

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.

1DC. 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. 3(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) F W 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 F W 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)
F W 376, ZOL 389 or BOT 450; or F S W 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) 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.

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.