Descriptive---Fisheries and Wildlife of Courses

471. Ichthyology
Fall. 3(2-3) Interdepartmental with Zoology.
P: ZOL 228.
Fish morphology, physiology, development, evolution, and ecology. World fishes with emphasis on freshwater fishes.
QF: FW 301, ZOL 307, ZOL 428 QA: FW 471, ZOL 471

472. Limnology
Fall. 3(3-0) Interdepartmental with Zoology.
P: CEM 141, ZOL 250. R: Not open to students with credit in ZOL 431.
Ecology of lakes with emphasis on interacting physical, chemical, and biological factors affecting their structure and function.
QF: CEM 141, ZOL 359 QA: FW 476

474. Fishery and Limnological Techniques
Fall. 3(1-6) Interdepartmental with Zoology.
P: FW 472 or concurrently.
Field and laboratory investigations of physical, chemical, and biological parameters of lakes and streams.
QF: FW 476 QA: FW 477, FW 475

475. Aquaculture
Spring. 3(0-0) P: ANS 313 or FW 364 or ZOL 250.
Propagation, feeding, and husbandry of aquatic organisms used for food, bait, and recreational fisheries management.
QF: FW 471 QA: FW 477

476. Aquaculture
Spring. 3(0-0) P: ANS 313 or ZOL 307.
Problems in aquaculture systems. Techniques for assessing acute and chronic effects of toxicants on biochemical, physiological, organismal, population, community, and ecosystem levels of organization.
QF: FW 831

479. Fishery Management
Spring. 3(2-1) P: FW 424, FW 471, FW 474.
Manipulation of aquatic populations and their habitats to achieve objectives for fishery resources.
QF: FW 476

484. Environmental Education
Spring. 3(0-0) P: AES 101 or FR 320 or RD 201 or TE 150. R: Not open to freshmen and sophomores.
Methods, materials, and theory for teaching environmental education in formal and nonformal educational settings.
QF: RD 301 or FR 320 QA: FW 454

490. Independent Studies in Fishery and Wildlife Problems
Fall. Spring. Summer. 1 to 5 credits. A student may earn a maximum of 5 credits in all enrollments for this course.
P: BS 116. R: Not open to freshmen and sophomores.
Approval of department and application required.
Special topics in fisheries and wildlife.
QF: BS 212 QA: FW 404

810. Human Dimensions Research in Fishery and Wildlife Fall of even-numbered years. 3(0-0) Methods of surveying, educating, and involving the public to achieve fish and wildlife management goals. Review of human dimensions research and current case studies.
QF: FW 810

814. Environmental Chemodynamics
Fall. 4(3-0) R: Open only to graduate students in College of Agriculture and Natural Resources, College of Human Medicine, College of Osteopathic Medicine, College of Veterinary Medicine.
Chemical and environmental factors controlling the distribution of organic and inorganic chemicals in air, water, and soil. Monitoring.
QF: FW 802

824. Analysis of Wildlife Populations
Spring. 3(2-3) R: Open only to graduate students in the Colleges of Agriculture and Natural Resources, Engineering, Human Medicine, Natural Science, Osteopathic Medicine, and Veterinary Medicine.
Statistical and computer techniques used to analyze and interpret demographic data from fish and wildlife studies.
QF: STT 421

826. Ecology and Management of Waterfowl Fall of even-numbered years. 3(2-3) P: FW 412, FW 424.
Physiological, behavioral, and population characteristics of waterfowl. Current issues and management.
QF: FW 412, FW 424 QA: FW 829

828. Conservation and Genetics
Fall of odd-numbered years. 3(3-0) P: ZOL 341 or ZOL 354.
Population genetic principles applied to ecology and management of fish and wildlife.
QF: ZOL 441 or ZOS 300 or ZOS 314 QA: FW 828

831. Aquatic Toxicology
Spring of even-numbered years. 4(3-2) R: Open only to graduate students in the Colleges of Agriculture and Natural Resources, Engineering, Human Medicine, Natural Science, Osteopathic Medicine, and Veterinary Medicine.
Techniques for assessing acute and chronic effects of toxicants on biochemical, physiological, organismal, population, community and ecosystem levels of organization.
QF: FW 831

860. Wildlife Nutrition
Fall of odd-numbered years. 3(2-2) R: Open only to graduate students in the Colleges of Agriculture and Natural Resources, and Natural Science.
Nutritional ecology of wild species. Techniques for analyzing and improving nutritional qualities.
QF: FW 860

875. Advanced Aquaculture
Fall of odd-numbered years. 3(3-0) R: Open only to seniors and graduate students.
Adaptations and responses of aquatic organisms to environmental change in aquaculture systems. Research methods and applications for aquaculture planning and management decisions.
QF: FW 755

878. Environmental Toxicology
Spring of even-numbered years. 3(3-0) R: Open only to graduate students in the Colleges of Agriculture and Natural Resources, Engineering, and Natural Science.
Fish habitat use. Analysis and manipulation of habitats to enhance fish production in freshwater ecosystems.
QF: FW 875

