Food Science and Nutrition

Food Science and Nutrition
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Typical employment areas for graduates of the food science and nutrition program include quality assurance, quality control, product development, food processing, sensory science and flavor chemistry. The food science curriculum meets the accreditation standards established by the Institute of Food Technologists.

Faculty

Professor M. Lin**, A. Mustapha**
Associate Professor A. D. Clarke**, I. U. Gruen**, B. Vardhanabhuti**
Assistant Professor K. Krishnaswamy*, P. Somavat*, L. Channaiah*
Instructor R. Linhardt
Adjunct Associate Professor L. Occena-Po*
Adjunct Professor G. Zheng*
Adjunct Instructor M. Jones, K. Hagely

* Graduate Faculty Member - membership is required to teach graduate-level courses, chair master's thesis committees, and serve on doctoral examination and dissertation committees.
** Doctoral Faculty Member - membership is required to chair doctoral examination or dissertation committees. Graduate faculty membership is a prerequisite for Doctoral faculty membership.

Undergraduate

- BS in Food Science and Nutrition (https://catalog.missouri.edu/collegeofagriculturefoodandnaturalresources/foodsciencenutrition/bs-food-science-nutrition/)
- Minor in Food Science and Nutrition (https://catalog.missouri.edu/collegeofagriculturefoodandnaturalresources/foodsciencenutrition/minor-food-science-nutrition/)

The department offers the Bachelor of Science degree with a major in Food Science and Nutrition within four tracks, namely Food Science, Food Business, Enology and Culinary Sciences. A minor is available.

Note: Tracks do not appear on transcripts or diplomas.

Graduate

The Food and Hospitality Systems Graduate Program offers M.S. and Ph.D. graduate degrees under three track options: Food Science, Hospitality Management and Agricultural Systems Management. We also offer an online graduate certificate program in Food Safety and Defense. The catalog provides a complete list of these degree options (https://catalog.missouri.edu/degreesanddegreeprograms/).

F_S 1010: Introduction to Viticulture and Enology
This course will give a general overview of growing grapes (viticulture) and winemaking (enology) with an emphasis on Missouri wines and wineries. This course is the first course in a sequence of courses in the viticulture and enology track of the food science degree program.

Credit Hour: 1

F_S 1020: World Food and You
(same as PLNT_SCI 1020). Basic scientific principles in food processing, manufacturing, preservation, quality and safety as influenced by cultural, geographical and environmental factors. Students will be exposed to introductory food science concepts that relate to food crops and foods prepared, processed, preserved and eaten around the world.

Credit Hours: 3

F_S 1020H: World Food and You - Honors
Basic scientific principles in food processing, manufacturing, preservation, quality and safety as influenced by cultural, geographical and environmental factors. Students will be exposed to introductory food science concepts that relate to food crops and foods prepared, processed, preserved and eaten around the world.

Credit Hours: 3
Prerequisites: Honors eligibility required

F_S 1030: Food Science and Nutrition
Basic principles of science and technology as applied to the problem of providing safe, nutritious, and desirable food for man.

Credit Hours: 3

F_S 2131: Dairy Products Evaluation
(same as AN_SCI 2131). Sensory Evaluation and judging of dairy products.

Credit Hours: 2

F_S 2172: Elements of Food Microbiology
Introductory microbiology course stressing basic principles as related to foods.

Credit Hours: 3
Prerequisites: Sophomore standing. Restricted to Food Science Students during Early Registration

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F_S 2172H: Elements of Food Microbiology - Honors
Introductory microbiology course stressing basic principles as related to foods.

Credit Hours: 3
Prerequisites: Sophomore standing; honors eligibility required. Restricted to Food Science Students during Early Registration

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F_S 2195: Grapes and Wines of the World
(same as PLNT_SCI 2195). Explores the world of wine through study of viticultural principles and practices, wine styles, classifying wine, the winemaking process and New World and Old World wine regions. Learn wine tasting skills and experience wines from around the world. World wine consumption, social and physical health benefits of moderate wine consumption.

Credit Hours: 3

F_S 2199: Seminar in Professional Development
The course explores the concept of what it means to be a professional in the field of food science. The course includes aspects of what it means to be a professional, such as resume writing, interviewing, finding a job, and building one's career. A second major aspect of the course is to explore the field of food science to gain a better understanding of various potential career paths available to students in food science.

