

580. Special Topics in Family Practice
Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 18 credits. Approval of department.
Explore and study special aspects and modes of family-oriented health care.

610. Family Practice Clerkship
Fall, Winter, Spring, Summer. 8 to 17 credits. May reenroll for a maximum of 34 credits. H M 602.
A clerkship in a model family practice unit with graded responsibility and supervision in the care of families and their medical problems with emphasis on primary, continuing and comprehensive care.

611. Introduction to Office Practice
Fall, Winter, Spring, Summer. 5 to 6 credits. H M 602.
A one month preceptorial exposure to the office practice of family practice in a variety of settings.

**FISHERIES AND
WILDLIFE**

FW

**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.

IDC. Resource Ecology and Man
For course description, see Interdisciplinary Courses.

202. Soils and Man's Environment
Winter. 3(3-0) Interdepartmental with the departments of Fisheries and Wildlife and Resource Development, and Agriculture and Natural Resources.
Use of soil-water resources in a technological society as it relates to environmental quality. Nature of pollution problems and their possible solutions. Food production and world population. Approved through Winter 1981.

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.

305. Principles of Fisheries and Wildlife Management
Spring. 3(3-0) IDC 200 or approval of department. Not open to majors in fisheries-limnology or wildlife-ecology options.
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
Fall. 3(3-0) B S 212 or approval of department.
Role of wild vertebrate animals as agents damaging to man's interests; the concepts of damage and control; damage control techniques. 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 man-induced perturbations on freshwater ecosystems.

402. Environmental Conservation Education
Spring, Summer. 4(3-2) Education majors or approval of department.
Nature, distribution and interrelationships of natural resources dictating the quality of man's environment. Principles of resource use, study of natural objects and techniques of teaching in and about the environment.

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.

420. Ecology of Animal Parasites
Summer. 6 credits. B S 212 or approval of department. Given at W. K. Kellogg Biological Station. Interdepartmental with the departments of Microbiology and Public Health, and Zoology. Administered by the Department of Microbiology and Public Health.
Parasitism of animals by protozoa, helminths and arthropods with emphasis on the interrelationships of host-parasite associations with the natural environments.

421. Stream Ecology
Fall, Summer—given at W. K. Kellogg Biological Station. 3(3-0) ENT 240 or approval of department. Interdepartmental with and administered by the Department of Entomology.
An in-depth examination of stream ecosystems—physical, chemical and biological aspects. Field work will be centered on local streams. Laboratory exercises will involve manipulations necessary for the determination of population energy budgets, with special emphasis on aquatic insects. Field trips required.

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.

425. Wildlife Habitat Analyses
Fall. 4(2-4) BOT 450 or ZOL 389 or FOR 220.
Evaluation of environmental factors affecting wildlife species; food and cover measurements. Determination of limiting factors.

426. Ecology of Migratory Birds
Fall. 4(2-4) ZOL 461 or approval of department.
Ecological, behavioral, and physiological characteristics affecting population parameters of migratory birds and applications of these relationships to the management of migratory wildlife resources.

427. Wildlife Biology and Management
Winter. 4(2-4) F W 424; ZOL 389 or BOT 450.
Ecology and management of resident wildlife on farm, forest and range lands.

450. Natural Resource Administration
Fall, 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
Winter. 4(4-0) FOR 450 or approval of department. Interdepartmental with the departments of Forestry, Park and Recreation Resources, and Resource Development, and Agriculture and Natural Resources. Administered by the Department of Forestry.
Basic economic and political principles and techniques that govern the production and consumption of forest land products, including basic forest valuation procedures.

471. Ichthyology
Spring. 3(2-3) F W 301 or ZOL 320 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(3-3) ZOL 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 131 and 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.

Descriptions – FISHERIES AND WILDLIFE

of

Courses

477. Limnological Methods
Winter. 3(0-9) FW 476 concurrently; ZOL 481; ENT 301, ENT 302 recommended. Interdepartmental with the Department of Zoology.
Methods and instruments of limnological field investigation on lakes and streams.

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.

485. Environmental Conservation Program Design
Winter. 3(3-0) Seniors or approval of department.
Materials and methods for integrating environmental conservation into educational programs in schools, nature centers, youth groups and communities.

801. Seminar in Fisheries and Wildlife
Fall, Winter, Spring. 1(1-0)
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.

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.

871. Ecology of Fishes
Summer. 3(1-6) Approval of instructor or ZOL 389 or FW 473. 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.

873. Ecology and Management of Stream Fish
Winter of odd-numbered years. 3(4-0) FW 376, ZOL 389 or BOT 450; or F sW 476 or concurrently.
Flowing water habitat as it affects fish, with influences of climate, vegetation, land use, water withdrawal; damming, channel alteration and fishery management.

874. Advanced Biological Limnology
Fall of odd-numbered years. 3(4-0) FW 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) FW 476, FW 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) FW 874 or FW 875 or approval of department.
Aquatic ecology: quantitative relationship between physical, chemical and biological parameters in polluted and unpolluted lakes and streams.

899. Master's Thesis Research
Fall, Winter, Spring, Summer.
Variable credit. Approval of department.

940. Quantitative Wildlife Ecology
Fall of even-numbered years. 3(3-0) Approval of department.
Fundamentals of population demographics. Rates of increase, dynamic and static life tables, logistic theory, the Leslie matrix model, age specific and time specific parameters. Current hypotheses on mechanisms promoting population stability.

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. 3(3-0) Interdepartmental with Human Nutrition and Foods.
Analysis of the scientific, social and environmental aspects of food in determining the quality of man's life. Introduction into the principles of food preservation and safety.

205. Food Laws and Regulations
Winter. 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
Spring. 3(3-0)
Modern food processing, world food problems, and the basic characteristics of processed foods.

215. World Food Issues
Spring. 3(3-0) Interdepartmental with and administered by the Department of Geography.
Food resources as related to world distributions of population, soil, water, fuel and minerals. Special attention to urbanization, irrigation, and future food needs and global constraints.

223. Commercial Food Processing Systems
Fall. 3(3-0) Interdepartmental with and administered by Agricultural Engineering Technology.
Processes and systems used in handling, processing and distribution of food; the need for processing systems and their influence on food quality.

242. Meats, Poultry and Fishery Products I
Fall. 3(2-2) Interdepartmental with the Department of Animal Husbandry.
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 132 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) Juniors; CEM 132 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.

311. Food Processing and Preservation
Winter. 4(4-0) CEM 132
Effects of processing, packaging and preservation on the quality of foods. Demonstrations of use of ingredients, evaluation of products and results of various processing methods.

331. Physical Principles of Food Processing
Fall, Winter. 4(3-2) FSC 211, MTH 109; PHY 239 or approval of department.
Food preservation by heat, low temperature, dehydration and radiation.

332. Biological Principles of Food Processing
Winter. 4(3-3) MPH 200 or approval of department.
Biological problems related to food processing including waste disposal, sanitizing and bactericidal compounds, pesticides and residues, plant and animal growth regulators, radioactive elements, preservatives and toxicology of additives.

333. Chemical Principles of Food Processing
Spring. 4(3-3) 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.

400. Milk Processing Technology
Fall. 4(3-3) CEM 132 or approval of department.
The fluid milk industry. Composition, quality, sanitation, nutritive value, processing, packaging and distribution of milk and milk products.