Description — Finance and Insurance of Courses

992. Seminar in Selected Finance Topics
Spring. 4(4-0) F 1991.
Study and research in finance topics selected from a course of interest to the instructor and doctoral candidates.

999. Doctoral Dissertation Research
Fall, Winter, Spring, Summer. 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(1-0) Freshmen. Fisheries and Wildlife Majors. Fishes 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
(IND 200) Fall, Winter, Spring, Summer. 3(0-0) 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.

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 228, B S 212, CSS 210, GLC 201, MTH 109 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, refuges, 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(3-0) 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 trip.

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(3-0) 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(3-0) B S 212; students may not receive credit for both F W 376 and F W 476. Lake and stream ecology including effects of natural and human-induced perturbations on freshwater ecosystems.

402. Environmental Conservation Education
Fall. 4(3-2) Education majors or approval of department. Nature, distribution, identification, and interrelationships of Michigan's flora and fauna which influence natural resource use. Includes techniques of teaching about the environment. Field trips required.

404. Fishes and Wildlife Problems
Fall, Winter, Spring, Summer. 1 to 5 credits. May reenroll for a maximum of 12 credits. B S 212; 6 credits of fisheries and wildlife; 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 318. 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 302, F W 340. Ecosystem components and processes applied to wetland management. Mitigation of human impact.

413. Upland and Wetland Ecosystem Laboratory
Fall. 2(0-6) 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 interrelations with animal populations.

424. Wildlife Population Analyses
Spring. 3(3-0) BOT 450 or ZOL 389, or concurrently. Population mensuration; reproductive and survival rates, sex and age determination; handling and marking methods. Field trips.

434. Wildlife Resource Policy and Management

450. Natural Resource Administration
Spring. 4(4-0) Seniors. Interdepartmental with Agriculture and Natural Resources and the departments of Forestry, Park and Recreation Resources, and Resource Development. Administered by the Department of Forestry.


455. Natural Resource Economics
Fall. 4(3-2) EC 200 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(3-0) F W 301 or ZOL 307 or ZOL 428. 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. 5(3-4) 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 389. Students may not receive credit for both F W 376 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 389 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.
Food Science and Human Nutrition — Description of Courses

FOOD SCIENCE AND HUMAN NUTRITION

College of Agriculture and Natural Resources
College of Human Ecology

Food Science

101. Food and Society (N)  
Fall, Winter, Spring, 3(3-0) Interdepartmental with Human Nutrition and Foods.  
Analysis of the scientific, social 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.  
Modern food processing, world food problems, and the basic characteristics of processed foods.

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(2-2) 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, 4(3-3) CEM 143 or concurrently or approval of department.  
Not open to students with credit in FSC 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.

328. Food Plant Sanitation  
(FSC 332), Winter, 3(3-0) FSC 211, MPH 300, CEM 141B.  
Sanitary aspects of food processing operations, water quality, equipment design, bactericidal agents, pest control, personnel hygiene, biological hazards, and regulatory agencies. Field trips required.

328L. 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 237, MTH 109. Interdepartmental with and administered by Agricultural Engineering Technology.  
Engineering concepts related to the unit operations found in the food industry. Fluid mechanics, heat transfer and rate processes including psychrometrics and refrigeration.

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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.

801. 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.

802. Advanced Topics  
Fall, Winter, Spring, Summer, 1 to 8 credits. May reenroll for a maximum of 15 credits. Approval of department.  
Study of selected advanced topics in detail and depth.

810. 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 dimensions research. Case studies of current management issues.

826. Waterfowl Ecology and Management  
Winter of even-numbered years, 4(3-3) F W 412, F W 426 or approval of department.  
Application of physiological, behavioral, and population characteristics of waterfowl to current issues and management.

828. Conservation and Genetics  
Winter of odd-numbered years, 3(3-0) ZOL 441 or CSS 350 or ANS 314 or approval of department.  
Application of population genetic principles to ecology and management of fish and wildlife.

830. 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 pollutants on fish growth, reproduction and survival. Applications for developing water quality criteria.

831. Aquatic Toxicology  
Spring of odd-numbered years, 3(3-0) 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.

860. 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, 3 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(3-3) 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 odd-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.

897. Ecosystem Ecology  
Fall, 3(3-0) ZOL 389 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.

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