Credit Hour: 1

F_S 3190: Study Abroad: International Meat, Dairy and Enology
(same as AN_SCI 3190). This study abroad course introduces students to the meat, dairy and wine industries in Germany or in New Zealand (destinations are on a rotational basis). Students will visit small, medium and large-scale producers and learn about differences in comparison to the US industries. May be repeated once for credit. Prerequisites: instructor's consent

Credit Hours: 3

F_S 3190H: Study Abroad: International Meat, Dairy and Enology - Honors
This study abroad course introduces students to the meat, dairy and wine industries in Germany or in New Zealand (destinations are on a rotational basis). Students will visit small, medium and large-scale producers and learn about differences in comparison to the US industries. May be repeated once for credit. Enrollment is limited to Honors eligible students.

Credit Hours: 3
Prerequisites: instructor's consent

F_S 3210: Kitchen Chemistry
This course is targeted at current Food Science, Hospitality Management, Nutrition or Biochemistry students who wish to study the application of scientific principles to the practice of cooking. This on-line summer class assumes students have access to a working kitchen. Video cooking projects are submitted weekly. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: CHEM 1100 or higher

F_S 3214: Principles of Meat Science
(same as AN_SCI 3214). Study of the principles involved in the conversion of living animals to meat and by-products; efficient utilization of meat as a food.

Credit Hours: 3
Recommended: one course in Biological Sciences

F_S 3231: Principles of Dairy Foods Science
(same as AN_SCI 3231). Technology, chemistry and microbiology related to milk and its transformation into fluid milk products, fermented dairy foods and spreads. (2 hours of lecture and two hours of laboratory per week.)

Credit Hours: 3
Recommended: One course in Chemistry or Biological Sciences

F_S 3240: Principles of Viticulture I
(same as PLNT_SCI 3240). Grapevine growth, development, selection, propagation, training systems, pruning, and harvesting; vineyard site selection, design, and development. Graded on A-F basis only.

Credit Hours: 4
Prerequisites: F_S 1010 and one of the following, F_S 2195 or PLNT_SCI 2195 or SOIL 2100 or PLNT_SCI 2110 or PLNT_SCI 2125

F_S 3330: Fermentation for Food, Fuel and Beverages
(same as BIOL_EN 3330). Covers the underlying principles of fermentation and their applications as utilized to produce fermented food, fuel and alcoholic beverages. Discussion of microorganisms, their metabolism and physiology. Unit operations involved in manufacture of fermented dairy, vegetable, and meat products; biofuel production from corn; production of beer, wines and distilled spirits; introduction to biorefineries. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: MATH 1100 and CHEM 1400 and CHEM 1401

F_S 3385: Problems in Food Science
Supervised study in a specialized phase of food science and nutrition.

Credit Hour: 1-99

F_S 4050: Zero Hunger Challenge
(same as BIOL_EN 4050; cross-leveled with BIOL_EN 7050, F_S 7050). Students from multidisciplinary background are formed into teams to address food and nutrition security. Students will learn about Sustainable Development Goal (SDG) 2: Zero Hunger, importance of partnership for the goals (SDG-17) to address grand global challenges. Transdisciplinary student teams will develop a proposal at the end of the course and are encouraged to participate in challenge competitions.

Credit Hours: 3

F_S 4050H: Zero Hunger Challenge - Honors
(same as BIOL_EN 4050H; cross-leveled with BIOL_EN 7050, F_S 7050). Students from multidisciplinary background are formed into teams to address food and nutrition security. Students will learn about Sustainable Development Goal (SDG) 2: Zero Hunger, importance of partnership for the goals (SDG-17) to address grand global challenges. Transdisciplinary student teams will develop a proposal at the end of the course and are encouraged to participate in challenge competitions.

Credit Hours: 3
Prerequisites: Honors eligibility required

F_S 4160: Food Process Engineering
(same as BIOL_EN 4160, CH_ENG 4160; cross-leveled with BIOL_EN 7160, CH_ENG 7160, F_S 7160). This course introduces underlying engineering principles in food processing, and unit operations in food industries. Topics include fluid flow, heat transfer in food processing, preservation process, dehydration, refrigeration, food freezing, psychrometrics, emerging technologies, food packaging, and sustainability. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: PHYSCS 1210, AG_S_TCH 1040 or Consent of Instructor

F_S 4199: Food Industry Senior Seminar
The course explores the structure and the various branches of the food industry. Emphasis is placed on industry trends and the manufacture of specific selected food products and their ingredients. Graded on A-F basis only.

Credit Hour: 1
Prerequisites: F_S 1030 or equivalent, F_S 2199 or equivalent; junior or senior standing

F_S 4301: Topics in Food Science
(cross-leveled with F_S 7301). Instruction in specific subject matter areas in the field of food science and nutrition.

Credit Hour: 1-99

F_S 4310: Food Chemistry and Analysis
(cross-leveled with F_S 7310). Structure, composition and chemical properties of food.

Credit Hours: 3
Recommended: 5 hours Chemistry or Biochemistry

F_S 4311: Investigation of Food Properties
(cross-leveled with F_S 7311). Study of the chemical and physical properties of foods and the interaction of food components.

