Food Chemistry Laboratory
Fall. 3(2-3) P: (FSC 401 and concurrently) or (FSC 410 and 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, fluorimetry, chromatography, electrophoresis, and proximate composition.

Integrated Approaches to Food Product Development
Spring. 3(2-3) P: (FSC 401 and FSC 410) and (FSC 440 or concurrently) 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.

Food Engineering: Fluids
Fall. 3(2-2) Interdepartmental with Biosystems Engineering. Administered by Biosystems Engineering. 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.

Food Processing: Cereals
Spring. 3(2-3) P: FSC 211 R: Not open to freshmen or sophomores. SA: FSC 331 Classification and composition of cereals. Milling processes. Cereal product manufacture.

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.

Food Processing: Meat Foods
Fall. 3(2-3) Interdepartmental with Animal Science. Administered by Food Science. P: FSC 211 or ANS 201 R: Not open to freshmen or sophomores. SA: FSC 333 Manufacturing practices and principles of frozen, cured meats and fish. Processed products from muscle foods. Product formulation and quality control.

Food Microbiology
Spring. 3(3-0) 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. SA: MPH 440
Major groups of microorganisms of importance to the food industry. Ecological, physiological, and public health aspects.

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. RB: MMG 206 or MMG 302 R: Open to seniors or graduate students. SA: MPH 441
Methods for studying major groups of microorganisms important to the food industry. Isolation, enumeration, characterization, identification, and use of microorganisms.
Food Science—FSC

483 Brewing and Distilled Beverage Technology
Spring. 3(3-2) Spring: Uncle John’s Fruithouse Winery and Brewing Company, East Lansing. Interdepartmental with Chemical Engineering. Administered by Chemical Engineering. P: CHE 311 or BE 350 or BE 429 RB: 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 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: ABM 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
Spring of even 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.

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

811 U.S. Food Laws and Regulations
Fall, Spring. 3(3-0) RB: (FSC 810) or food science, law, food safety, international development, veterinary medicine, or related disciplines. SA: ANR 811 Not open to students with credit in FSC 421.
Surveys the laws and regulations governing the manufacture, distribution and sale of food products in the United States. the regulation of foods and food additives, genetic modification of food, food safety and HACCP, civil and criminal liability for defective products, inspections, labeling, importation, exportation, and current issues of concern.

812 Food Laws and Regulations in the European Union
Fall, Spring. 3(3-0) RB: (FSC 810) or food science, law, food safety, international development or related disciplines.
Introduction to the European Union (EU), the role of case law, official controls, the European Food Safety Authority, food labeling, food additives, food fortification, genetically modified foods, organic foods, imports, food safety, inspections, enforcement and compliance, and the role of science in EU food law.

813 Food Laws and Regulations in Latin America
Fall. 3(3-0) RB: (FSC 810) or food science, law, food safety, international development or related disciplines.
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.

814 Food Laws and Regulations in Canada
Spring. 3(3-0) RB: (FSC 810) or food science, law, food safety, international development or related disciplines.

815 Food Laws and Regulations in Asia
Summer. 3(3-0) RB: Food science, law, food safety, international development or related disciplines.
Current issues that have shaped the regulation of food in Asia, regional characteristics and culture, basic food laws, agency responsibilities, product registration requirements, basic standards, food labeling, food safety, food additives, food import systems. Special emphasis will be given to the food regulations of Japan, China, Korea and Southeast Asia (ASEAN).

816 Codex Alimentarius - The Food Code
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.

817 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 policies and operations of the World Organization for Animal Health (OIE), regarding global animal health, animal welfare, world trade, and food safety.

818 Global Risk Regulation: Focus on Food Safety
Spring. 3(3-0) RB: Food science, law, food safety, animal science, veterinary medicine, international development, health, environment, or related disciplines.
Focuses on societies’ efforts to assess and manage food, health, safety and environmental risks, including selection of the risks deserving regulatory attention, scientific advice and decision-making situations of scientific uncertainty, the role of non-scientific values, calculating costs and benefits of regulation, and distributional and equity effects.

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
Spring of odd years. 3(3-0) RB: (BMB 401 and FSC 401) or permission.
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 540
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 8 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 masters 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 masters 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.