

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

Major groups of microorganisms of importance 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. P:NM: (MIC 206 or MIC 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.

**470 Integrated Approaches to Food Product Development**

Fall, Spring. 2(0-6) P:M: (FSC 402 or concurrently or FSC 441 or concurrently or FSC 455 or concurrently) and completion of Tier I writing requirement. P:NM: (FSC 339) R: Open only to seniors or graduate students.

Food product development including obtaining, screening, and selection of ideas. Integration of food processing, chemistry, analysis, and microbiology for the design, production, and evaluation of a food product.

**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 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.

**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.

**801 Chemistry of Food Lipids**  
Fall of odd years. 3(3-0) P:NM: (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) P:NM: (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) P:NM: (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.

**837 Food Rheology**  
Fall. 3 credits. Interdepartmental with Biosystems Engineering. Administered by Department of Agricultural Engineering.

Definition, analysis, and measurement of rheological properties to describe the steady shear, dynamic, viscoelastic, extensional, and solid behavior of biological materials. Industrial applications of rheological methods with emphasis on fluid and semi-solid foods.

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

Detection, characterization, identification, and enumeration of food-associated pathogens. Applications and regulation of food biotechnology.

**842 Foodborne Diseases**  
Spring of odd years. 3(3-0) P:NM: (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, 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 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.

**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 M.S. students in Food Science.

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 Ph.D. students in Food Science.

Doctoral dissertation research.

## FOOD SYSTEMS ECONOMICS AND MANAGEMENT FSM

### Department of Agricultural Economics College of Agriculture and Natural Resources

**335 Food Marketing Management**  
Spring. 3(3-0) Interdepartmental with Marketing and Supply Chain Management. Administered by Department of Marketing and Supply Chain Management. P:M: (FSM 200 or MSC 300) R: Open only to juniors or seniors. SA: ML 335, MTA 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.

**439 Food Business Analysis and Strategic Planning**  
Fall. 3(3-0) Interdepartmental with Marketing and Supply Chain Management. Administered by Department of Marketing and Supply Chain Management. P:M: (MSC 335 or FSM 335) and (STT 201 or STT 200 or STT 315) R: Open only to juniors or seniors. SA: ML 439, MTA 439

Principles and techniques of business analysis and strategic planning applied to food firms. Food trend forecasts, market potential, competition and cost analyses, business and strategic planning.