879. Advanced Limnology
Spring of even-numbered years. 3(3-0) R: Open only to graduate students in the Colleges of Agriculture and Natural Resources, Engineering, and Natural Science.
Physical, chemical, and biological processes affecting productivity of aquatic ecosystems.
QF: FW 477 QA: FW 874, FW 875

891. Advanced Topics
Fall, Spring, Summer. 2 to 4 credits. A student may earn a maximum of 15 credits in all enrollments for this course.
In-depth study of advanced topics in fisheries and wildlife.
QF: FW 892

999. Master's Research
Fall, Spring, Summer. 1 to 6 credits.
A student may earn a maximum of 15 credits in all enrollments for this course.
R: Open only to graduate students in Fisheries and Wildlife.
Master's degree Plan B research paper.
QF: FW 892

999. Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course.
R: Open only to Doctoral level graduate students in Fisheries and Wildlife.
QF: FW 999

FOOD ENGINEERING FE
Department of Agricultural Engineering
College of Agriculture and Natural Resources
College of Engineering

329. Fundamentals of Food Engineering
Spring. 3(4-0) Interdepartmental with Food Science.
P: FSC 211, MTH 124, PHY 231. R: Not open to freshmen and sophomores.
Unit operations in food industry: fluid mechanics, heat transfer, rate processes, refrigeration, freezing, and dehydration. Thermal process calculations.
QF: PHY 207, FSC 211, MTH 109 or MTH 111 QA: ATM 325, FSC 430

381. Food Process Engineering I
Fall. 3(0-0) P: CHE 311 or CE 321 or ME 332. R: Open only to majors in College of Engineering.
Rheological behavior of foods and semi-solid foods. Applications in mixing, pipeline design, extrusion, and coating.
QF: MTH 310, CHE 340 or CE 321 or ME 332 QA: FE 475

433. Food Dehydration
Spring. 3(3-0) P: CHE 211 or ME 410. R: Open only to majors in College of Engineering.
Dehydration of food and agricultural products. Bin belt, rotary, spray, microwave, and solar drying of food products.
QF: AE 392, CHE 343 QA: F E 433
483. Food Process Engineering II  Fall (3-0)  
P: CHE 321 or concurrently; CEM 362 or concurrently; CR 381 or concurrently; MPH 205. R: Open only to students in the College of Engineering. 
QP: CHE 341, FE 475, CEM 365, MPH 200  QA: FE 477

485. Food Process Engineering III  Fall (3-0)  
P: FE 381; FE 383 or concurrently or ME 410. R: Open only to majors in College of Engineering. 
Diffusion, mass transfer coefficients, separations, freezing, dehydration, process integration, and design concepts. 
QP: FCE 475 or ME 411 QA: FE 473

487. Food Engineering Design Project  Spring (4-0)  
P: FE 483, FE 486. R: Open only to seniors and graduate students in Food Engineering. 
QP: AE 458, FE 477 QA: FE 487

490. Directed Study  Fall, Spring, Summer. 1 to 4 credits. 
A student may earn a maximum of 9 credits in all enrollments for this course. 
P: FSC 211 or MSEM 221 or MTH 235. R: Open only to Engineering majors. Approval of department; application required. 
Supervised individual student research and study in food engineering. 
QP: MTH 210 or FSC 241 QA: FE 480

491. Special Topics in Food Engineering  Fall, Spring, Summer. 1 to 4 credits. 
A student may earn a maximum of 8 credits in all enrollments for this course. 
P: FSC 211 or MSEM 221 or MTH 235. R: Open only to Engineering majors. Approval of department. 
Special topics in food engineering. 
QA: F 480

FOOD SCIENCE  FSC
Department of Food Science and Human Nutrition
College of Agriculture and Natural Resources

211. Principles of Food Science  Fall (3-0)  
P: CEM 141 QA: FSC 211

330. Food Processing: Fruits and Vegetables  Fall (2-0)  
P: MTH 116, FSC 211. R: Not open to freshmen. 
Fruit and vegetable composition and quality indices. Harvest and storage technology. Preservation systems: canning, freezing and specialized techniques. offered first half of semester. 
QP: MTH 108, MTH 109 or MTH 111, FSC 211  QA: FSC 460

331. Food Processing: Cereals  Fall (2-13)  
P: MTH 116, FSC 211. R: Not open to freshmen. 
QP: MTH 108, MTH 109 or MTH 111 QA: FSC 470

332. Food Processing: Dairy Foods  Spring (2-13)  
P: MTH 116, FSC 211. R: Not open to freshmen. 
QP: MTH 108, MTH 109 or MTH 111, FSC 211 QA: FSC 400, FSC 405

333. Food Processing: Meat, Poultry and Fishery Products  Spring (2-13)  
P: FSC 211, MTH 118. R: Not open to freshmen. 
Manufacturing practices and principles of fresh, frozen, and cured meats, eggs, and processed products. Product formulation and quality control. offered second half of semester. 
QP: MTH 108, MTH 109 or MTH 111, FSC 211 QA: FSC 445

