100 Decision-making in the Agri-Food System
Fall, Spring. 3(3-0) Interdepartmental with Agribusiness Management. Administered by Department of Agricultural Economics. SA: FSM 200

210 Professional Seminar in Food Industry Management
Spring. 1(1-0) P:M: (ABM 100 or concurrently or ABM 130 or concurrently) R: Open only to Food Industry Management majors.
Industry trends in food industry management. Verbal, written, and visual communication techniques applied to professional situations, including professional development and career planning.

220 Food Product Marketing
Fall. 3(3-0) P:M: (ABM 100 or concurrently) Structure of the food marketing system including food processors, manufacturers, retailers and food service. Impact of consumer behavior and buying patterns. International food product marketing. Strategic planning in food marketing.

222 Agribusiness and Food Industry Sales (W)
Fall, Spring. 3(3-0) Interdepartmental with Agribusiness Management. Administered by Department of Agricultural Economics. P:M: (ABM 100 or ABM 130 or EC 201 or EC 202) and completion of Tier I writing requirement. R: Open only to sophomores or juniors or seniors. SA: FSM 320
Selling processes and activities within agribusiness and food firms. Principles and techniques of sales. Operation of sales organizations.

335 Food Marketing Management
Spring. 3(3-0) Interdepartmental with Marketing and Supply Chain Management. P:M: (FIM 220 or MSC 335) SA: ML 335, MTA 335, FSM 335
Management decision-making in food industry organizations (processors, wholesalers, retailers). Marketing and sales in response to customer and consumer needs. Distribution and merchandising systems in domestic and international contexts.

337 Labor and Personnel Management in the Agri-Food System
Fall. 3(3-0) Interdepartmental with Agribusiness Management. Administered by Department of Agricultural Economics. P:M: (ABM 100 or ABM 130) R: Open only to juniors or seniors. SA: FSM 325
Human resource management principles for farms, agribusinesses and food firms: planning, recruiting, training, scheduling, motivating, supervising and evaluating. Labor regulations, compensation and records.
Food Science—FSC

275 Seafood Systems Management
Spring. 3(3-0) Interdepartmental with Fisheries and Wildlife; Animal Science. Administered by Department of 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.

320 Muscle Foods
Spring. 3(2-3) Interdepartmental with Animal Science. Administered by Department of Animal Science. P.M. (ANS 210 or FSC 211 or HNF 150)

Structure of muscle. Meat technology and merchandising concepts.

329 Fundamentals of Food Engineering
Spring. 3(3-0) Interdepartmental with Biosystems Engineering. Administered by Department of Agricultural Engineering. P.M.: (FSC 229) and (MTH 126 or LBS 118) and (PHY 231 or LBS 164) RB: (FSC 211) SA: FE 329

Unit operations in food industry: fluid mechanics, heat transfer, rate processes, refrigeration, freezing, and dehydration. Thermal process calculations.

339 Food Processing and Engineering Laboratory
Spring. 2(0-6) P.M.: (FSC 329 or concurrently) and completion of Tier I writing requirement. RB: (FSC 229)

Application of principles of material and energy balance, fluid flow, heat transfer, and water activity to the batch and continuous processing of raw product into high quality food.

342 Food Safety and Hazard Analysis Critical Control Point Program
Fall. 3(3-0) RB: (FSC 211 or concurrently or FSC 229 or concurrently or HNF 150 or concurrently or HNF 311 or concurrently) or a prior or concurrent basic course in microbiology, chemistry or biological sciences. SA: FSC 442

Sources of microbiological, chemical and physical hazards; minimizing microbial growth and survival; good manufacturing practices and sanitation practices; Hazard Analysis Critical Control Point Programs in food processing and foodservice.

401 Food Chemistry
Fall. 3(3-0) P.M.: (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.M.: (FSC 401 or concurrently) and completion of Tier I writing requirement. RB: (FSC 229)

Chemical changes in food constituents which affect stability of food products and properties such as color, flavor and texture.

407 Food and Animal Toxicology
Fall. 3(3-0) Interdepartmental with Animal Science. Administered by Department of Animal Science. P.M.: (BMB 200 and BMB 401 and FSL 250) R: Not open to freshmen or sophomores.


407L Toxicology Methods Laboratory
Fall. 2(0-4) Interdepartmental with Animal Science. Administered by Department of Animal Science. RB: (ANS 407 or concurrently) R: Not open to freshmen or sophomores.

Laboratory techniques for evaluating potential toxicity of chemicals to living systems. Field trip to industrial toxicology laboratory required.

417 Topics in Toxicology
Spring. 1(1-0) Interdepartmental with Animal Science. Administered by Department of Animal Science. RB: (ANS 407) R: Not open to freshmen or sophomores.

Selected topics including regulatory toxicology, risk assessment, environmental toxicology, food safety, and safe handling of toxic substances.

420 Quality Assurance
Fall. 2(2-0) P.M.: (STT 200 or STT 201 or STT 231 or STT 315 or STT 351) and (FSC 229 or concurrently or ANS 210 or concurrently or HRT 203 or concurrently or FSC 211 or concurrently) R: Open only to juniors or seniors or 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.M.: (HNF 150 or HNF 311 or FSC 211 or FSC 229 or FSC 437) R: Open only to seniors or graduate students.

Adoption, interpretation, and enforcement of laws and regulations governing food processing and foodservice systems. Impact of regulation on food production, availability, marketing, and safety.

430 Food Processing: Fruits and Vegetables
Spring. 3(3-0) P.M.: (FSC 211 or HNF 311 or FSC 229 or FSC 238 or FSC 437 or FSC 440) R: Open only to seniors or graduate students.

