

376. Applied Limnology
Spring of even-numbered years. 3(3-0)
?: Open only to graduate students in the Colleges of Agriculture and Natural Resources, Engineering, and Natural Science.
Applied aquatic ecology. Quantitative relationships between physical, chemical, and biological parameters in polluted and unpolluted lakes.

377. Fish Population Dynamics
Fall of even-numbered years. 3(2-2)
?: Open only to graduate students in the College of Agriculture and Natural Resources or College of Natural Science.
Quantitative analysis of fish populations. Evaluation, causes, and impacts of the rates of change in survival, growth, reproduction, and recruitment for fish populations and their yield.

378. Dynamics of Trace Contaminants in Aquatic Systems
Spring of even-numbered years. 3(3-0)
?: Open only to graduate students in the Colleges of Agriculture and Natural Resources, Engineering, Human Medicine, Natural Science, Osteopathic Medicine, and Veterinary Medicine.
Chemical and environmental parameters controlling movement and disposition of trace contaminants in aquatic environments. Fate models.

379. Advanced Limnology
Spring of odd-numbered years. 3(3-0)
?: 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.

391. Advanced Topics
Fall, Spring, Summer. 2 to 4 credits. A student may earn a maximum of 10 credits in all enrollments for this course.
In depth study of advanced topics in fisheries and wildlife.

392. Biodiversity
Spring. 2(2-0) A student may earn a maximum of 4 credits in all enrollments for this course. Interdepartmental with Zoology. Administered by Zoology.
?: ZOL 250.

Status of world biota and factors in the decline and extinction of major groups of plants and animals. Theory and design of natural reserves. Assessment and ecological meaning of diversity. Management for global and local diversity.

393. Seminar in Fisheries and Wildlife
Fall, Spring. 1(1-0) A student may earn a maximum of 7 credits in all enrollments for this course.
Study and research in advanced problems and current development in fisheries and wildlife.

397. Community and Ecosystem Ecology
Spring. 4(4-0) Interdepartmental with Zoology, and Botany and Plant Pathology. Administered by Zoology.
Structure and function of natural communities and ecosystems. Community analysis along environmental gradients. Succession, food web analysis, energy flow, nutrient cycling, and effects of human activities on ecosystems.

398. Master's Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 10 credits in all enrollments for this course.
?: Open only to graduate students in Fisheries and Wildlife.
Master's degree Plan B research paper.

399. Master's Thesis Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 99 credits in all enrollments for this course.
R: Open only to graduate students in Fisheries and Wildlife.

943. Techniques of Analyzing Unbalanced Research Data
Spring. 4(4-0) Interdepartmental with Animal Science, Forestry, Crop and Soil Sciences, and Horticulture. Administered by Animal Science.
P: STT 464. R: Open only to graduate students in the College of Agriculture and Natural Resources.
Linear model techniques to analyze research data characterized by missing and unequal number of observations in classes. Simultaneous consideration of multiple factors. Estimable comparisons. Hypothesis testing. Computational strategies. Variance and covariance components. Breeding values.

976. Multivariate Methods in Agriculture and Natural Resources
Spring. 4(4-0) Interdepartmental with Forestry and Animal Science. Administered by Forestry.
P: STT 422, MTH 314. R: Open only to graduate students in the College of Agriculture and Natural Resources and in the Interdepartmental Graduate Specializations in Ecology and Evolutionary Biology.
Application of multivariate methods to research problems. Hotelling's T-test, profile analysis, discriminant analysis, canonical correlation, principal components, principal coordinates, correspondence analysis, and cluster analysis.

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.

FOOD ENGINEERING FE

**Department of Agricultural Engineering
College of Agriculture and Natural Resources
College of Engineering**

329. Fundamentals of Food Engineering
Spring. 3(3-0) 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.

FOOD SCIENCE FSC

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

150. Introduction to Nutrition and Food Science
Fall, Spring, Summer. 3(3-0) Interdepartmental with Human Nutrition and Foods. Administered by Human Nutrition and Foods.
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. 3(3-0)
P: CEM 141.
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 Animal Science and Fisheries and Wildlife. Administered by 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.

329. Fundamentals of Food Engineering
Spring. 3(3-0) Interdepartmental with Food Engineering. Administered by Food Engineering.
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.

330. Food Processing: Fruits and Vegetables
Fall. 2(3-3)
P: MTH 116, FSC 211. R: Not open to freshmen.
Fruit and vegetable composition and quality indices. Harvest and post harvest technology. Preservation systems: canning, freezing and specialized techniques. Offered first half of semester.

331. Food Processing: Cereals
Fall. 2(3-3)
P: MTH 116, FSC 211. R: Not open to freshmen.
Classification and composition of cereals. Milling processes. Cereal product manufacture. Offered second half of semester.

332. Food Processing: Dairy Foods
Spring. 2(1-3)
P: MTH 116, FSC 211. R: Not open to freshmen.
Fluid milk. Principles and technology in manufacturing dairy products. Marketing, distribution and regulations of dairy foods. Offered first half of semester.

333. Food Processing: Meat, Poultry and Fishery Products
Spring. 2(1-3)
P: FSC 211, MTH 116. 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.

401. Food Chemistry
Fall. 3(3-0)
P: FSC 211, CEM 251. R: Not open to freshmen and sophomores. Not open to students with credit in HNF 300.
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 credit.
P: FSC 401 or concurrently. R: Open only to majors in Food Science, Foods: Technology and Management, and Food Engineering. 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.