817. Financial Decision Models

Winter. 4(4-0) ACC 839, F I 888. Interdepartmental with the Department of Accounting.

Development and application of computerized financial models in finance, accounting, and control activities. Use of financial planning software on personal and mainframe computers. Emphasis on models in case analysis.

850. Risk Management and Insurance Concepts

Winter, Summer. 4(4-0)

Analysis of business exposures and risk management techniques. Risk meeting alternatives and their economic, legal, and social implications. The role of insurance and employee benefits in risk management.

855. Market Cost-Revenue Analysis

Winter. 4(4-0) One course in accounting and one in marketing. Interdepartmental with and administered by the Department of Marketing and Transportation Administration.

Analytical tools for use in planning and controlling marketing activities. Emphasis on the determination of factors causing marketing cost differences and the assignment of costs to those factors. Application of tools to determination of expenditure-revenue patterns and market potentials.

870. Financial Markets

Fall. 4(4-0) F I 888.

Financial markets, rates, and flows. Major theoretical explanation and empirical evidence concerning financial market behavior.

871. Portfolio Theory and Capital Markets

Fall, Spring. 4(4-0) ACC 839; F I 888.

Theoretical and empirical developments in portfolio analysis, capital markets, capital asset pricing model, arbitrage pricing theory, efficient market hypothesis, and studies of capital markets.

872. Management and Financing of Corporate Assets

Fall, Summer. 4(4-0) F I 871 or concurrently.

Principles of decision analysis in management of current assets, estimation of requirements for short term funds, and valuation of capital budgeting and merger proposals. Analysis of actual business cases is supplemented by selected readings.

873. Long Term Financial Policies

Winter, Summer. 4(4-0) F I 871 or F I 872.

Planning capital structure and the cost of capital. Examines fundamental considerations of raising capital, debt management, dividend policy and problems in public issues. Analysis of actual business cases is supplemented by selected readings.

874. Investment Strategy

Spring. 4(4-0) F I 871 or concurrently.

Analysis of theories and techniques available to achieve superior returns through security selection and/or portfolio management. Review and evaluation of significant literature and empirical results of various investment strategies.

878. Bank Management

Spring. 4(4-0) F I 888.

Provides a comprehensive working knowledge of commercial bank management. Topics include capital adequacy, liquidity, public policy and bank failures, regulation, consumer protection, and other internal and external banking industry issues.

888. Financial Concepts and Analysis

Fall, Winter. 4(4-0) ACC 839.

Basic principles of business finance covering short, intermediate, and long term problems. Principles of capital budgeting. Emphasis on the mathematics of finance and use of numerical examples and problems.

889. Financial Decision Making

Fall, Winter, Spring, Summer. 4(4-0) ACC 840, F I 888 or concurrently.

Financial planning and control using financial theory and management techniques for short, intermediate, and long term problems. Involves case problems.

890. Special Problems

Fall, Winter, Spring, Summer. 1 to 4 credits. Approval of department.

Independent study of special topics in finance or insurance.

990. Seminar in Financial Management Theory

Fall. 4(4-0) Doctoral candidates with approval of department.

The financial theory of the firm. Theoretical models dealing with capital structure, cost of capital, and dividend policy.

991. Seminar in Capital Markets

Winter. 5(5-0) F I 990.

The mathematical basis of portfolio theory. Development of capital asset pricing models. Empirical tests of capital market theories.

992. Seminar in Selected Finance Topics

Spring. 4(4-0) F I 991.

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

Fall, Winter, Spring, Summer. 3(3-0) Interdepartmental with the departments ofForestry, 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.

207. Great Lakes: Biology and Management

Spring. 3(3-0) Interdepartmental with the Department of Resource Development.

Living aquatic resources of the Great Lakes: environmental history, biological resources and their management.

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.

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 of even-numbered years. 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. 4(3-3) 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. 4 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 of even-numbered years. 4(4-0) 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 ENGINEERING

See Agricultural Engineering.

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.
Fundamentals of food composition, food processing, preservation and food commodities.

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.

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 Technology and Systems Management.
Engineering concepts related to the unit operations found in the food industry. Fluid mechanics, heat transfer and rate processes including psychrometrics and refrigeration.

330. Food Processing Operations
(FSC 331.) Winter. 3(3-0) PHY 237, FSC 211, or approval of department.
Unit operations for food preservation by low temperature, heat, dehydration, evaporation and separation processes.

330L. Laboratory in Food Processing Operations
Winter. 1(0-2) FSC 330 or concurrently.
Demonstrations, workshops, and pilot-scale processing illustrating selected unit operations in food manufacture.

333. Food Chemistry
Spring. 3(3-0) 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.

333L. Laboratory in Food Chemistry
Spring. 1(0-3) FSC 211, CEM 241 and FSC 333 or concurrently.
Chemical changes in food that affect quality and stability.

400. Milk Processing Technology
Fall. 4(3-3) CEM 241 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. 3(3-0) FSC 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(3-0) 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.

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

421. Food Plant Management
Spring. 3(3-0) Seniors or approval of department.
Business and technical management concepts associated with food plants. Efficiency factors, regulatory obligations, and administrative aspects.

430. Thermal Processes for Foods
Winter. 3(2-2) ATM 329, FSC 328 or concurrently.
Process design concepts with emphasis on heating and cooling of foods in containers. Parameters used to describe thermal resistance of product components. Process time calculations for thermal processes.

440. Food Microbiology
Spring. 3(3-0) MPH 200 or MPH 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.

441. Food Microbiology Laboratory
Spring. 2(0-4) FSC 440 or concurrently or approval of department. Interdepartmental with the Department of Microbiology and Public Health.
Laboratory practice with major groups of microorganisms of importance to the food industry. Concurrent enrollment in FSC 440 recommended.

445. Meat, Poultry and Fish Processing
Spring. 4(2-6) FSC 333 or approval of department.
Muscle food and egg processing technology, product formulation and quality control. Manufacturing of cured meat, sausage and processed products.

455. Food Analysis I
Fall, Spring. 4(2-4) CEM 162, CEM 241 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 iodimetric techniques in food analysis.

456. Food Analysis II
Winter. 4(2-6) CEM 162 and CEM 241 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 201 or approval of department.
Organization of and tools used for quality control: control charts, acceptance and auditing inspections, critical control points, reliability, safety, recall and liability.