492. Management of Financial Institutions
Winter. 4(4-0) F 1391.
Management of depository-type financial institutions like savings and loans, credit unions and banks. Lending, investments and asset-liability management. Regulation, deregulation and competition between non-depository institutions.

493. Advanced Business Finance
Spring. 4(4-0) F 1391, Seniors.
Advanced study of the financial management of business firms. Special emphasis is placed on areas of major interest from both applied and theoretical points of view. Areas covered include capital budgeting, valuation, financial structure, mergers, and working capital management as well as other financial topics. Cases are used.

494. Strategies for Speculative Markets
Winter. 4(4-0) F 1391.
Use of stock options, futures and other financial instruments in domestic and foreign markets. The general theory of hedging risk.

495. Special Problems
Fall, Winter, Spring. 1 to 4 credits. Senior F 1 major, approval of department.
Independent study of special topics in finance or insurance.

496. Computer Financial Models
Spring. 4(4-0) F 1 391, MTA 317 or STT 422 or STT 441.
Solution of financial problems through the use of personal computers and selected software programs.

871. Portfolio Theory and Capital Markets
Fall, Spring. 4(4-0) ACC 836, F 1 888.
Theoretical and empirical developments in portfolio analysis, capital markets, capital asset pricing model, arbitrage pricing theory, efficient market hypothesis, and studies of capital markets.

872. Management and Financing of Corporate Assets
Fall, Summer. 4(4-0) F 1 871 or concurrently.
Principles of decision analysis in management of current assets, estimation of requirements for short term funds, and valuation of capital budgeting and merger proposals. Analysis of actual business cases is supplemented by selected readings.

873. Long Term Financial Policies
Winter, Summer. 4(4-0) F 1 871 or concurrently.
Planning capital structure and the cost of capital. Examines fundamental considerations of raising capital, debt management, dividend policy and problems in public issues. Analysis of actual business cases is supplemented by selected readings.

874. Investment Strategy
Spring. 4(4-0) F 1 871 or concurrently.
Analysis of theories and techniques available to achieve superior returns through security selection and/or portfolio management. Review and evaluation of significant literature and empirical results of various investment strategies.

878. Bank Management
Spring. 4(4-0) F 1 888.
Provides a comprehensive working knowledge of commercial bank management. Topics include capital adequacy, liquidity, public policy and bank failures, regulation, consumer protection, and other internal and external banking industry issues.

888. Financial Concepts and Analysis
Fall. Winter. 4(4-0) ACC 829.

889. Financial Decision Making
Fall, Winter, Spring. 4(4-0) ACC 840, F 1 888 or concurrently.
Financial planning and control using financial theory and management techniques for short, intermediate, and long term problems. Involves case problems.

890. Special Problems
Fall, Winter, Spring. 1 to 4 credits. Approval of department.
Independent study of special topics in finance or insurance.

900. Seminar in Financial Management
Theorica
Fall. 4(4-0) Doctoral candidates with approval of department.
The financial theory of the firm. Theoretical models dealing with capital structure, cost of capital, and dividend policy.

991. Seminar in Capital Markets
Winter. 5(5-0) F 1990.

992. Seminar in Selected Finance Topics
Spring. 4(4-0) F 1 991.
Study and research in finance topics selected from areas of interest to the instructor and doctoral candidates.

999. Doctoral Dissertation Research
Fall, Winter, Spring. 1 to 5 credits. May reenroll for a maximum of 36 credits. Approval of department.

FISHERIES AND WILDLIFE

College of Agriculture and Natural Resources

100. Introduction to Fisheries and Wildlife
Fall. 1(4-0) Freshmen Fisheries and Wildlife Majors.
Fisheries and wildlife as a profession. Academic and nonacademic needs to meet professional objectives, using current management problems as a focus for discussion.

203. Resource Ecology
Fall, Winter, Spring, Summer. 3(3-0) Interdepartmental with the departments of Forestry, Geography, Resource Development, and Zoology.
Basic concepts of ecology which are the unifying basis for resource management, conservation policy and the analysis of environmental quality. Extensive use of guest lecturers.

207. Great Lakes: Biology and Management
Spring. 3(3-0) Interdepartmental with the Department of Resource Development.
Living aquatic resources of the Great Lakes: environmental history, biological resources and their management.

301. Fish and Wildlife of North America
Winter. 5(3-4) B S 212 or approval of department.
Comparative study of fish and wildlife groups in North America, their significant life history stages, morphology, migrations, habitats and populations. Common species are identified in the laboratory.

