150. Physics—Elementary Concepts
Fall. 1(3-0) MTH 109 or 109 or
LBC 111 and LBC 151 concurrently.
Elementary concepts of mechanics, electricity, magnetism, and optics.

151. Introduction to Chemistry and Physics I
Fall. 4(4-3) MTH 109 or 109 or
LBC 111 concurrently; high school physics or 150 concurrently.
Fundamental techniques of quantitative scientific investigation; gas laws, kinetic theory and thermodynamics.

152. Introduction to Chemistry and Physics II
Winter. 4(4-3) 151.
Topics in modern physics: photons, electrons, atoms and molecules; radioactivity, nuclear reactions; Bohr theory of the hydrogen atom; special theory of relativity.

153. Introduction to Chemistry and Physics III
Spring. 4(4-3) 152.
Topics in modern chemistry: atomic structure, chemical bonds, molecular orbitals; stoichiometry, chemical dynamics and equilibria, fundamentals of organic chemistry.

214. Calculus III
Fall, Winter, Spring. 5(5-0) 113.
Not open to students with credit in MTH 215.
Topics covered include infinite series, power series, and introduction to differential equations; first order, second order linear with constant coefficients, first order systems; numerical methods, power series solutions, and applications.

215. Calculus IV
Fall, Winter, Spring. 5(5-0) 214.
Not open to students with credit in MTH 214.
Introduction to the calculus of several variables.

242. Biology II
Fall, Winter. 4(3-3) 141.
Organisms: growth and development from molecular genetics through life cycles of selected plant and animal species.

251. Introduction to Chemistry and Physics IV
Fall. 4(4-3) 153.
Classical physics; kinematics and dynamics of particles and rigid bodies; electricity, magnetism, electromagnetism, wave motion and wave optics.

252. Introduction to Chemistry and Physics V
Winter. 4(4-3) 251.
Chemistry of non-metals, traditional elements and coordination compounds, organic chemistry.

253. Introduction to Chemistry and Physics VI
Spring. 4(4-3) 252.
Relativity; atomic, molecular, and solid-state physics, quantum-mechanical effects and devices, nuclear models and nuclear energy levels.

256. Energy Consumption and Environmental Quality
Spring. 3(0-0) Sophomore. Interdepartmental with the Physics Department.
The role of energy as a fundamental pollutant will be discussed along with the availability of fossil energy sources. Limitations on the safe utilization of both fossil and nuclear energy will also be considered.

290. Special Problems
Fall, Winter, Spring. 1 or 2 credits. May be re-enrolled for a maximum of 6 credits. Approval of college.

295. Independent Study
Fall, Winter, Spring, Summer. 1 to 4 credits. May be re-enrolled for a maximum of 15 credits. Approval of college.
Independent study for qualified students under direction of a faculty member.

331. Modern Fiction
Fall. 3(0-0) 132.
The study of recent short stories and novels, particularly those which might have a special value for the student of science. Student may submit original work of a fictional nature in partial fulfillment of course requirements. Selected students may meet course requirements through independent study.

332. Modern Drama
Winter. 3(0-0) 132.
The study of recent plays which have social or literary significance. Student may submit original work of a dramatic nature in partial fulfillment of course requirements. Selected students may meet course requirements through independent study.

333. Modern Poetry
Spring. 3(0-0) 135.
The study of recent verse of a literary or provocative nature. Student may submit original poetry in partial fulfillment of course requirements.

372. 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 axiomatic, meta-theory, modal logic, falsifiability, non-paraconsistent, inductive argument, the justification of logic.

373. Introduction to the Philosophy of Science
Winter. Spring. 4(4-0) 372. Juniors or approval of college.
Philosophical problems about the character and justification of scientific knowledge. Possible topics: concept formation, theory construction, scientific explanation, confirmation theory, "logic" of discovery, philosophical implications of physical theories.

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.
302. Organization and Administration
Fall, Winter, Spring. 4(4-0)
Juniors. Business majors; EC 901 and AFA 301.
Examination of the internal organization structure and of executive roles and functions in the business and other goal-directed institutions. Examines administrative and managerial concepts in the context of behavioral research in business. Case and outside research reports are used for specific analyses.

