430 Food Processing: Fruits and Vegetables
Fall. 3(2-3) P: (FSC 211) and (FSC 325 or BE 350) R: Not open to freshmen or sophomores. SA: FSC 330

Food Science—FSC

431 Food Processing: Cereals
Spring. 3(2-3) P: (FSC 211) and (FSC 325 or BE 350) R: Not open to freshmen or sophomores. SA: FSC 331

Classification and composition of cereals. Milling techniques.

432 Food Processing: Dairy Foods
Fall. 3(2-3) P: (FSC 211) and (FSC 325 or BE 350) 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
Spring. 3(2-3) Interdepartmental with Animal Science. Administered by Food Science. P: (FSC 211) and (FSC 325 or BE 350) R: Not open to freshmen or sophomores. SA: FSC 333

Manufacturing practices and principles of fresh, frozen, and cured meats and fish. Processed products from muscle foods. Product formulation and quality control.

440 Food Microbiology
Fall. 3(0-3) Interdepartmental with Microbiology and Molecular Genetics. Administered by Food Science. P: (MMG 201 or MMG 301) and completion of Tier I writing requirement. R: Not open to freshmen.

Major groups of microorganisms of importance to the food industry. Ecological, physiological, and public health aspects.

441 Food Microbiology Laboratory
Fall. 2(0-4) Interdepartmental with Microbiology and Molecular Genetics. Administered by Food Science. P: (FSC 440 or concurrently) R: MMG 301 or concurrently. SA: MPH 441

Methods for studying major groups of microorganisms important to the food industry. Isolation, enumeration, characterization, identification, and use of microorganisms.

442 Hazard Analysis Critical Control Point Training and Certification
Fall. 1(1-0) P: (FSC 325) and (MMG 301 or concurrently) R: FSC 440 R: Open to juniors or seniors.

Design and implementation of Hazard Analysis Critical Control Point (HACCP) programs for the food industry. Offered second half of semester.

445 Food and Nutrition Laboratory
Fall. 3(2-3) P: (BBM 200 or concurrently) or (BBM 401 or concurrently) or (BBM 461 or concurrently) and completion of Tier I writing requirement. Principles and applications of analytical techniques. Analysis for fats, proteins, carbohydrates, minerals, vitamins, and additives. Techniques include spectroscopy, fluorimetry, chromatography, electrophoresis, and proximate composition.

447 Food Engineering: Fluids
Fall. 3(2-3) P: FSC 310 and FSC 401 and FSC 440 R: FSC 325 R: Open to seniors or graduate students. Food process 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.

455 Food and Nutrition Laboratory
Fall. 3(2-3) P: (BBM 200 or concurrently) or (BBM 401 or concurrently) or (BBM 461 or concurrently) and completion of Tier I writing requirement. Principles and applications of analytical techniques. Analysis for fats, proteins, carbohydrates, minerals, vitamins, and additives. Techniques include spectroscopy, fluorimetry, chromatography, electrophoresis, and proximate composition.

470 Integrated Approaches to Food Product Development
Spring. 3(2-3) P: FSC 410 and FSC 401 and FSC 440 R: FSC 325 R: Open to seniors or 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.

475 International Studies in Food Science
Fall. Spring. Summer. 2 to 6 credits. A student may earn a maximum of 12 credits in all enrollments for this course. P: HNF 150 or FSC 211 R: Approval of department; application required. Education abroad experience. Contemporary problems affecting food science and human nutrition in world, national and local communities.

477 Food Engineering: Fluids
Fall. 3(2-3) Interdepartmental with Bioengineering and Systems Engineering. Administered by Bioengineering. P: BE 350 and BE 351 and BE 360 SA: FE 465 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.

481 Fermented Beverages
Fall. 3(2-2) R: Open to juniors. Approval of department. Origin and history of alcoholic beverages produced by fermentation; types of products and methods of production; relationships among fermentation and sensory attributes; responsible consumption of alcoholic beverages.

482 Science and Technology of Wine Production
Fall. 3(2-3) Interdepartmental with Chemistry and Chemical Engineering. Administered by Chemistry. P: CEM 143 or CEM 251 or CEM 351 R: Must be at least 21 years of age. R: Open to seniors or graduate students in the Department of Biosystems and Agricultural Engineering or in the Department of Chemical Engineering and Materials Science or in the Department of Chemistry or in the Department of Food Science and Human Nutrition or in the Department of Horticulture or in the Department of Microbiology and Molecular Genetics or in the Lyman Briggs Chemistry Coordinator Major. Approval of department. Origin and history of wine and wine production. Determination of time of harvest, methods of post-harvest handling, storage, and processing of grapes into wine. Physical and chemical changes in wine and processes. Analysis of must and its adjustments, fermentation, aging, and aging. Physiology of yeasts and bacteria involved in winemaking and spoilage. Cellar practices, problems, and operations.

483 Brewing and Distilled Beverage Technology
Spring. 3(2-3) Interdepartmental with Chemical Engineering. Administered by Chemical Engineering. P: CHE 311 or (ME 410 or concurrently) or (BE 350 or (BE 429 or concurrently) or (FSC 325 or concurrently) R: Major in Chemical Engineering, Biosystems Engineering or Food Science. Must be at least 21 years of age. R: Approval of department. Raw materials for fermentation and basics of alcohol fermentation, beer and cider production; basics of distillation; brandy and eau de vie production; whiskey production; vodka, gin and flavored spirits production; flavor chemistry.