302. Ecosystem Processes
Spring. 3(3-0) CEM 143, PHY 238, B S 212, CSS 210, GIC 201, MTH 110 or MTH 111.
Concepts of ecosystem structure and function developed from basic scientific laws and relationships.

305. Principles of Fisheries and Wildlife Management
Winter. 3(3-0) F W 203 or approval of department. Not open to majors with Fishery Biology and Limnology or Wildlife Biology and Ecology option.
Ecological concepts in management. Effects of regulations, refuge, stocking, species introduction, habitat manipulation, artificial feeding, genetic improvement, land use and control of predators, diseases and competitors on the production of fish and game.
328.  Vertebrate Pest Control
Winter. 3(0-0) B S 212 or approval of department.
Role of vertebrate animals as agents damaging to human interests: the concepts of damage control; damage control techniques, optional field trips.

340.  Wildlife Biometry
Winter. 4(3-2) MTH 111, six credits in fisheries and wildlife.
Survey of statistical formulas, methods and applications of statistics to problems in fisheries and wildlife.

374.  Biological Oceanography
Winter. 3(0-0) B S 212 or approval of department.
Biology of marine animals, with emphasis on physical, chemical and biological factors affecting their abundance and distribution.

376.  Introductory Limnology
Winter. 3(0-0) B S 212; 6 credits of Biological Oceanography required.
Study special topics in fisheries and wildlife.

404.  Fisheries and Wildlife Problems
Fall, Winter, Spring, Summer. 1 to 5 credits. May reenroll for a maximum of 12 credits. B S 215, B credits of Biological Oceanography; approval of department. To give undergraduate majors an opportunity to study special topics in fisheries and wildlife.

410.  Upland Wildlife Management
Fall. 3(3-0) F W 302 or FOR 304, FOR 204 or BOT 315. Wildlife management based on upland ecological processes: assessment and management of habitat. Mitigation of human impact.

412.  Wetland Ecosystem Management
Fall. 3(3-0) F W 303, F W 340. Ecosystem components and processes applied to wetland management. Mitigation of human impact.

413.  Upland and Wetland Ecosystem Laboratory
Fall. 2(0-0) F W 410 or F W 412 or concurrently. Wildlife habitat analysis and management in upland and wetland ecosystems. Field trips required.

415.  Parasitic Diseases of Animals: Ecosystem Approach
Spring. 4(3-2) F W 301 or ZOL 306 or approval of instructor. Diseases of fish and wildlife caused by selected viruses, bacteria, helminths, and arthropods. Biology of infectious agents and their interrelationships with animal populations.

424.  Wildlife Population Analyses
Spring. 4(3-2) BOT 450 or ZOL 390, or concurrently. Population measurement: reproductive and survival rates, sex and age determination, handling and marking methods. Field trips.

434.  Wildlife Resource Policy and Management

450.  Natural Resource Administration

455.  Natural Resource Economics
Fall. 4(3-2) EC 290 or EC 201. Interdepartmental with Agriculture and Natural Resources and the departments of Forestry, Park and Recreation Resources, and Resource Development. Administered by the Department of Forestry. Basic economic and institutional principles and techniques that govern the production and consumption of renewable natural resources. Natural resource evaluation, project analysis, and distributional considerations.

471.  Ichthyology
Spring. 3(2-3) F W 301 or ZOL 307 or ZOL 438. Interdepartmental with the Department of Zoology. Classification and natural history of fishes. Emphasis on food, game, and forage fishes.

473.  Fishery Biology and Management
Fall. 3(3-0) F W 471. Biology of fishes with special reference to distribution and natural history, and application of this knowledge to problems of obtaining maximum return from fishery resources.

475.  Fish Culture
Spring. 3(3-0) F W 473. Artificial propagation of freshwater fish including hatchery management, nutritional and environmental requirements, disease and parasite control and intensive fishery management. Utilization of hatchery stock in fisheries management.

476.  Limnology
Winter. 3(3-0) CEM 141B, CEM 161; BOT 450 or ZOL 399. Students may not receive credit for both F W 378 and F W 476. Interdepartmental with the Department of Zoology. Ecology of lakes and streams with special reference to physical, chemical and biological factors affecting their productivity.

