

Fisheries and Wildlife—FW

- 473 Environmental Fish Physiology**
Spring of odd years. 3(3-0) Interdepartmental with Physiology. P:M: (BS 111 or LBS 145 or LBS 149H) R: Not open to freshmen or sophomores.

Physiological adaptations of fish to environmental factors; bioenergetics, homeostasis, senses adaptations to diverse and extreme aquatic environments.

- 474 Limnological and Fisheries Techniques**
Fall. 3(1-6) Interdepartmental with Zoology. P:M: (FW 472 or FW 414 or concurrently)

Field and laboratory investigations of physical, chemical, and biological parameters of lakes and streams. Field trips required.

- 475 Aquaculture**
Spring. 3(3-0) Interdepartmental with Animal Science. RB: (ANS 313 or ZOL 355)

Propagation and rearing of aquatic organisms used for food, bait and recreational fisheries management. Culture principles and techniques for important aquatic species. Commercial potential.

- 477 Pest Management I: Pesticides in Management Systems**
Fall. 3(3-0) Interdepartmental with Entomology; Crop and Soil Sciences; Horticulture. Administered by Department of Entomology. RB: (CEM 143 or CEM 251) and (BOT 405 and CSS 402) and (ENT 404 or ENT 470 or FW 328)

Chemistry, efficient use, and environmental fate of pesticides. Legal and social aspects of pesticide use.

- 478 Pest Management II: Biological Components of Management Systems (W)**
Spring of even years. 3(2-3) Interdepartmental with Entomology; Crop and Soil Sciences; Forestry; Horticulture. Administered by Department of Entomology. P:M: (ENT 404 or ENT 470 or PLP 405 or CSS 402 or FW 328) and completion of Tier I writing requirement.

Principles of host plant resistance and biological control and their relationship to the design of agroecosystems. Classification of insect biological control agents.

- 479 Fisheries Management**
Spring. 3(2-2) P:M: (FW 424) and (FW 414 or FW 472)

Manipulation of aquatic populations and their habitats to achieve societal goals for fishery resources. Management of human impact and biotic diversity.

- 480 International Studies in Fisheries and Wildlife**
Summer. 3 to 6 credits. A student may earn a maximum of 12 credits in all enrollments for this course. RB: (ZOL 355) R: Not open to freshmen; Approval of department, application required.

Fisheries and wildlife ecology and management study in regions beyond the United States. Ecological, economic, social, and cultural influences on fisheries and wildlife resources.

- 484 Environmental Education**
Spring. 3(2-2) P:M: (AEE 101 or AEE 110 or PRR 351 or RD 300 or TE 150) R: Not open to freshmen or sophomores.

Methods, materials and theory for teaching environmental education in formal and non-formal educational settings. Field trips required.

- 485 Environmental Science Senior Seminar**
Spring. 1(2-0) P:M: (FW 484 or concurrently) R: Open only to seniors in the Environmental Science minor.

Ecological principles, population growth, resource utilization and lifestyle choices.

- 489 Seminar in Zoo and Aquarium Science**
Fall, Spring. 1(1-0) A student may earn a maximum of 3 credits in all enrollments for this course. Interdepartmental with Zoology; Park, Recreation and Tourism Resources. Administered by Department of Zoology. R: Approval of department.

Scientific writing and oral presentations related to zoo and aquarium studies.

- 490 Independent Study in Fisheries and Wildlife**

Fall, Spring, Summer. 1 to 5 credits. A student may earn a maximum of 5 credits in all enrollments for this course. RB: (BS 110) R: Not open to freshmen or sophomores. Approval of department; application required.

Supervised individual research and study in fisheries and wildlife.

- 491 Special Topics in Fisheries and Wildlife**

Fall, Spring, Summer. 1 to 5 credits. A student may earn a maximum of 5 credits in all enrollments for this course. R: Not open to freshmen or sophomores. Approval of department; application required.

Selected topics of current interest and importance in fisheries and wildlife.

- 493 Professional Internship in Fisheries and Wildlife**

Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P:M: (FW 100 or FW 203 or FW 205) R: Open only to sophomores or juniors or seniors. Approval of department; application required. A student may earn a maximum of 6 credits in all enrollments for any or all of these courses: ABM 493, AEE 493, ANR 493, ANS 493, CSS 493, EEP 493, FIM 493, FW 493, HRT 493, PKG 493, PLP 493, PRR 493, and RD 493.

Supervised professional experiences in agencies and businesses related to fisheries and wildlife professions.

- 498 Internship in Zoo and Aquarium Science**
Fall, Spring, Summer. 3 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. Interdepartmental with Zoology; Landscape Architecture. Administered by Department of Zoology. R: Open only to juniors or seniors. Approval of department.

Application of zoological experience in a zoo or aquarium setting outside the university.

