395. Independent Study  
Fall, Winter, Spring. 2 to 4 credits.  
May re-enroll for a maximum of 12 credits.  
Approval of college.  
Student conceived individual courses of study in curricular areas. Preliminary faculty approval and continuing guidance.  
A. Independent Study—General  
B. Independent Study—Biology  
C. Independent Study—Chemistry/Physics  
D. Independent Study—Mathematics  
E. Independent Study—Science Studies

394. Introductory Animal Systematics Laboratory  
Fall. 3(0-3) ZOL 303 concurrently.  
Interdepartmental with the Department of Zoology.  
Laboratory examination of form and function of representative vertebrate and invertebrate animals.

391. Philosophy of Technology  
Fall, Winter. 4(4-0) Sophomores or approval of college. Interdepartmental with the Department of Philosophy.  
Is our technology desirable? Are its social forms desirable? What alternatives are there? Students will develop and defend their own appraisals of technology.

392. Introduction to Symbolic Logic  
Fall, Winter. 4(4-0) Sophomores or approval of college.  
Concepts, notation and application of truth-functional and quantification logic. Special topics may include automata, meta-theory, modal logic, fallacies, paradoxes, inductive argument, the justification of logic.

374. Historical Problems in the Biological Sciences  
Fall, Winter. 4(4-0) Juniors or approval of college.  
Various themes or periods in the biological sciences. The course may emphasize the pattern of theoretical development, changes in explanatory ideals, the interaction of external factors and scientific ideas, etc.

375. Historical Problems in the Physical Sciences  
Spring. 4(4-0) Juniors or approval of college.  
Various themes or periods in the physical sciences. The course may emphasize the pattern of theoretical development, changes in explanatory ideals, the interaction of external factors and scientific ideas, etc.

376. Historical Problems in Technical Change  
Fall, Spring. 4(4-0) Juniors or approval of college.  
Factors which influence technical change. Exploration of both historical and contemporary problems of technology and technical change.

377. The Natural Environment: Perceptions and Practices  
Spring. 4(4-0) Sophomores.  
Factors which have influenced U.S. environmental attitudes as reflected in art and literature. Ways in which changing attitudes have led to changes in legislation and practice.

378. Popular Culture and Technical Change  
Winter. 4(4-0) Juniors or approval of college.  
How mass culture and technology affect each other. The course demonstrates several approaches to this question and introduces students to research in this area.

483. Philosophy of Physical Science  
Fall. 4(4-0) Nine credits in physical science or approval of Department, Interdepartmental with the Department of Philosophy.  
Philosophical problems of the physical sciences. The topics will be taken from such areas as: quantum mechanics, space-time, classical mechanics, relativity.

484. Philosophy of Biological Sciences  
Winter, Spring. 4(4-0) Nine credits in science or approval of Department, Interdepartmental with the Department of Philosophy.  
Methodological notions and problems of the biological sciences such as: observation and measurement, classification, teleological and functional explanation, teleological systems, emergence, vitation, value neutrality.

490. Directed Study  
Fall, Winter, Spring. 2 to 6 credits.  
May re-enroll for a maximum of 6 credits. Juniors and approval of college.  
Faculty directed studies in curricular areas which are normally related to regular course offerings.  
A. Directed Study—General  
B. Directed Study—Biology  
C. Directed Study—Chemistry/Physics  
D. Directed Study—Mathematics  
E. Directed Study—Science Studies

401. Senior Seminar I  
Fall, Winter, Spring. 3(3-0) Seniors or approval of college.  
Selected interdisciplinary problems concerned with the interface between science and society or science and man are identified and formulated. A bibliography is generated and an outline for a thesis prepared.

492. Senior Seminar II  
Fall, Winter, Spring. 3(3-0) 491.  
The thesis planned in 491 is written and evaluated.

493. Field Experience  
Fall, Winter, Spring. 4 to 15 credits.  
May re-enroll for a maximum of 16 credits.  
Approval of college.  
Experiential learning related to the public or private practice of science and technology.

495. Independent Study  
Fall, Winter, Spring. 2 to 12 credits.  
May re-enroll for a maximum of 12 credits. Juniors and approval of college.  
Student conceived individual courses of study in curricular areas. Preliminary faculty approval and continuing guidance.  
A. Independent Study—General  
B. Independent Study—Biology  
C. Independent Study—Chemistry/Physics  
D. Independent Study—Mathematics  
E. Independent Study—Science Studies

300. Operations Planning  
Fall, Spring. 4(4-0) 315, AFA 202.  
Operations Management—functions and technologies. Planning and acquiring physical facilities, work design and work measurement, acquisition and management of materials.

301. Operations Control  
Winter. 4(4-0) 300.  
Analysis and control of operations. Production control, product reliability, maintenance, cost control and management information systems.

302. Organization and Administration  
Fall, Winter, Spring, Summer. 4(4-0) 302 or MTA 300.  
Junior Business majors; EC 302 and AFA 301.  
Analysis of the internal organization structure and of executive roles and functions in the business enterprise and other goal-directed institutions. Examines administrative and managerial concepts in the context of behavioral research in business. Cases and outside research reports are used for specific analyses.

