification.

Skiing

Ski Conditioning Fall II.

Two classes each week.

A variety of indoor and outdoor exercises designed to increase flexibility, strength, and endurance in preparation for the ski season.

Downhill Skiing Spring. Fee charged. Further

information available at registration.

Cross-Country Skiing Spring I. Intended for both

beginners and advanced skiers. Fee charged.

One class each week.

In the first few lessons the basic ski-touring techniques are taught. Main emphasis is on touring. Lectures cover waxing and choosing proper skiing equipment.

Soccer Fall I.

Two classes each week.

Introduction to the game includes basic individual skills (passing, trapping, volleying) and team play and strategy.

Softball Spring II.

Two classes each week.

Instruction in regulation play. Batting, pitching, and fielding skills are also emphasized.

Swimming

Beginning Swimming Fall I, fall II, spring I, and spring II.

Two classes each week.

Instruction and practice in basic skills leading to passing the swimming proficiency test.

Intermediate Swimming Fall I, fall II, spring I, and spring II.

Two classes each week.

Practice and perfection of basic skills and five basic strokes.

Advanced Swimming Fall I, fall II, spring I, and spring II.

Two classes each week.

Practice and perfection of the eleven basic strokes.

Beginning Synchronized Swimming Fall.

One class each week.

Sculling; stunts, including the tub, marlin, log roll, front and back tuck somersaults, and front and back pikes.

Diving Fall II.

Two classes each week.

Instruction in fundamentals of competitive diving. Dives taught include front (pike and layout), back, front and back somersault.

Tennis

Beginning Tennis Fall I and spring II.

Two classes each week.

Instruction and practice in basic skills and footwork, including grips and basic strokes: forehand, backhand, serve. Team play for doubles and scoring.

Low Intermediate Tennis Fall I and spring II.

Two classes each week.

Review and further instruction in strokes: backhand and forehand, serve, volley, lob. Doubles strategy and play.

High Intermediate and Advanced Tennis Fall I and spring II. Fee charged.

Two classes each week.

Skills emphasized include backhand, volley, serve (flat, slice, twist), approach shot, lob, smash. Advanced strategy for singles and doubles play. Students provide their own rackets.

214 Physical Education

Volleyball Fall I, fall II, spring I, and spring II.

Two classes each week.

Beginning — Presentation and practice of basic skills:

serves (underhand, sidearm, overhead), volley, underhand pass, bump, spike, block; rules and scoring.

Intermediate — Emphasis on accuracy and consistency. Skills taught include spike and block, overhead serves, various methods of team play and court coverage, the dink, Japanese roll, and other advanced techniques.

Water Safety

Advanced Life Saving Fall and spring. Students should be in good physical condition.

Two classes each week.

Water Safety Instructor Training Fall and spring.

Two classes each week.

Work toward American Red Cross WSI certificate.

Instruction in methods of teaching swimming strokes and lifesaving skills.

New York State College of Veterinary Medicine

Anatomy

- 500 **Gross Anatomy** Fall.
- 501 **Gross Anatomy** Spring.
- 502 **Developmental and Microscopic Anatomy** Fall.
- 503 **Microscopic Anatomy** Spring.
- 504 **Neuroanatomy** Spring.
- 505 **Applied Anatomy** Fall.
- 506 **Applied Anatomy** Spring.
- 600 **Special Projects in Anatomy** Fall and spring.
- 601 **Advanced Anatomy** Fall and spring.
- 602 **Advanced Clinical Neurology** Spring.
- 700 **Vertebrate Morphology** Spring.

Avian and Aquatic Animal Medicine

- 255 **Poultry Hygiene and Disease** Fall.
- 555 **Avian Diseases** Spring.
- 671 **Diseases of Aquatic Animals** Spring.
- 672 **Aquavet: Introduction to Aquatic Veterinary Medicine.** Fall.
- 673 **Diseases of Aquarium Fish** Spring.
- 770 **Advanced Work in Avian Diseases** Fall and spring.
- 771 **Graduate Seminar in Diseases of Aquatic Animals** Fall and spring.
- 772 **Advanced Work in Aquatic Animal Diseases** Fall and spring.