Fruit and vegetable composition and quality indices. Harvesting, technology in postharvest physiology, and preparatory systems. Principles and applications of thermal processing, freezing, and specialized techniques.

431 Food Processing: Cereals
Spring. 3(2-3) P.M.: (FSC 211 or FSC 229) R: Not open to freshmen or sophomores.


432 Food Processing: Dairy Foods
Spring. 3(2-3) P.M.: (FSC 211 or FSC 229 or ANS 210) R: Not open to freshmen or sophomores. SA: FSC 333

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(3-2) P.M.: (FSC 211 or FSC 229 or ANS 210) 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. Egg characteristics. Product formulation and quality control.

440 Food Microbiology
Spring. 3(3-0) Interdepartmental with Microbiology and Molecular Genetics. P.M.: (MMG 205 or MMG 301) and completion of Tier I writing requirement. R: Not open to freshmen or sophomores.

Major groups of microorganisms important to the food industry. Emphasis on ecological, physiological, and public health aspects.

441 Food Microbiology Laboratory
Spring. 2(0-4) Interdepartmental with Microbiology and Molecular Genetics. P.M.: (FSC 440 or concurrently) and completion of Tier I writing requirement. RB: (MMG 206 or MMG 302) 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.M.: (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 spectroscopy, fluorimetry, chromatography, electrophoresis, and proximate composition.

477 Food Engineering
Fall. 3(2-2) Interdepartmental with Biosystems Engineering. Administered by Department of Agricultural Engineering. P.M.: (BE 350 and BE 351 and CE 321) SA: FE 485

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 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to seniors or graduate students. Approval of department; application required.

Supervised professional experiences in agencies and businesses related to food science.
FOR-Forestry

Department of Forestry
College of Agriculture and Natural Resources

101 Michigan’s Forests
Spring, 3(0-3)
Ecological, social and economic roles of Michigan’s forests in historic and contemporary context. Geographic similarities and differences in forest resources.

201 Tenets of Forestry
Fall. 1(1-0) R: Open only to students in the Department of Forestry.
History, founding principles, and core concepts of forestry. Stewardship, conservation, professional ethics, and current forestry issues.

202 Introduction to Forestry
Fall, Spring. 3(0-3)
Historical development of forestry. Forest growth, protection, management, and products. Relationship of national and world economy and policy to forestry. Emphasis on multiple uses of forests.

204 Forest Vegetation
Fall. 4(3-3)
Nomenclature, classification, and identification of woody plants. Tree structure as it relates to growth and ecosystem dynamics.

206 Natural Resource Data Analysis
Spring. 3(2-2) RB: (CSE 101 or CSE 131) SA: FOR 207
Quantitative analysis of natural resource data. Modeling and display of biophysical and socioeconomic data related to natural resource systems.

210 Fundamentals of Soil and Landscape Science
Fall, Spring. 3(0-3) Interdepartmental with Crop and Soil Sciences. Administered by Department of Crop and Soil Sciences. RB: (CEM 141)

211 Introduction to Gender and Environmental Issues
Spring. 3(3-0) Interdepartmental with Fisheries and Wildlife; Environmental Economics and Policy; Resource Development; Women’s Studies. Administered by Department of Fisheries and Wildlife. R: Not open to freshmen. SA: PRM 211

220 Forests and the Global Environment
Fall. 3(3-0)
Relationships between forests, climatic and edaphic factors, and human influences upon forest resources. Deforestation, biodiversity, sustainable forest management and timber trade.

801 Chemistry of Food Lipids
Fall of odd years. 3(3-0) RB: (FSC 401 and BMB 461)
Composition and structure of lipids: physical and chemical properties in relation to their function in foods.

802 Food Proteins
Spring of even years. 3(3-0) RB: (BMB 461 and FSC 401)
Use of proteins and enzymes in the food industry. Functional properties of proteins and enzymes in food systems.

807 Advanced Food Toxicology
Fall of even years. 3(3-0) Interdepartmental with Animal Science; Human Nutrition and Foods. R: Approval of department.
Toxicology related to food safety. Metabolism of toxicants as influenced by food constituents, mutagenesis, and chemical carcinogenesis. Risk assessment.

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.

840 Advanced Food Microbiology
Spring of odd years. 3(3-0) RB: (FSC 440)

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.

850 Analytical Techniques in Food Science
Summer of odd years. 2(1-2) 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 years. 2(1-2) R: Open only to graduate students in Food Science, Human Nutrition, Animal Science, and Horticulture.
Theory, application, and evaluation of food processing technology: ultrafiltration, food irradiation, and critical point extraction.

890 Special Problems in Food Science
Fall, Spring. 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 Foods or Food Science or Human Nutrition.
Topics of current interest and importance in basic and applied areas of food science.

892 Food Science Seminar
Fall, Spring. 1(1-0) A student may earn a maximum of 4 credits in all enrollments for this course. R: Open only to graduate students in Food Science.
Critical review of literature. Organization and communication of scientific data in food science.

896 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.

897 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 M.S. students in Food Science.
Master’s thesis research.

898 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 Ph.D. students in Food Science.
Doctoral dissertation research.

900 Independent Study
Fall, Spring. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
Individual research and writing under faculty supervision.

901 Issues in Forensic Science
Fall, Spring. 2 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course.
Forensic science research, practice and legal processes.

902 Practicum
Fall, Spring. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
Observation, study, and work in selected forensic science agencies.

903 Special Problems in Forensic Science
Fall, Spring. 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 Forensic Science. Approval of department; application required.
Individual investigation of an area of forensic science.

904 Master’s Thesis Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
Planned research and writing directed by student’s thesis committee.