305. Materials and Purchasing Management
Fall, Winter. 4(4-0) 302 or MTA 300 or 360; non-majors.
Planning, organizing and controlling materials; acquisition in industrial enterprises, institutions, and government. Management of purchasing, materials movement, storage and control. Value-added purchasing research, vendor relations and purchase forecasting.

306. Analysis of Processes and Systems
Fall, Winter, Spring. 4(4-0) CPS 110, STT 316.
Analysis of some fundamental systems and process concepts which are basic to industrial management. Concept 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)
Organization, functions, and policy administration of personnel relations activities in the business enterprise; consideration of new techniques of employment, training, wage payment, morale-building, and employee security.

401. Planning and Control of Production
Winter. 4(4-0) 300, 360; Seniors.
Production planning, inventory control, machine loading, scheduling, and critical path scheduling.

405. Manufacturing Policy
Spring. 4(4-0) 300, 360; Seniors.
Policy formulation in production management. Coordinating staff functions and integrating production with other activities in the firm.

409. Business Policy
Fall, Winter, Spring, Summer. 4(4-0)
AFA 330; MTA 300.
Problems, methods, and analytical frameworks for building and maintaining consistent and effective policy frameworks in the business enterprise. Written and oral analyses are made of comprehensive cases cutting across the major functions within business organizations. Team and individual reports are required.

411. Personnel Selection and Development
Winter. 4(4-0) 310; MTA 317.
Manpower input problems of business organizations—manpower planning, recruitment, selection, 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 motivation and compensation problems for enterprise and other goal-directed institutions. Performance appraisal, job evaluation, wage and salary administration, non-financial incentives and the impact of job content and job context factors on performance.

413. Safety, Health and Employee Benefits
Summer. 4(4-0) 302; Seniors.
Manpower maintenance problems in business organization with emphasis on safety and health programs, practices and trends in employee benefit plans. Focus is on issues and relevant research and techniques.

414. Human Relations in Business
Fall, Winter, Summer. 4(4-0)
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.
Manpower-management problems and managerial strategy; tactics in collective bargaining—the union challenges, legal constraints, negotiations and open-shop contract, dimensions of cooperation and conflict.

420. Problems of Small Business Enterprise
Fall. 4(4-0) Approval of department.
For College of Business Seniors, or non-business majors enrolled concurrently. For students participating in Lansing Entrepreneurial Assistance Service (LEASE).
Analysis of problems of establishing, financing, and managing a small business enterprise. Emphasis on minority entrepreneurship. Students will prepare a proposal for establishing a small business enterprise.

421. Small Business Counseling
Winter, Spring. 3 to 5 credits. May re-enroll for a maximum of 8 credits. 420, and approval of department.
Program of business counseling with small businesses in the Lansing area in need of management assistance. Students will meet bi-weekly to share experiences and discuss problems.

428. Field Studies
Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 9 credits. Business administration majors and approval of department.
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 experience. Field work may be arranged in finance, insurance, marketing, personnel management, production management, purchasing, real estate, retailing, transportation and banking.

499. Senior Seminar
Spring. 4(4-0) Senior majors; approval of department.
Directed reading and student research in contemporary management problems.

501. Work Design and Administration
Fall, 4(4-0)
Design, improvement, and problems in the administration of systems with emphasis on effective performance criteria for evaluating systems. Tools for developing, analyzing, and improving procedures. Cases and projects.

502. 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.
818. Supervisory and Executive Development  
Fall, Spring, Summer. 4(4-0) 806 or 808.  
Theory and research of developmental stages of executive careers. Special emphasis on impact of organization on executive potentiality; forces influencing development of executive skills and 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.

830. Fundamentals of Management  
Fall, Winter. 4(4-0) Open only to selected MBA candidates.  
The managerial process: planning, organization, measurement, and control of work and work flow; recruitment, placement, motivation, development, and assessment of organizational manpower. Management theory and practice illuminated by managerial and behavioral science research.