Clinical Sciences

- 475 **Health and Diseases of Animals** Spring.
- 546 **Clinical Orientation** Fall.
- 560 **Clinical Methods** Fall.
- 581 **Obstetrics and Reproductive Diseases** Spring.
- 582 **Obstetrics and Reproductive Diseases** Fall.
- 583 **Large Animal Medicine** Fall.
- 584 **Large Animal Medicine** Spring.
- 585 **Large Animal Surgery** Spring.
- 586 **Radiology** Spring.
- 587 **Clinical Nutrition** Spring.
- 589 **Veterinary Medical Orientation** Spring.

- 571 **Clinical Pathology** Fall.
- 572 **Senior Seminar** Fall and spring.
- 573 **Large Animal Clinic** Fall.
- 574 **Large Animal Surgical Clinic** Spring.
- 575 **Ambulatory Clinic** Fall.
- 576 **Ambulatory/Mastitis Clinic** Spring.
- 577 **Diagnostic Services** Fall.
- 578 **Anesthesiology Clinic** Spring.
- 579 **General Medicine** Spring.
- 580 **Radiology Clinic** Spring.
- 581 **Basic Nutrition** Fall.
- 582 **Large Animal Surgical Techniques** Spring.
- 583 **Small Animal Medicine and Surgery** Fall.
- 584 **Small Animal Medicine and Surgery** Spring.
- 586 **Small Animal Surgical Exercises** Spring.
- 587 **General Surgery and Anesthesiology** Fall.
- 589 **Small Animal Medical Clinic** Fall.
- 590 **Small Animal Medical Clinic** Spring.
- 591 **Small Animal Surgical Clinic** Fall.
- 592 **Small Animal Surgical Clinic** Spring.
- 593 **Ophthalmology** Spring.
- 594 **Large Animal Medical Clinic** Spring.
- 596 **Opportunities in Veterinary Medicine** Spring.
- 598 **Dermatology Clinic** Spring.
- 675 **Special Problems in Large Animal Medicine** Fall and spring.
- 676 **Special Problems in Large Animal Surgery** Fall and spring.
- 677 **Special Problems in Large Animal Obstetrics** Fall and spring.
- 679 **Dairy Herd Health** Fall.
- 680 **Poisonous Plants** Fall.
- 681 **Horse Health Management** Spring.
- 682 **Large Animal Internal Medicine** Fall.
- 684 **Horse Lameness** Spring.
- 686 **Goats: Management and Diseases** Spring.
- 687 **Diseases of Swine** Spring.
- 688 **Special Problems in Small Animal Medicine** Fall and spring.
- 689 **Special Problems in Small Animal Surgery** Fall and spring.
- 690 **Veterinary Dermatology** Fall.
- 778 **Gastroenterology Conference** Fall and spring.
- 779 **Veterinary Gastroenterology** Spring.

- 780 **Veterinary Research Methods** Spring.
- 781 **Advanced Work** Fall and Spring.
- 782 **Special Topics of Veterinary Ophthalmology** Spring.

Microbiology

- 315 **Basic Immunology Lectures** Fall.
- 316 **Basic Immunology Laboratory** Fall.
- 317 **Pathogenic Microbiology** Spring.
- 515 **Veterinary Immunology** Fall.
- 516 **Veterinary Bacteriology** Fall.
- 517 **Veterinary Virology** Spring.
- 518 **Veterinary Mycology and Protozoology** Fall.
- 519 **Infectious and Zoonotic Diseases** Spring.
- 605 **Special Projects in Microbiology** Fall and spring.
- 606 **Small Animal Infectious Diseases** Spring.
- 706 **Advanced Immunology Laboratory** Spring.
- 707 **Advanced Work in Bacteriology, Virology, or Immunology** Fall and spring.
- 708 **Animal Virology Lectures** Spring.
- 709 **Animal Virology Laboratory** Spring.
- 710 **Microbiology Seminar** Fall and spring.
- 711 **Laboratory Methods of Diagnosis** Fall and spring.
- 713 **Seminars on Current Topics in Immunology and Microbiology** Fall, spring, and summer.