FOOD INDUSTRY MANAGEMENT FIM

Department of Agricultural Economics College of Agriculture and Natural Resources

- 100 Decision-making in the Agri-Food System**
Fall, Spring. 3(3-0) Interdepartmental with Agribusiness Management. Administered by Department of Agricultural Economics. SA: FSM 200

Organization and operation of the agri-food system. Economic analysis of agri-food firms and consumers. Management functions and decision-making of agri-food firms.

- 210 Professional Seminar in Food Industry Management**
Spring. 1(1-0) P:M: (ABM 100 or concurrently or ABM 130 or concurrently) R: Open only to Food Industry Management majors.

Industry trends in food industry management. Verbal, written, and visual communication techniques applied to professional situations, including professional development and career planning.

- 220 Food Product Marketing**
Fall. 3(3-0) P:M: (ABM 100 or concurrently)
- Structure of the food marketing system including food processors, manufacturers, retailers and food service. Impact of consumer behavior and buying patterns. International food product marketing. Strategic planning in food marketing.

- 222 Agribusiness and Food Industry Sales (W)**
Fall, Spring. 3(3-0) Interdepartmental with Agribusiness Management. Administered by Department of Agricultural Economics. P:M: (ABM 100 or ABM 130 or EC 201 or EC 202) and completion of Tier I writing requirement. R: Open only to sophomores or juniors or seniors. SA: FSM 320
- Selling processes and activities within agribusiness and food firms. Principles and techniques of sales. Operation of sales organizations.

- 335 Food Marketing Management**
Spring. 3(3-0) P:M: (FIM 220 or MSC 300) and (MSC 303) SA: ML 335, MTA 335, FSM 335

Management decision-making in food industry organizations (processors, wholesalers, retailers). Marketing and sales in response to customer and consumer needs. Distribution and merchandising systems in domestic and international contexts.

- 337 Labor and Personnel Management in the Agri-Food System**
Fall. 3(3-0) Interdepartmental with Agribusiness Management. P:M: (ABM 100 or ABM 130) R: Open only to juniors or seniors. SA: FSM 325

Human resource management principles for farms, agribusinesses and food firms: planning, recruiting, training, scheduling, motivating, supervising and evaluating. Labor regulations, compensation and records.

- 351 Retail Management**
Fall, Spring, Summer. 3(3-0) Interdepartmental with Marketing and Supply Chain Management. Administered by Department of Marketing and Supply Chain Management. P:M: (MSC 300 or MSC 327) R: Open only to juniors or seniors in the Eli Broad College of Business or the Food Industry Management or Merchandising Management major. SA: ML 351, MTA 351
Domestic and international retailing structure, environment, and development. Managerial strategy. Locational, purchasing, organizational, personnel and promotional techniques. Retail budgeting and control. Social and ethical considerations.
- 400 Public Policy Issues in the Agri-Food System**
Spring. 3(3-0) Interdepartmental with Agribusiness Management. Administered by Department of Agricultural Economics. P:M: (ABM 100) R: Open only to juniors or seniors. SA: FSM 421
Objectives, alternatives and consequences of public policy in the agri-food system. Analysis of economic implications for food and agribusiness firms, farmers, consumers and society.
- 410 Advanced Professional Seminar in Food Industry Management**
Fall. 1(1-0) P:M: (ABM 210 or FIM 210) R: Open only to Food Industry Management juniors or seniors.
Advanced professional problems and reestablishment of career planning in the agri-food system. Industry trends, career alternatives, and job search strategies. Enhanced verbal, written and visual communication techniques.
- 422 Vertical Coordination in the Agri-Food System**
Fall. 3(3-0) Interdepartmental with Agribusiness Management. Administered by Department of Agricultural Economics. P:M: (ABM 100 and EC 201) R: Open only to juniors or seniors. SA: FSM 443
Analysis of vertical coordination in the industrialized agri-food system. Agricultural cooperatives, contracts, marketing orders, and trade associations. Analysis of imperfect competition and methods of conducting business. Interaction with legal systems and government.
- 427 Global Agri-Food Industries and Markets**
Fall. 3(3-0) Interdepartmental with Agribusiness Management. Administered by Department of Agricultural Economics. P:M: (FIM 220 or ABM 225)
Strategic understanding of the international agri-food system. Analysis of global production, marketing, and consumption. Knowledge of changing conditions in international industries and markets. Global trends and opportunities.
- 439 Food Business Analysis and Strategic Planning(W)**
Fall. 3(3-0) Interdepartmental with Marketing and Supply Chain Management. P:M: (FIM 220) R: Open only to juniors or seniors SA: ML 439, MTA 439, MSC 439
Principles and techniques of business analysis and strategic planning applied to food firms. Food trend forecasts, market potential, competition and cost analyses, business and strategic planning.

