832. *Theories of Management and Decision-Making in the Family*
(FCS 832.) Winter of odd-numbered years. 4(2-1) 331.
Comparative study of conceptual frameworks of family decision-making and of interrelated decisions, including both individual and social choices.

835. *Family As an Ecosystem*
Fall. 3(3-0) Approval of department.
Family viewed as an ecosystem. Emphasis placed on energy and communication cycles within the family. Integration of management, family dynamics and developmental concepts.

837. *Allocation of Family Resources*
(FCS 837.) Spring of even-numbered years. Summer of odd-numbered years. 4(4-0) 437, 438.
Contributors to and recipients of family resources both human and non-human. Patterned use of resources and the effect of definite factors such as standard of living on those patterns.

838. *Analysis of Family Income*
(FCS 838.) Spring of odd-numbered years. Summer of even-numbered years. 3(3-0) 438.
Forms of family income and economic problems relative to the protection of family economic security through insurance and investments, property rights and descent of property, and estate planning.

840. *Workshops in Family Ecology*
(H E 830.) Summer. 2 to 10 credits. May re-enroll for a maximum of 10 credits. Approval of department.
Laboratory approach which provides opportunities for experienced educational personnel to concentrate their study on common professional problems.

841. *Seminars in Home Economics Education*
(H E 831.) Spring, Summer. 2 or 3 credits. May re-enroll for a maximum of 9 credits. Approval of department.
Seminars in selected topics.

842. *Laboratory and Field Experience*
(H E 832.) Fall, Spring, Summer. 4 credits. Approval of department.
Supervised graduate practicums, observation, internships, and externships.

843. *Independent Study in Home Economics Education*
(H E 833.) Fall, Winter, Spring, Summer. 1 to 5 credits. May re-enroll for a maximum of 9 credits. Approval of department.
Study on an individual or group basis.

899. *Research*
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

901. *Internship*
(H E 901.) Fall, Winter, Spring, Summer. 3 to 5 credits. May re-enroll for a maximum of 9 credits. Approval of department.
Supervised advanced graduate practicums, observation, internships, and externships in the various areas of emphasis.

902. *Independent Study in Family Ecology*
(H E 902.) Fall, Winter, Spring, Summer. 1 to 5 credits. May re-enroll for a maximum of 9 credits. Approval of department.
Study on an individual basis.

903. *Seminars in Family Ecology*
(H E 903.) Spring, Summer. 2 or 3 credits. May re-enroll for a maximum of 9 credits. Approval of department.
Seminars in selected topics.

932. *History and Philosophy of Home Management*
(FCS 932.) Fall. Summer of even-numbered years. 3(2-0)
History and development of home management as a field of study. Values and decision-making as analyzed by various disciplines and as used in home management.

999. *Research*
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

FAMILY MEDICINE F M

College of Osteopathic Medicine

530. *Physical Examination Skills*
Fall. 2(1-2) Admission to medical school and approval of department.
Introductory course in physical examination skills used in the family physician's office. The lecture relates principles of physical examination to the laboratory where skills are taught.

545. *Principles of Family Medicine I*
Spring. 3(3-0) Admission to medical school and approval of department.
Clinical medicine which is specific in content for the practice of family medicine.

555. *Principles of Family Medicine II*
Summer. 4(4-0) Admission to medical school and approval of department.
Continuation of 545.

620. *Special Problems*
Fall, Winter, Spring, Summer. 1 to 6 credits. May re-enroll for a maximum of 24 credits. Approval of department.
Individual or group projects on special problems related to family medicine.

630. *Principles of Family Practice I*
Winter. 2(0-6) Admission to medical school and approval of department.
Weekly placement of the student in a family physician's office and instruction in osteopathic examination.

640. *Principles of Family Practice II*
Spring. 1(0-3) Admission to medical school and approval of department.
Continuation of 630.

650. *Principles of Family Practice III*
Summer. 1(0-3) Admission to medical school and approval of department.
Continuation of 640.

660. *Principles of Family Practice IV*
Fall, Winter. 2(0-4) Admission to medical school and approval of department.
Continuation of 650.

