

**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 areas 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**

**F W**

**College of Agriculture and Natural  
Resources**

100. **Introduction to Fisheries and  
Wildlife**

Fall, 1(1-0) 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**

(IDC 200.) 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.

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, GLG 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. **Fisheries 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 interrelationships with animal populations.

424. **Wildlife Population Analyses**

Spring. 4(3-2) 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**

Winter. 4(3-2) F W 410, F W 412, F W 424.

The impact of public policy on wildlife management. Objectives of and approaches to wildlife management. Planning, implementing, and evaluating wildlife management programs.

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.

Concepts and methods of administering wildland properties. The legal, economic and social environment. Benefit-cost analysis of management changes. Unit organization, personnel management and accounting. Presents a systems view of administration.

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(2-3) 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(0-9) 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.

**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 6 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 424 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 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.

**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. Master's Thesis Research**

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

**999. 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 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 200, 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.