FOOD SCIENCE

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

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.

325 Food Processing: Unit Operations
Spring. 4(3-3): P: (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.

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 botanical 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: 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: (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.

410 Sensory Analysis and Consumer Research
Fall. 3(2-2): P: (FSC 211 or HNF 150) and (STT 200 or STT 201 or STT 315 or STT 421 or STT 464) RB: HNF 300 or FSC 401 R: Open to undergraduate students in the College of Agriculture and Natural Resources or in the Department of Food Science and Human Nutrition. SA: HNF 410
Discriminative, affective and descriptive methods used to evoke, measure, analyze, and interpret sensory reactions to food characteristics and consumer needs.

420 Quality Assurance
Fall. 2(2-0): P: (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 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.

421 Food Laws and Regulations
Spring. 3(3-0): P: HNF 150 or HNF 311 or FSC 211 or FIM 100
Adoption, interpretation, and enforcement of laws and regulations governing food processing and foodservice systems. Impact of regulation on food production, availability, marketing, and safety.

423 Functional Foods and Human Health
Spring of even years. 3(3-0): P: (HNF 150 or (HNF 311 or concurrently) and (MMG 205 or MMG 301 or FSC 342) and ((BMB 200 or concurrently) or (BMB 401 or concurrently)) Concepts, nature and classification of functional foods. Spectrum of biological activity. Positive and negative impacts on health, and regulatory aspects.

429 Fundamentals of Food Engineering
Spring. 3(3-0) Interdepartmental with Biosystems Engineering. Administered by Biosystems Engineering. P: FSC 325 and MTH 126 and PHY 231 RB: FSC 211 R: Not open to students in the College of Engineering. SA: BE 329
Definition and measurement of food properties, thermodynamics, fluid mechanics, heat transfer, and mass transfer.

430 Food Processing: Fruits and Vegetables
Fall. 3(3-0): P: FSC 211 or HNF 210 R: Not open to freshmen or sophomores. SA: FSC 330
Fruit and vegetable composition and quality indices. Harvest technology, post-harvest physiology, and preparatory systems. Principles and applications of thermal processing, freezing, and specialized techniques.

431 Food Processing: Cereals
Spring. 3(2-3): P: FSC 211 R: Not open to freshmen or sophomores. SA: FSC 331

432 Food Processing: Dairy Foods
Spring. 3(2-3): P: FSC 211 or ANS 210 R: Not open to freshmen or sophomores. SA: FSC 332
Principles for production and processing of safe and wholesome dairy foods. Practical experience in safety and quality assurance systems and in the processing of fluid milk, cultured products, cheese, and frozen desserts.

433 Food Processing: Muscle Foods
Fall. 3(2-3): P: FSC 211 or ANS 210 R: Not open to freshmen or sophomores. SA: FSC 333
Manufacturing practices and principles of fresh, frozen, and canned meats and fish. Processed products from muscle foods. Egg characteristics. Product formulation and quality control.

441 Food Microbiology Laboratory
Spring. 2(0-4) Interdepartmental with Microbiology and Molecular Genetics. Administered by Food Science. P: (FSC 440 or concurrently) and completion of Tier I writing requirement. R: Not open to freshmen. SA: MPH 441
Methods for studying major groups of microorganisms important to the food industry. Isolation, enumeration, characterization, identification, and use of microorganisms.

455 Food Analysis
Fall. 3(2-3) P: (BMB 200 or (BMB 401 or concurrently)) and completion of Tier I writing requirement Principles and application of analytical techniques. Analysis for fats, proteins, carbohydrates, minerals, vitamins, and additives. Techniques include spectrophotometry, fluorometry, chromatography, electrophoresis, and proximate composition.

477 Food Engineering: Fluids
Spring. 3(2-3) P: (FSC 401 and FSC 410) and (FSC 440 or concurrently) RB: FSC 325 R: Open to seniors and graduate students. Food product development including obtaining, screening, and selecting ideas. Integration of food processing, chemistry, analysis, and microbiology for the design, production, and evaluation of a food product.

487 Food Engineering: Properties
Unit operations, process engineering, equipment, and industrial practices of the food industry. Manufactured dairy products: thermal processing, pipeline design, heat exchange, evaporation, dehydration, aseptic processing, membrane separation, cleaning, and sanitation.

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 or sophomores. Approval of department; application required.
Individual study of selected topics in food science. Supervised independent study.

493 Professional Internship in Food Science
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. A student may earn a maximum of 6 credits in all enrollments for any or all of these courses: AEN 493, AEE 493, ANR 493, ANS 493, CMP 493, CSS 493, EEP 493, ESA 493, FSC 493, FIM 493, FW 493, HRT 493, PKG 493, PLP 493, and PRR 493. R: Open to juniors or seniors in the Food Science major. Approval of department; application required. Supervised professional experiences in agencies and businesses related to food science.
803 **Advanced Food Chemistry**  
Fall of odd years. 3(3-0) RB: (FSC 401) or Prior coursework in biochemistry. SA: FSC 801, FSC 802  
Carbohydrates, proteins, and lipids. Purification, structural characterization, chemical reactions, and functional properties of these components in food systems.

807 **Advanced Food Toxicology**  
Fall of even years. 3(3-0) R: Approval of department.  
Toxicology related to food safety. Metabolism of toxicants as influenced by food constituents, mutagenesis, and chemical carcinogenesis. Risk assessment.

823 **Diet and Immune Function**  
Spring of odd years. 3(3-0) RB: Biochemistry and Microbiology.  
Influence of diet on the immune system and relationship to infectious and non-infectious diseases, adverse reactions such as food allergy, and alcohol and substance abuse. Methods to evaluate immune function.

831 **Advanced Cereal Science**  
Fall of even years. 3(3-0) RB: (BMB 401 and FSC 331 and FSC 401) or approval of department.  
Physico-chemical properties of major constituents in cereal grains. Relationship of constituent structures to functionality in the processing of cereal grains into food products, with emphasis on wheat.

842 **Foodborne Diseases**  
Spring of odd years. 3(3-0) RB: FSC 440 or FSC 840  
Epidemiology, isolation, characterization, clinical manifestations, pathogenicity, incidence and control of bacterial, parasitic and viral foodborne pathogens and associated toxins.

890 **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: Open only to graduate students in Food Science. Approval of department; application required.  
Individual investigation of an area of food science.

891 **Selected Topics in Food Science**  
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to graduate students in the Food Science major or Human Nutrition major.  
Topics of current interest and importance in basic and applied areas of food science.

892 **Food Science and Animal Science Seminar**  
Fall, Spring. 1(1-0) A student may earn a maximum of 4 credits in all enrollments for this course. Interdepartmental with Animal Science. Administered by Food Science. R: Open to graduate students in the Department of Animal Science or in the Department of Food Science and Human Nutrition.  
Critical review of literature. Organization and communication of scientific data in food science and animal science.

898 **Master's Research**  
Fall, Spring, Summer. 1 to 5 credits. A student may earn a maximum of 5 credits in all enrollments for this course. R: Open only to master's students in Food Science. Approval of department.  
Directed research in support of Plan B master's degree requirements.

899 **Master's Thesis Research**  
Fall, Spring, Summer. 1 to 10 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to master's students in the Food Science major.  
Master's thesis research.

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 students in the Food Science major.  
Doctoral dissertation research.