665. *Principles of Family Medicine III*
Fall. 4(4-0) Admission to medical school and approval of department.
Continuation of 555.

670. *Principles of Family Practice V*
Spring, Summer. 2(0-4) Admission to medical school and approval of department.
Continuation of 660.

675. *Principles of Family Medicine IV*
Winter. 4(4-0) Admission to medical school and approval of department.
Continuation of 665.

685. *Principles of Family Medicine V*
Spring. 4(4-0) Admission to medical school and approval of department.
Continuation of 675.

695. *Principles of Family Medicine VI*
Summer. 4(4-0) Admission to medical school and approval of department.
Continuation of 685.

FISHERIES AND WILDLIFE F W

College of Agriculture and Natural Resources

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

202. *Soils and Man's Environment*
Winter. 3(3-0) Interdepartmental with Resource Development Department, Natural Resources, and Soil Science and administered by Soil Science.
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.

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*
Winter. 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.

374. *Biological Oceanography*
(474.) 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.

402. *Environmental Conservation Education*
Fall, Spring, Summer. 4(3-2) Elementary education Juniors.
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 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.

424. Wildlife Population Analyses

Spring. 4(3-2) 305 or approval of department.

Population mensuration; reproductive and survival rates; sex and age determination; handling and marking methods.

425. Wildlife Habitat Analyses

Spring. 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) 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) Interdepartmental with Forestry, Parks and Recreation Resources and Resource Development Departments and Natural Resources. Administered by the Forestry Department.

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.

471. Ichthyology

Spring. 3(2-3) 301 or ZOL 305 or 314. Interdepartmental with Zoology Department.

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.

476. Limnology

Winter. 3(3-0) B S 212. Interdepartmental with the Zoology Department.

Ecology of lakes and streams with special reference to physical, chemical, and biological factors affecting their productivity.

477. Limnological Methods

Winter. 3(0-9) 476 concurrently; ZOL 481; ENT 301, 302 recommended. Interdepartmental with the Zoology Department.

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 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. 421 or approval of instructor. Given at W. K. Kellogg Biological Station. Interdepartmental with and administered by the Entomology Department.

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.

874. Advanced Biological Limnology

Fall. 3(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.

899. Research

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

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

211. Introduction to Food Science

Spring. 3(3-0)

Modern food processing, world food problems, and the basic characteristics of processed foods.

242. Meats, Poultry and Fishery Products I

Fall. 3(2-2) Interdepartmental with the Animal Husbandry Department.

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)

Composition, use, classification and market grades, methods of storage and factors affecting keeping quality of dairy products.

331. Physical Principles of Food Processing

Fall, Winter. 4(3-2) 211; MTH 109; PHY 239 or approval of department.

Food preservation by heat, low temperature, dehydration and radiation.

*Named changed October 17, 1970. Formerly Food Science and Human Nutrition and Foods.

†Named changed July 1, 1970. Formerly College of Home Economics.

332. Food Processing II: Biological Principles

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) 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

(304.) 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

Spring. 3(3-0) 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(2-3) 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(2-3) 331; 333 concurrently or approval of department.

Concentration and dehydration of foods by roller, spray, and freeze drying and foam, puff and tunnel drying. Stability and nutritional aspects of dehydrated foods.

405. Chemistry and Technology of Dairy Products Manufacturing

Winter. 3(2-3) May re-enroll for a maximum of 6 credits if a different topic is taken. 400 or approval of department.

Physical, chemical and microbiological factors in the processing of dairy products. Ice cream, sherbets, ice milks and special frozen desserts are studied in odd-numbered years; cheese, and related dairy products in even-numbered years.

421. Food Plant Management

Spring. 3(2-3) Seniors or approval of department.

Efficiency concepts, merchandising, personnel utilization and organization.

440. Food Microbiology

(MPH 371.) Spring. 5(3-6) MPH 200 or 301 or 401, or approval of department. Interdepartmental with the Microbiology and Public Health Department.

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(1-6) 333 or approval of department.

Processing, formulation and quality control.