Pathology

- 535 **Veterinary Pathology I** Fall.
- 536 **Veterinary Pathology II** Spring.
- 539 **Introduction to Laboratory Animal Medicine** Fall.
- 540 **Clinical Pathology** Spring.
- 541 **Comparative Necropsy** Spring.
- 635 **Special Problems in Pathology** Fall and spring.
- 636 **Wildlife Pathology** Fall.
- 637 **Postmortem Pathology** Fall.
- 638 **Microscopy** Fall.
- 639 **Select Topics in Laboratory Animal Medicine** Fall and spring.
- 640 **Principles of Toxicological Pathology** Fall.
- 641 **Clinical Immunology** Spring.
- 736 **Pathology of Nutritional Diseases** Spring.
- 739 **Advanced Work in Pathology** Fall and spring.

- 740 **Reproductive Pathology** Spring.
- 749 **Laboratory Animal Clinical Rotation** Fall and spring.
- 788 **Seminar in Surgical Pathology** Fall and spring.
- 789 **Seminar in Necropsy Pathology** Fall and spring.
- 790 **Special Topics in Pathology** Fall and spring.
- 791 **Mechanisms of Disease** Spring.
- 792 **Immunopathology** Spring.

Physical Biology/Section of Physiology

- Invertebrate Zoology (Biological Sciences 310)**
- Histology: The Biology of the Tissues (Biological Sciences 313)**
- 346 **Introductory Animal Physiology Lectures (also Biological Sciences 311)** Fall.
- 348 **Introductory Animal Physiology Lab (also Biological Sciences 319)** Fall.
- Seminar in Anatomy and Physiology (Biological Sciences 410)**
- General Animal Physiology; A Quantitative Approach, Lectures (Biological Sciences 416)**
- General Animal Physiology, Laboratory (Biological Sciences 418)**
- Undergraduate Research in Animal Physiology and Anatomy (Biological Sciences 499)**
- 550 **Applied Radiation Biology and Veterinary Nuclear Medicine** Fall.
- 600 **Graduate Research in Animal Physiology and Anatomy (also Biological Sciences 719)** Fall and spring.
- Lipids (Biological Sciences 619 and Nutritional Sciences 602)**
- 650 **Special Projects in Physical Biology** Fall and spring.
- 652 **Applied Electrophysiology** Fall.
- 653 **Clinical and Research Techniques in Veterinary Nuclear Medicine** Fall.
- Mammalian Physiology, Lectures (Biological Sciences 458)**
- Mammalian Physiology, Laboratory (Biological Sciences 458)**
- Physiological Optics (Biological Sciences 695)**
- 750 **Radioisotopes in Biological Research (also Biological Sciences 616)** Spring.
- 752 **Biological Membranes and Nutrient Transfer (also Biological Sciences 618)** Spring.
- 755 **Physical Biology Graduate Seminar** Fall and spring.
- 758 **Molecular Mechanisms of Hormone Action (also Biological Sciences 658)** Spring.
- 759 **Mineral Metabolism (also Biological Sciences 615 and Nutritional Sciences 659)** Fall.

Physiology, Biochemistry, and Pharmacology

- 525 **Vertebrate Biochemistry** Fall.
- 526 **Physiology for Veterinary Students** Spring.
- 527 **Physiology for Veterinary Students** Fall.
- 528 **Basic Pharmacology** Spring.
- 529 **Clinical Pharmacology** Fall.
- 620 **Special Projects in Physiology** Fall and spring.
- 621 **Toxicology** Spring.
- 622 **Special Projects in Pharmacology** Fall and spring.
- 626 **Veterinary Animal Behavior** Spring.
- 627 **Acid-Base Relations** Fall and spring.
- 720 **Special Problems in Physiology** Fall and spring.
- 721 **Research** Fall and spring.
- 724 **Physiologic Disposition of Drugs and Poisons** Spring.
- 726 **Physiology** Spring.
- 727 **Physiology** Fall.

Preventive Medicine

- 330 **Introductory Parasitology and Symbiology** Spring.
- 440 **Parasitic Helminthology** Spring.
- 510 **Animal Parasitology** Fall.
- 511 **Diagnostic Parasitology** Fall.
- 520 **Preventive Medicine in Animal Health Management** Fall.
- 545 **Principles of Epidemiology** Spring.
- 568 **Veterinary Medical Orientation** Fall.
- 660 **Safety Evaluation in Public Health** Spring.
- 661 **Data Processing in Preventive Medicine** Spring.
- 662 **Advanced Epidemiology** Spring.
- 737 **Advanced Work in Animal Parasitology** Fall and spring.