401. Food Chemistry  Fall (3-0)  
P: FSC 211 or concurrently. R: Not open to freshmen and sophomores. 
Principles of food chemistry. Emphasis on isolation, purification, identification, and analysis of food constituents. 
QP: FSC 211, CEM 441 QA: FSC 333, FSC 402

402. Food Chemistry Laboratory  Fall (1-0)  
P: FSC 401 or concurrently. R: Not open to freshmen and sophomores. 
Analysis of food constituents and quality assurance programs for food processing industries. 
QP: SST 201, FSC 330 QA: FSC 457

420. Quality Assurance  Fall (2-5)  
P: STT 201 or FSC 351 or FSC 352 or FSC 353. R: Not open to freshmen and sophomores. 
Theory and application of quality assurance programs for food processing industries. 
QP: FSC 333 QA: FSC 335L

421. Food Laws and Regulations  Fall (3-0)  
P: HNF 150 or HNF 311 or FSC 211. R: Not open to freshmen and sophomores. 
Adoption, interpretation and enforcement of laws and regulations governing food processing and food service systems. 
QP: HNF 202 or HNF 411 or FSC 211 QA: FSC 205

432. Advanced Food Processing: Dairy Foods  Fall of odd-numbered years. (3-2)  
P: FSC 332. R: Not open to freshmen and sophomores. 
Theoretical and practical principles of the manufacture of cheese, frozen desserts, butter and powders. Concentration and fractionation techniques for predicting dairy by-products. 
QP: FSC 400 QA: FSC 405

433. Advanced Food Processing: Meat, Poultry and Fish  Fall of even-numbered years. (3-2)  
P: FSC 333. R: Not open to freshmen and sophomores. 
Scientific principles of processing animal tissue for food. 
QP: FSC 434 QA: FSC 445

440. Food Microbiology  Spring (3-0)  
P: MPH 290 or MPH 301 QA: FSC 440 or MPH 440

441. Food Microbiology Laboratory  Spring (1-0)  
P: MPH 290 or MPH 301 QA: FSC 440 or MPH 440

455. Food Analysis  Fall (3-2)  
P: BCH 290, CEM 282, FSC 401. R: Not open to freshmen and sophomores. 
Principles and application of analytical techniques. Analysis for fats, proteins, carbohydrates, minerals, vitamins and additives. Techniques include spectrophotometry, fluorimetry, chromatography, electrophoresis, proximate composition. 
QP: CEM 162, CEM 441, FSC 333 QA: FSC 455, FSC 456

490. Special Problems in Food Science  Fall, Spring. Summer. 1 to 3 credits. 
A student may earn a maximum of 6 credits in all enrollments for this course. 
R: Not open to freshmen and sophomores. Approval of department and committee required. 
Individual study of selected topics in food science. 
Supervised independent study. 
QA: FSC 480

492. Senior Seminar in Food Science  Spring. (1-0)  
R: Open only to seniors in Food Science. 
Critical study and discussion of contemporary issues related to the food industry. 
QA: FSC 490

801. Chemistry of Food Lipids  Spring of odd-numbered years. (3-0)  
P: FSC 401, BCH 461. R: Not open to freshmen and sophomores. 
Composition and structure of lipids: physical and chemical properties in relation to their function in foods. 
QP: FSC 335, FSC 335L, BCH 453 QA: FSC 952

802. Food Proteins  Spring of even-numbered years. (3-0)  
P: BCH 461, FSC 401. R: Not open to freshmen and sophomores. 
Use of proteins and enzymes in the food industry. Functional properties of proteins and enzymes in food systems. 
QP: FSC 452, FSC 333

807. Advanced Food Toxicology  Fall of even-numbered years. (3-3)  
R: Open to seniors in Food Science. 
Interdepartmental with Animal Science. 
R: Approval of department. 
Toxicology related to food safety. Metabolism of toxins as influenced by food constituents, mutagenesis, and chemical carcinogenesis. 

833. Muscle and Meat Biochemistry  Spring of even-numbered years. (3-0)  
P: BCH 452 or concurrently; HNF 311. 
Anatomical, physiological, and biochemical properties of muscle. Structure and function of muscle proteins. 
Regulation of muscle contraction. 
QP: BCH 452 QA: FSC 961

840. Advanced Food Microbiology  Spring of even-numbered years. (3-0)  
P: FSC 440. 
QP: FSC 440 QA: FSC 832

850. Analytical Techniques in Food Science  Summer of odd-numbered years. (2-1)  
R: Open only to graduate students in Food Science or Human Nutrition. 
Theory and application of dynamic rheological testing, nucleic acid and protein analysis, and immunological techniques. Other new technologies related to food science.

860. Research in Food Processing Technology  Summer of even-numbered years. (2-1)  
R: Open only to graduate students in Food Science, Human Nutrition, Animal Science, and Horticulture. 
Theory, application, and evaluation of food processing technologies: ultracentrifugation, food irradiation, and critical point extraction.