477.  Limnological Methods
Winter. 3(3-0) F W 476 concurrently; ENT 301, ENT 302 recommended. Interdepartmental with the Department of Zoology. Methods and instruments of limnological field investigation on lakes and streams.

478.  Stream Ecology
Fall. 3(3-0) ENT 420, ZOL 399 or BOT 450 or F W 302 or approval of department. Interdepartmental with the departments of Entomology and Zoology. Biological, chemical, physical, and geological processes which determine the structure and function of stream ecosystems.

484.  Outdoor Environmental Education
Fall. 4(3-2) Juniors or approval of department. Using the outdoors as a teaching laboratory for ecological studies of plant and animal communities. Designed primarily for secondary teachers.

501.  Seminar in Fisheries and Wildlife
Fall, Winter, Spring. 1(1-0). May reenroll for a maximum of 7 credits. Approval of department. Graduate problems and current developments of importance.

502.  Advanced Topics
Fall, Winter. Spring Summer. 1 to 6 credits. May reenroll for a maximum of 15 credits. Approval of department. Study of selected advanced topics in detail and depth.

510.  Human Dimensions of Fish and Wildlife Management
Fall of even-numbered years. 3(3-0) Approval of department. Methods of surveying, educating, and involving the public to achieve fish and wildlife management goals. Human dimension of research. Case studies of current management issues.

526.  Waterfowl Ecology and Management
Winter. 3(3-0) ZOL 441 or CSS 305 or ANS 314 or approval of department. Application of population genetic principles to ecology and management of fish and wildlife.

530.  Environmental Requirements of Fish
Winter of odd-numbered years. 3(3-0) Approval of department. Adaptations and responses of fish to environmental changes: research methods for evaluating environmental limitations and effects of pollution on fish growth, reproduction and survival. Applications for developing water quality criteria.

531.  Aquatic Toxicology
Spring of odd-numbered years. 3(0-0) F W 830 or approval of department. Acute and chronic toxicity of compounds and elements on aquatic organisms. Monitoring and predicting structural and functional changes: biochemical, histological, physiological, organismal, behavioral, populational, community, ecosystem.

580.  Wildlife Nutrition
Winter of odd-numbered years. 4(3-2) Approval of department. Application of nutritional concepts to wildlife management. Design of nutritional investigations including methods of sampling and analysis. Improvement of the nutritional status of wildlife habitat.
871. Ecology of Fishes
Summer of even-numbered years. 4 credits. Approval of department. Given at the W. K. Kellogg Biological Station. Interdepartmental with and administered by the Department of Zoology.
Exploration of ecological problems with particular emphasis on growth, food and habitat selection, population biology and niche relations. Field and experimental investigations of fish communities.

872. Fish Communities and Aquatic Ecosystems
Winter of even-numbered years. 3(3-0) Approval of department.
Processes by which fish influence the structure and function of aquatic ecosystems.

874. Advanced Biological Limnology
Fall of odd-numbered years. 3(4-0) F W 477, or approval of department.
Historical and current contributions to concepts of community structure, energy flow and materials cycling in aquatic eco-systems.

875. Chemical Limnology
Winter. 4(2-2) F W 476, F W 477 or approval of department.
Application of analytical chemistry concepts and technologies to fundamental chemical mechanisms in natural and polluted water systems. Special consideration given to selected heterogeneous equilibria.

876. Applied Limnology
Spring. 3(3-0) F W 874 or F W 875 or approval of department.
Aquatic ecology: quantitative relationship between physical, chemical and biological parameters in polluted and unpolluted lakes and streams.

877. Fish Population Dynamics
Winter of odd-numbered years. 3(3-0) Approval of department.
Quantitative analysis of fish populations: rates of change and their underlying causes.

878. Dynamics of Aquatic Contaminants
Spring of even-numbered years. 4(2-4) F W 476, F W 477 or approval of department.
Movement of contaminants through aquatic ecosystems. Chemical and physical processes controlling decomposition and disposition of contaminants. Relationship of chemical form to bioavailability and toxicity. Statistical and deterministic predictive simulation models.

879. Ecosystem Ecology
Fall of even-numbered years. 4(4-0) 2CL 388 or BOT 450. Interdepartmental with and administered by the Department of Zoology.
Concepts of ecosystem structure, energy flow, and nutrient cycling in representative terrestrial and aquatic ecosystems.

