FAMILY MEDICINE*  F M
College of Osteopathic Medicine

530. Physical Examination Skills  F M
Fall, Winter, Spring, Summer. Admission to medical school and approval of department.

545. Principles of Family Medicine I  F M
Spring. Admission to medical school and approval of department.

555. Principles of Family Medicine II  F M
Summer. Admission to medical school and approval of department.

590. Special Problems in Family Medicine  F M
Fall, Winter, Spring, Summer. 1 to 8 credits. Admission to medical school and approval of department.

600. Clinical Practicum in Family Medicine  F M
Fall, Winter, Spring, Summer. 2 to 12 credits. Admission to medical school and approval of department.

620. Directed Studies  F M
Fall, Winter, Spring, Summer. 2 to 24 credits. Admission to medical school and approval of department.

632. Principles of Family Practice I  F M
Winter. Admission to college of medicine.

FISHERIES AND WILDLIFE  F W
College of Agriculture and Natural Resources

100. Introduction to Fisheries and Wildlife  F W
Fall. Admission to graduate level.

202. Soils and Man's Environment  F W
Winter. Admission to graduate level.

FAMILY PRACTICE*  F M
College of Human Medicine

500. Preceptorship Training  F M
Fall, Winter, Spring, Summer. 1 to 3 credits. Admission to medical school and approval of department.

580. Special Topics in Family Practice  F M
Fall, Winter, Spring, Summer. 3 to 6 credits. Admission to medical school.

603. Comprehensive Patient Care Clerkship  F M
Fall, Winter, Spring. 16 credits. Admission to student training.

605. Principles of Fishery and Wildlife Management  F W
Spring. Admission to graduate level.

328. Vertebrate Pest Control  
Fall. 3(3-0) B S 212 or approval of department.  
The role wild animals play as a damaging agent 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. 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.  
Biological 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 376 and 476.  
Lake and stream ecology including effects of natural and man-induced perturbations on freshwater ecosystems.

420. Environmental Conservation Education  
Fall, Winter, 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 and about the environment.

404. Fisheries and Wildlife Problems  
Fall, Winter, Spring, Summer. 1 to 5 credits. May re-enroll 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.

428. Wildlife Population Analyses  
Spring. 4(3-2) B OT 450 or ZOL 389. or concurrently.  
Population measurement; reproductive and survival rates; sex and age determination; handling and marking methods. Field trips.

425. Wildlife Habitat Analyses  
Fall. 4(2-4) B OT 450 or ZOL 389 or FOR 250.  
Evaluation of environmental factors affecting wildlife species; food and cover measurements. Determination of limiting factors.

426. Ecology of Migratory Birds  
Fall. 4(3-2) 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) 444; ZOL 389 or B OT 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 the departments of Forestry, Park and Recreation Resources and Resources Development and Natural Resources. Administered by the Department of Forestry.  

455. Natural Resource Economics  
Winter. 4(4-0) 450 or approval of department. Interdepartmental with the departments of Forestry, Park and Recreation Resources, Resource Development, 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(3-2) 301 or ZOL 365 or 314. 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(3-2) ZOL 471.  
Biology of fishes with special references 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) 473.  
Artificial propagation of fresh water 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 161; B OT 450 or ZOL 389. Students may not receive credit for both 476 and 477. 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(0-3) 476 concurrently; ZOL 451; ENT 301, 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  
Summer. 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(0-0)  
Graduate problems and current developments of importance.

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

821. Advanced Stream Ecology  
Summer. 3 credits. ENT 421 or approval of instructor. Given at W. K. Kellogg Biological Station. Interdepartmental with and administered by the Department of Entomology. Stream ecosystem energy budget models with emphasis on individual projects involving both laboratory and field experiments. Particular use will be made of artificial streams and locally abundant species of aquatic insects.

830. Environmental Requirements of Fish  
Winter. 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 365 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.

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

909. Research
Fall, Winter, Spring, Summer. Variable credit. Approval of Department.

940. Quantitative Wildlife Ecology
Spring. 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. 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
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.

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 Physical Systems in Agriculture and Natural Resources.
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(3-2) 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(3-2) CEM 133 or approval of department.
Chemical and physical properties of milk and milk products. Survey of dairy products and the technologies involved in their manufacture.

311. Food Processing and Preservation
Winter. Summer. 4(4-0) CEM 123 or HR 245 or approval of department; not open to majors in Food Science.
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(3-3) 211 MTH 100; PHY 230 or approval of department.
Food preservation by heat, low temperature, dehydration and radiation.

332. Biological Principles of Food Processing
Winter. 4(3-0) MPH 200 or approval of department.
Biological problems related to food processing including waste disposal, sanitizing and bacteriological compounds, pesticides and residues, plant and animal growth regulators, radioactive elements, preservatives and technology of additives.

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

401. Industrial Food Fermentations
Fall. 4(3-3) 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(3-3) 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.

404. Dehydrated Foods
Spring. 3(3-3) 321 concurrently or approval of department.
Concentration and dehydration of foods by roller, spray, and freeze drying and foam, pull and tuned drying. Stability and nutritional aspects of dehydrated foods.

405. Technology of Manufactured Dairy Products
Winter. 4(3-3) 400 or approval of department.
Manufacturing technology of fermented dairy foods, frozen dairy desserts, and imitation dairy products.

421. Food Plant Management
Spring. 3(3-3) Seniors or approval of department.
Efficiency concepts, merchandising, personnel utilization and organization.

440. Food Microbiology
Fall. Dietetics majors only. Spring. 5(3-4) MPH 200 or 301 or approval of department. Interdepartmental with the Department of Microbiology and Public Health.
Major groups of microorganisms of importance to the food industry are studied with emphasis on ecological, physiological, and public health aspects.

445. Meat, Poultry and Fishery Products III
Spring. 3(3-6) 333 or approval of department.
Processing, formulation and quality control.

448. Fruit, Vegetable and Cereal Products I
Fall. 4(3-3) 331 or approval of department.
Quality factors involved in canning, sugar and salt preservation and milling.

449. Fruit, Vegetable and Cereal Products II
Winter. 4(3-3) 331 or approval of department.
Quality factors involved in cooling, freezing and other preservation procedures.

455. Food Analysis I
Fall. 4(4-0) CEM 132 and 165 or approval of department.
Modern methods of analysis for fat, protein, moisture and other macroconstituents of food. Application of spectrophotometry in determination of microconstituents; use of dye-binding, complexometric and titrimetric techniques in food analysis.

456. Food Analysis II
Winter. 4(3-6) CEM 165 and 341 or approval of department.
Use of colorimetry and spectrophotometry, chromatographic methods and other techniques for the analysis of food constituents and additives.

457. Quality Control in the Food Industry
Winter of even-numbered years. 3(3-0) STT 301 or approval of department.
Organization of quality control within the food industry by case study. Use of control charts, sampling plans, flavor panel analyses.

480. Special Problems in Food Science
Fall, Winter, Spring, Summer. 1 to 3 credits. May re-enroll for a maximum of 9 credits. Advanced undergraduates may select research work in food chemistry, food microbiology, food engineering, food plant management, processing dairy products, meat, poultry and fishery products, fruits and vegetables, cereals or beverages.