- 490 Independent Study in Food Industry Management**
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P:M: (ABM 100) R: Open only to sophomores or juniors or seniors in the Food Industry Management major. Approval of department: Application required. Students are limited to a combined total of 6 credits in ABM 490 and FIM 490. SA: FSM 490
Independent supervised study in topics in food industry management.
- 493 Professional Internship in Food Industry management**
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P:M: (ABM 100) R: Open only to juniors or seniors in the Food Industry Management major. Approval of department; application required. A student may earn a maximum of 6 credits in all enrollments for any or all of these courses: ABM 493, AEE 493, ANR 493, ANS 493, CSS 493, EEP 493, FIM 493, FW 493, HRT 493, PKG 493, PLP 493, PRR 493, and RD 493.
Supervised professional experience in the food industry.

FOOD SCIENCE FSC

Department of Food Science and Human Nutrition College of Agriculture and Natural Resources

- 120 What's for Dinner: Science on Your Plate**
Fall, Spring. 1(2-0) Not open to students with credit in FSC 229.
Relationship between science and food. Current issues and future challenges in food science. Impact of technology, government, consumers and the media.
- 150 Introduction to Human Nutrition**
Fall, Spring, Summer. 3(3-0) Interdepartmental with Human Nutrition and Foods. Administered by Department of Food Science and Human Nutrition.
Nutrition needs in life stages from a human ecological perspective. Domestic and international factors affecting the availability of a safe, nutritious food supply. Relationships of food choices to health and disease.
- 211 Principles of Food Science**
Fall, Spring. 3(3-0)
Scientific principles, historical perspective, and current status of technology related to food composition, safety, toxicology, processing, preservation, and distribution.
- 275 Seafood Systems Management**
Spring. 3(3-0) Interdepartmental with Fisheries and Wildlife, Animal Science. Administered by Department of Fisheries and Wildlife.
Domestic and international perspectives on major aquatic foods. Cultural and nutritional value; wild harvest; aquaculture; processing technology; food handling and food safety.
- 320 Muscle Foods**
Spring. 3(2-3) Interdepartmental with Animal Science. Administered by Department of Animal Science. P:M: (ANS 210 or FSC 211 or HNF 150)
Structure of muscle. Meat technology and merchandising concepts.
- 325 Food Processing: Unit Operations**
Fall, Spring. 4(2-6) P:M: (ANS 210 or FSC 211) and completion of Tier I writing requirement. SA: FSC 229, FSC 339
Principles, technologies, and applications in conversion of raw products into high quality foods. Unit operations: thermal processing, irradiation, freezing, membrane fractionation, enzyme technologies, dehydration and refrigeration. Field trip required.
- 329 Fundamentals of Food Engineering**
Spring. 3(3-0) Interdepartmental with Biosystems Engineering. Administered by Department of Agricultural Engineering. P:M: (FSC 229) and (MTH 126 or LBS 118) and (PHY 231 or LBS 164) RB: (FSC 211) SA: FE 329
Unit operations in food industry: fluid mechanics, heat transfer, rate processes, refrigeration, freezing, and dehydration. Thermal process calculations.
- 342 Food Safety and Hazard Analysis Critical Control Point Program**
Fall. 3(3-0) RB: (FSC 211 or concurrently or HNF 150 or concurrently or HNF 311 or concurrently) or a prior or concurrent basic course in microbiology, chemistry or biological sciences. SA: FSC 442
Sources of microbiological, chemical and physical hazards; minimizing microbial growth and survival; good manufacturing, cleaning and sanitation practices; Hazard Analysis Critical Control Point Programs in food processing and food service.
- 401 Food Chemistry**
Fall. 3(3-0) P:M: (BMB 200 or CEM 352) or (BMB 401 or concurrently) R: Not open to freshmen or sophomores.
Organic and biological reactions of food constituents. Chemical changes in foods during processing and storage affecting texture, color, flavor, stability, and nutritive qualities.
- 402 Food Chemistry Laboratory**
Fall. 1(0-3) P:M: (FSC 401 or concurrently) and completion of Tier I writing requirement.
Chemical changes in food constituents which affect stability of food products and properties such as color, flavor and texture.
- 407L Toxicology Methods Laboratory**
Fall. 2(0-4) Interdepartmental with Animal Science. Administered by Department of Animal Science. RB: (ANS 407 or concurrently) R: Not open to freshmen or sophomores.
Laboratory techniques for evaluating potential toxicity of chemicals to living systems. Field trip to industrial toxicology laboratory required.
- 420 Quality Assurance**
Fall. 2(2-0) P:M: (STT 200 or STT 201 or STT 231 or STT 315 or STT 351) and (FSC 211 or concurrently or ANS 210 or concurrently or HRT 204 or concurrently) R: Open only to juniors or seniors or graduate students in the Department of Food Science and Human Nutrition or in the Food Processing and Technology Specialization.
Theory and application of quality assurance programs for food processing industries.