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 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: ABM 493, AEO 493, ANR 493, ANS 493, CMP 493, CSS 493, CSUS 493, EEP 493, FSC 493, FIM 493, FW 493, HRT 493, PKG 493, and PLP 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
Spring of even years. 3(3-0) R: (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.

811 U.S. Food Laws and Regulations
Fall. Spring. 3(3-0) R: (FSC 810) or food science, law, food safety. International development or related disciplines. SA: ANR 810 Survey of food laws of various countries and regions.

815 International Food Laws and Regulations
Fall. Spring. 3(3-0) R: Food science, law, food safety. International development or related disciplines. SA: ANR 810

Survey of food laws of various countries and regions.
Introduction to the European Union (EU), the role of compliance, and the role of science in EU food law. Authority, food labeling, food additives, food fortification requirements, basic standards, food labeling, food laws, agency responsibilities, product registration requirements, basic standards, food labeling, food safety, and food importation. Trade issues, international organizations, and commercial agreements.

Food Laws and Regulations in Latin America
Fall, Summer. 3(3-0) RB: (FSC 810) or food law background. Not open to students with credit in LAW 810G. Current issues that have shaped Latin American food regulation. Overview of regional characteristics. Basic food laws, agency responsibilities, product registration requirements, basic standards, food labeling, food safety, food additives, and food importation. Trade issues, international organizations, and commercial agreements.

Food Laws and Regulations in Canada
Spring. 3(3-0) RB: (FSC 810) or food science, law, food safety, international development or related disciplines. Canadian regulatory framework. Labeling and advertising rules under the Canadian Food and Drug Act and other statutes. Food additives, food supplement and food fortification. Regulation of novel foods and genetically modified foods, organic foods and food irradiation. Inspection and related food safety programs. Food recalls. Compliance and enforcement. Food importation.

Food Laws and Regulations in China
Summer. 3(3-0) RB: Food science, law, food safety, international development or related disciplines. Not open to students with credit in LAW 810J. Current issues that have shaped the regulation of food in China, regional characteristics and culture, food laws, agency responsibilities, product registration requirements, basic standards, food labeling, food safety, food additives, and food import systems.

Codex Alimentarius - The Food Code
Fall, Spring. 3(3-0) RB: (FSC 810) or food science, law, food safety, international development or related disciplines. How Codex Alimentarius formulates and harmonizes food standards for hygiene, contaminants, food additives, veterinary drugs, and pesticide residues, including its role in the World Trade Organization (WTO) Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT) Agreements.

Animal Health, World Trade and Food Safety (OIE): Challenges and Opportunities
Fall. 3(3-0) RB: (FSC 810) or animal science, veterinary medicine, food science, law, food safety, international development, agriculture, or related disciplines. Examines the history, objectives, rules and operations of the World Organization for Animal Health (OIE), regarding global animal health, animal welfare, world trade, and food safety.

812 Food Laws and Regulations in the European Union

813 Food Laws and Regulations in Latin America

814 Food Laws and Regulations in Canada

815 Food Laws and Regulations in China

816 Codex Alimentarius - The Food Code

817 Animal Health, World Trade and Food Safety (OIE): Challenges and Opportunities

820 Regulatory Leadership in Food Law
Spring. 3(3-0) RB: (FSC 811) or prior coursework in food science, food law, or food safety Not open to students with credit in LAW 810J. Introduction to regulatory affairs through the regulation of food.

821 Wine, Beer, and Spirits Laws and Regulations
Spring of even years. 3(3-0) RB: (FSC 811) or prior coursework in food safety, food laws, or food science Not open to students with credit in LAW 810Y. Laws, regulations, and policies that govern alcoholic beverages in the United States.

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.

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.

843 Exposure Science and Environmental Epidemiology
Spring of odd years. 3(3-0) RB: Statistics, basic biological and chemical science. Human exposure to chemicals in food and the environment and its relationship to health and illness. Applied concepts in toxicology, exposure assessment, environmental epidemiology, and risk assessment.

844 Risk Assessment of Foodborne Chemicals and Toxins
Spring of even years. 3(3-0) RB: Calculus, basic biological and chemical sciences, toxicology. Human health risk assessment, including hazard identification, dose-response and exposure assessment, and risk characterization. Application to food safety and environmental risks.

851 The Law of the Foreign Supplier Verification Program Rule
Summer of odd years. 3(3-0) RB: (FSC 811) or prior coursework in food safety, food law, or food science Not open to students with credit in LAW 810V. Legal perspective of FDA's Foreign Supplier Verification Program of the Food Safety Modernization Act.

852 The Law of the Preventive Controls for Human Food Rule
Fall of odd years. 3(3-0) RB: (FSC 811) or prior coursework in food safety, food law, or food science Not open to students with credit in LAW 810W. Legal perspective of FDA’s Preventive Controls for Human Food Rule of the Food Safety Modernization Act.

853 The Law of the Produce Safety Rule
Fall of even years. 3(3-0) RB: (FSC 811) or prior coursework in food safety, food law, or food science Not open to students with credit in LAW 810X. Legal perspective of FDA’s Produce Safety Rule of the Food Safety Modernization Act.

890 Special Problems in Food Science
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open only to graduate students in Food Science. Approval of department; application required.

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.

892 Food Science Seminar
Spring. 1(1-0) A student may earn a maximum of 4 credits in all enrollments for this course. R: Open to graduate students in the Department of Food Science and Human Nutrition. Critical review of literature. Organization and communication of scientific data in food 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 36 credits in all enrollments for this course. R: Open to doctoral students in the Food Safety major. Doctoral dissertation research.