891. Master's Thesis Research
Fall, Winter, Spring, Summer. Variable credits. Approval of department.

899. Doctoral Dissertation Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

FOOD SCIENCE AND HUMAN NUTRITION
College of Agriculture and Natural Resources
College of Human Ecology

Food Science FSC

101. Food and Society (N)
Fall, Winter, Spring. 3(3-0) Interdepartmental with Human Nutrition and Foods. Analysis of the technology and environmental aspects of food in determining the quality of human life. Introduction into the principles of food preservation and safety.

205. Food Laws and Regulations
Spring. 3(3-0) Interdepartmental with Human Nutrition and Foods.
Food laws and regulations that govern food processing and food service systems; procedures involved in adopting and enforcing food laws and regulations.

211. Introduction to Food Science
Winter, Spring. 3(3-0) CEM 141B.
Fundamentals of food composition, food processing, preservation and food commodities.

256. Meats, Poultry and Fishery Products I
Fall. 3(2-2) Interdepartmental with the Department of Animal Science.
Principles of evaluation and nutritive value. Identification of grades and cuts of beef, pork, lamb and poultry products.

300. Dairy Products
Spring. 3(3-0) CEM 143 or approval of department.
Chemical and physical properties of milk and milk products. Survey of dairy products and the technologies involved in their manufacture.

310. Food Safety and Microbiology
Fall. 3(3-0) CEM 143 or concurrently or approval of department. Not open to students with credit in FSG 440. Interdepartmental with the Department of Microbiology and Public Health.
Effects of food handling, preparation and service on food safety. Microorganisms in foods; sanitation, food borne disease and food service regulations.

325. Food Plant Sanitation
(FSC 330.) Winter. 3(3-0) FSC 211, MPH 200, CEM 141B.
Sanitary aspects of food processing operations, water quality, equipment design, bacteriological agents, pest control, personal hygiene, biological hazards, and regulatory agencies. Field trips required.

328. Laboratory in Food Plant Sanitation
Winter. 1(0-3) FSC 328 or concurrently.
Sanitary aspects of food processing operations, water quality, and related hygienic aspects. Field trips required.

329. Unit Operation and Food Processing I
Fall. 4(3-2) PHY 227, MTH 169. Interdepartmental with and administered by Agricultural Technology and Systems Management.
Engineering concepts related to the unit operations found in the food industry. Fluid mechanics, heat transfer and rate processes including psychrometrics and refrigeration.

330. Food Processing Operations
(FSC 331.) Winter. 3(3-0) PHY 237, FSC 211, or approval of department.
Unit operations for food preservation by low temperature, heat, dehydration, evaporation and separation processes.

330L. Laboratory in Food Processing Operations
Winter. 1(0-2) FSC 330 or concurrently.
Demonstrations, workshops, and pilot-scale processing illustrating selected unit operations in food manufacture.

333. Food Chemistry
Spring. 3(3-0) FSC 211 and CEM 241 or approval of department.
Chemical changes in foods that affect the texture, color, flavor, odor, stability, and nutritive quality during processing and storage.

333L. Laboratory in Food Chemistry
Spring. 1(0-3) FSC 211, CEM 241 and FSC 332 or concurrently.
Chemical changes in food that affect quality and stability.

400. Milk Processing Technology
Fall. 4(3-3) CEM 241 or approval of department.
The milk milk industry. Composition, quality, sanitation, nutritive value, processing, packaging and distribution of milk and milk products.

401. Industrial Food Fermentations
Fall. 3(3-0) FSC 440 and organic chemistry or approval of department.
Physical, microbiological and chemical procedures in utilizing microbial cultures in controlled fermentations of foods and food constituents.

402. Chemistry and Technology of Lipids
Winter. 3(3-0) One term organic chemistry.
Chemical and physical properties of edible fats and oils. Refining and processing of lipids into margarine, butter, shortening and salad oils. Chemical methods for analysis of lipids.

405. Technology of Manufactured Dairy Products
Winter. 4(3-3) CEM 406 or approval of department.
Manufacturing technology of fermented dairy foods, frozen dairy desserts, and imitation dairy products.

421. Food Plant Management
Spring. 3(3-0) Seniors or approval of department.
Business and technical management concepts associated with food plants. Efficiency factors, regulatory obligations, and administrative aspects.

430. Thermal Processes for Foods
Winter. 3(3-2) AET 323, FSC 328 or concurrently.
Process design concepts with emphasis on heating and cooling of foods in containers. Parameters used to describe thermal resistance of product components. Process time calculations for thermal processes.