831. Computers and Systems Analysis for Business  
Fall, Spring. 4(4-0) 832 or concurrently; MTH 111 and STT 121 or concurrently or 12 credits of college mathematics. Open only to selected MBA candidates.

832. Statistical Methods for Business  
Fall, Spring. 4(4-0) 832 or concurrently; MTH 111 and STT 121 or concurrently or 12 credits of college mathematics. Open only to selected MBA candidates.

833. Decision Making Models  
Fall, Winter, Spring, Summer. 4(4-0) 831, 832; AFA 840 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 423.  
Formulation and solution of linear optimization models in business administration under conditions of certainty.

835. Nonlinear Optimization Models  
Winter, Summer. 4(4-0) 834.  
Continuation of 834.

836. Stochastic Programming Models  
Spring. 4(4-0) 835.  
Formulation and optimization of stochastic programming models in business administration.

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

Winter. 4(4-0) Interdepartmental with and administered by the Economics Department.  
Organization and technique in choice and implementation of economic, especially planning and programming, functions of political authority.

Spring. 4(4-0) Interdepartmental with the Department of Economics.  
Analysis of role and tasks, appropriate techniques and organizational structures of political agencies in planning and management of complex programs.

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

906. Behavioral Research: Organization  
Winter. 3 credits. MTA 505.  
Concepts and methods of behavioral science research that are applicable to the study of organization as a strategic device in the development of business enterprises.

907. Behavioral Research: Business Executive  
Spring. 3 credits. 906.  
Methods and techniques 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) 500; doctoral candidates.  
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, Summer. 4(4-0) 836, STT 423, MTH 228.  
Formulation and application of advanced simulation models to study the behavior and design of complex business and industrial systems.

938. History of Management Science  
Winter. 4(4-0) 836, MTH 334, 425, STT 862.  
History of important theoretical developments and applications in the field of management science.

939. Contemporary Issues in Management Science  
Spring. 4(4-0) 937, 938.  
Detailed treatment of selected recent research applications and developments in the field of management science.

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

MARKETING AND TRANSPORTATION ADMINISTRATION

College of Business

300. Consumption and Marketing Organization  
Fall, Winter. 4(2-2) 300.  
Interdepartmental with Food Science and Technology.  
Adjustment of firm to its market environment with emphasis on competitive strategy. Assessment of market forces and opportunities with reference to social, political, economic and technological forces affecting distribution methods and institutions. Structural organization of marketing system—functions involved in effective market performance. Small group problems involving analysis of costs and efficiency.

301. Management of Marketing Effort  
Fall, Winter. 4(2-2) 300.  
Market management in relation to total enterprise. Problems, analytical tools and approaches to decisions concerning allocation of funds to various means of market cultivation. Development of promotional strategy, price policy and management of field selling effort. Particular attention to role of marketing research, forecasting, budgets, organization arrangements and control techniques. Use of cases in small groups.

311. Principles of Selling  
Fall, Winter, Spring, Summer. 3(2-1) 311.  
Nature of personal selling and its requirements. Functional relationships of selling in marketing mix. Buyer motivations and selling theories, with application to various buyer-seller situations.

313. Sales Management  
Fall, Winter, Spring. 4(4-0) 300.  
Techniques and policies in the administration of the personal sales organization with respect to the marketing strategies involved. Emphasis on the sales management problems of manufacturers.

316. Fundamentals of Statistical Inference  
Fall, Winter, Spring. 4(5-0) 315.  
Variously with Food Science and Technology and Interdepartmental with and administered by the Statistics and Probability Department.  
Description of sample data, applications of probability theory, sampling, estimation, tests of hypothesis.

317. Quantitative Business Research Methods  
Fall, Winter, Spring, Summer. 4(3-3) 316.  
Interdepartmental with the Statistics and Probability Department.  
Applications of statistical techniques to business decision-making. Topics covered include applications of linear regression and correlation, analysis of variance, selected nonparametric tests, time series, and index numbers.

335. Food Processing and Distribution Management  
Winter. 3(2-2) 300 or FSM 200.  
Interdepartmental with Food Systems Economics and Management.  
Analysis of problems faced in the food processing and distribution system. Includes functional interrelationships, consumer orientation and future development.