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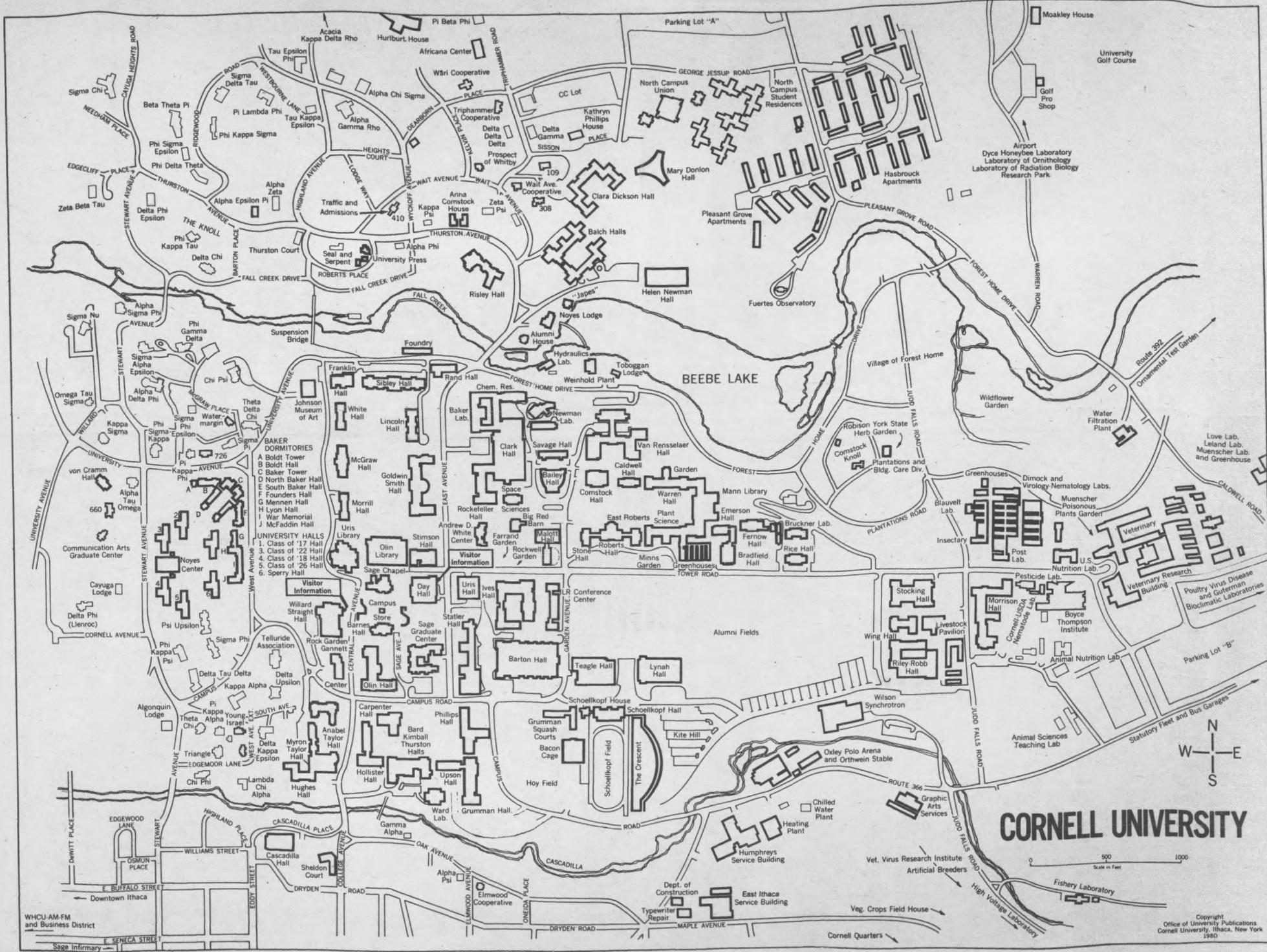
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Cornell University Announcements
USPS 132-860
Building 7, Research Park
Ithaca, New York 14850

Second-class postage
paid at Ithaca, New York