305. Materials and Purchasing Management  
Fall, Winter. 4(4-0) 302 or MTA 300 or Juniors; non-majors.  
Planning, organizing and controlling materials; acquisition in industrial enterprises, institutions, and government. Management of purchasing, materials movement, storage and control. Value analysis, purchasing research, vendor relations and purchase forecasting.
306. Analysis of Processes and Systems Fall, Winter, Spring. 4(4-0) CPS
110, 577 316.
Analysis of some fundamental systems and process concepts which are basic to industrial management. The course is oriented toward computer model building, acquainting the student with the use of the computer as an instrument for analysis of complex problems in industry. Course includes consideration of criteria for efficiency and optimization, and program planning.

310. Fundamentals of Personnel Administration Fall, Winter, Spring, Summer. 4(4-0) Seniors. Organization, functions, and policy administration of employee relations activities in the business enterprise; consideration of new techniques of employment, training, wage payment, morale-building, and employee security.

403. Purchasing and Materials Research Winter. 4(4-0) Juniors. Applied research focusing on the purchasing and materials management functions in organization. Emphasis on the planning and operation of the research effort. Field research studies.

405. Operations Management: Current Topics Spring. 4(4-0) 301, 302. Consideration of current and controversial questions in the operations area. Field experience to study operations and policies in industrial, institutional, and service organizations.

406. Introduction to Management Science Winter. 4(4-0) 306. Quantitative models and techniques applied to various business problems integrating the computer into the problem solving process. Topics include linear programming, integer programming, dynamic programming, queuing problems, Bayesian Decision Theory, theory of games.

411. Personnel Selection and Development Winter. 4(4-0) 310; MTA 317. Manpower input problems of business organizations—manpower planning, recruitment, selection, placement, training and development at all levels. Focus is on policy issues, research findings, and advanced techniques.

412. Compensation and Motivation Spring. 4(4-0) 310. Manpower input and compensation problems in business organizations—performance appraisal, job evaluation, wage and salary administration, non-financial incentives and the impact of job content and job context factors on performance.

413. Occupational Safety and Health Administration Fall, Winter, 4(4-0) Juniors; 302 for majors. Programs and procedures for control of work accidents and maintenance of health in business and other organizations. Analysis of costs related to employee and product safety. Administration of a safety program in compliance with new federal law.

414. Human Relations in Business Fall, Winter, Summer. 4(4-0) 310. Seniors; approval of department. Students may not receive credit in both MGT 414 and PSY 356. Human problems in business administration: examination of the empirical research dealing with organizational and administrative problems in business, including morale, motivation, authority, power, centralization, commitment, and mobility.

415. Managerial Approaches to Collective Bargaining Winter, Spring. 4(4-0) 302 or Junior non-business majors. Union-management problems and managerial strategy and tactics in collective bargaining—the union challenge, legal constraints, negotiations, and operating under the contract, dimensions of cooperation and conflict.

417. Minorities and Women in the World of Work Fall, Spring, Winter. 4(4-0) Senior majors or approval of department. Interdepartmental with the Department of Racial and Ethnic Studies and the School of Social Work.

Racial, ethnic, sexual and other minority experiences and problems in the world of work. Awareness training approach (what it's like to be . . . ) featuring movies, guest, subgroup discussions and encounter-type exercises.

418. Psychiatric and Social Problems Fall, Winter, Spring, Summer. Variable credits. May enroll for a maximum of 8 credits. Business administration majors and approval of department.

Planned program of observation, study, and work in selected business firms. Designed to supplement classroom study in such a way as to make maximum contribution to students' total educational and work experience. Training and work may be arranged in finance, insurance, marketing, personnel management, production management, purchasing, real estate, retailing, transportation and banking.

801. Work Design and Administration Fall. 4(4-0) Design, improvement, and problems in the administration of work systems with emphasis on reproductive organizational evaluation, job evaluation, and job design. Tools for developing, analyzing, and improving procedures. Cases and projects.

802. Materials Management Spring. 4(4-0) Advanced study of the policies, practices and problems relating to the procurement and control of materials in business organizations.

IDC. Seminar in Industrial Relations For course description, see Interdisciplinary Courses.

806. Organisation and Administration Fall, Winter, Spring. 4(4-0) Approval of department. Organisation and administration of business enterprises—how to operate effectively; an open system of business enterprise and the environment; how to operate effectively; an open system of the organization and the environment. Organizational structure and administrative process in the management of business concerns are analyzed in the light of objectives, environment, and current theories.

810. Problems of Organization and Administration Fall, Winter, Summer. 4(4-0) May re-enroll for a maximum of 8 credits. Advanced studies in selected administrative and technical policies and practices in employee relations, with individual and group project work and research.

811. Advanced Problems in Personnel Management Fall, Spring. 4(4-0) May re-enroll for a maximum of 8 credits. 810. Advanced studies in selected administrative and technical policies and practices in employee relations, with individual and group project work and research.

814. Occupational Safety and Health Management Fall, Spring. 4(4-0) Graduate students or approval of department. Objectives and procedures for managerial control of work injuries and illness in business and other organizations. Compliance with Federal and state law, correcting hazards, analyzing costs, modifying behavior. Product safety.

817. Supervisory and Executive Development Fall, Spring. 4(4-0) 806 or 810. Theory and research of developmental stages of executive careers. Special emphasis on impact of organization on executive potentiality; forces influencing development of skills, abilities; studies of antecedents of executive role performance; role of training programs.

821. Production Control Winter. 4(4-0) 801. Planning and control of production operations. Inventory management, production and work force smoothing, job shop scheduling and project scheduling.
831. Computers and Systems Analysis for Business
Fall, Spring. 4(4-0) 832 or concurrently; MTH 111 and STT 315 or concurrently or 12 credits of college mathematics. Open only to selected MBA candidates. Computer programming and systems analysis in business administration.

832. Statistical Methods for Business
Fall, Spring. 4(4-0) 831 or concurrently; MTH 111 and STT 315 or concurrently or 12 credits of college mathematics. Open only to selected MBA candidates. Statistics for analysis and research in business.

833. Decision Making Models
Fall, Winter, Spring, Summer. 4(4-0) 831, 832; AFA 849 or concurrently. Normative decision analysis in business under different assumptions of information availability.

834. Linear Optimization Models
Fall, Spring. 4(4-0) 833, MTH 228, STT 422. Linear programming: basic concepts and terminology. Model building with LP with applications to problems from business. The simplex method. Introduction to dual problems. Economic interpretations of duality. Post-optimality analysis.

835. Nonlinear Optimization Models
Winter, Summer. 4(4-0) Students may not receive credit for both SYS 835 and MCT 835. CHE 485 or MCT 834 or knowledge of linear programming. Interdepartmental and jointly administered with Systems Science and the Department of Chemical Engineering. Nonlinear optimization examples and applications. Kuhn-Tucker Theory. Saddle point optimality conditions. Algorithms for problems with constraints. Unconstrained optimization; introduction to search methods.

836. Applied Stochastic Processes for Business
Spring. 4(4-0) 835. The structure and analysis of stochastic models common to business and economics. Topics may include the Poisson process, renewal-reward processes, Markov processes, with examples from queuing, reliability, maintenance and inventory.

860. Corporation Management and Society
Spring. 4(4-0) 806. Analysis of the emerging character of administrative structure of the large corporation. Administrative authority, corporate government, stockholder and director relationships. Examination of ethics of decision-making, strategic values and priorities basic to resource allocation decisions.

880. Organization and Control in the Political Economy: Institutions and Theory
Winter of even-numbered yrs. 4(4-0) Interdepartmental with and administered by the Department of Economics. Organization and technique in choice and implementation of economic, especially political authority.

881. Organization and Control in the Political Economy: Selected Problems
Winter of odd-numbered yrs. 4(4-0) Approval of instructor, interdepartmental with and administered by the Department of Economics. Analysis of role and tasks, appropriate techniques and organizational structures of political agencies in planning and management of complex problems.

890. Special Problems
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

906. Behavioral Research: Organization
Winter. 3 credits. MTA 905. Concepts and methods of behavioral science research that are applicable to the study of organizations as a strategic device in the development of tangible and intangible values and in the control of elements of business enterprise.

907. Behavioral Research: Business Executive
Fall. 3(4-0) Concepts and methods of behavioral science research in the study of the agents of enterprise decision-making and action. Attention is focused on the way in which decisions are made in business organizations and the multiple influences operating on the executive. Modes of adjustment to the decision environment are examined.

908. Seminar in Organization Theory
Winter. 4(4-0) 808; doctoral candidates' candidates with approval of department. Directed reading and research on issues in contemporary organization theory.

911. Seminar in Personnel Research
Spring. 4(4-0) 810; doctoral candidates. Directed reading and research on issues in contemporary personnel administration theory and practice.

937. Systems Simulation
Fall. 4(4-0) 835, STT 423, MTH 228. Interdepartmental with the Department of Statistics and Probability. The concept of a model, model building, characteristics of simulation models. Techniques of computer simulation. Simulation models in research and management planning/control. Validation and experimental design. Special purpose languages.

948. Mathematical Programming For Business
Spring. 4(4-0) 836, MTH 342, 426, STT 867. Interdepartmental with the Department of Statistics and Probability. Large mathematical programs with special structure. Duality and decomposition in mathematical programming. Basic theory of dynamic programming; multistage decision processes and the principle of optimality. Risk, uncertainty, and introduction to stochastic and adaptive control processes.

949. Advanced Applied Stochastic Processes
Winter. 4(4-0) 830, 937. Interdepartmental with the Department of Statistics and Probability. Selected topics from the following areas: Semi-Markov, Markov-renewal, and regenerative processes; Markov and semi-Markov decision processes; decision theory, applications from production, inventory, reliability, queuing, and gaming theory.

999. Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.