Credit Hours: 3
Recommended: F_S 4310 or equivalent, or instructor's consent

F_S 4315: Food Chemistry and Analysis Laboratory
(cross-leveled with F_S 7315). The quantitative determination of the constituents of food.

Credit Hours: 3

F_S 4315W: Food Chemistry and Analysis Laboratory - Writing Intensive
(cross-leveled with F_S 7315). The quantitative determination of the constituents of food.

Credit Hours: 3

F_S 4330: Principles of Food Processing
(cross-leveled with F_S 7330, AG_S_TCH 7330). Introduction to basic engineering concepts used to process raw materials. Principle topics include energy, material balance, fluid flow, heat transfer, refrigeration and freezing, and preservation.

Credit Hours: 3
Prerequisites: MATH 1100 and AG_S_TCH 1040 or PHYSCS 1210

F_S 4331: Technology of Dairy Products and Ingredients
(cross-leveled with F_S 7331). Technology, chemistry, and nutrition of dairy foods as well as functional properties of dairy ingredients.

Credit Hours: 3
Prerequisites: F_S 3231 or equivalent
Recommended: one Chemistry course

F_S 4340: Principles of Viticulture II
(same as PLNT_SCI 4340). Environmental and biological factors influencing vine physiology and winegrape quality. Irrigation, canopy management, pest and disease control, budgets and current trends in viticulture. Graded on A-F basis only.

Credit Hours: 4
Prerequisites: F_S 3240 or PLNT_SCI 3240

F_S 4344: Processing Muscle Foods
(same as AN_SCI 4344; cross-leveled with F_S 7344, AN_SCI 7344). Materials and technologies for the manufacture of muscle food products from red meats, poultry and seafood. Experience problem-solving through further processing of complex ingredients and develop skills by practicing operations in a pilot plant facility.

Credit Hours: 3
Recommended: One Chemistry course

F_S 4345: Principles of Viticulture and Winemaking
(same as PLNT_SCI 4345; cross-leveled with PLNT_SCI 7345, F_S 7345). This course will cover the basics needed by viticulturists and winemakers to understand grape vine growth and vineyard considerations along with winemaking principles. Viticultural topics will include grapevine growth and development, vineyard design and development, cultivar selection, grapevine propagation, training systems, and harvest and pruning. Winemaking topics will include sensory analysis of grapes, chemical, microbiological and technological aspects of winemaking, and the analytical methods used for juice and wine analysis. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: BIO_SC 1010 and BIO_SC 1020 or BIO_SC 1030 or BIO_SC 1200 or BIO_SC 1500

F_S 4354: Physiology and Biochemistry of Muscle as Food
(same as AN_SCI 4354; cross-leveled with F_S 7354, AN_SCI 7354). Basic concepts in muscle growth and development of livestock evaluating the effects of environment, welfare, nutrition and genetics regarding muscle metabolism, physiology, and the ultimate condition of muscle as food.

Credit Hours: 3
Prerequisites: AN_SCI 3254 or MPP 3202 or BIO_SC 3700; AN_SCI 2001 or AN_SCI 2214 or AN_SCI 2114 or AN_SCI 3214 or F_S 3214 or AN_SCI 3231 or F_S 3231
Recommended: Any Biochemistry or Organic Chemistry course

F_S 4370: Food Microbiology
(cross-leveled with F_S 7370). Study of bacteria, yeast and molds. Includes dominant flora, public health significance, characterization of organisms, examination of foods representative of major food groups, spoilage, preservation, food fermentations and physiological groups.

Credit Hours: 3
Prerequisites: F_S 2172
Recommended: one Biochemistry course

F_S 4375: Food Microbiology Laboratory
(cross-leveled with F_S 7375). Examination of foods for microorganisms and characterization of major species.

Credit Hours: 2
Prerequisites or Corequisites: F_S 4370

F_S 4380: Sensory Analysis of Food and Beverages
(cross-leveled with F_S 7380). Methodological principles of the sensory analysis of food and beverages.

Credit Hours: 3
Prerequisites: F_S 1030; junior or senior standing
Recommended: one statistics course

F_S 4385: Problems in Food Science
Advanced problems in a selected field of food science and nutrition.

Credit Hour: 1-99

F_S 4390: Optimization and Management of Food and Agricultural Systems
(same as AG_S_TCH 4390; cross-leveled with F_S 7390, AG_S_TCH 7390, HSP_MGMT 7390). This course is designed to introduce the student to the concept of layers and interacting systems within an operation and the analytical methods of modeling and simulation to make effective management decisions for optimal system design and function.

Credit Hours: 3
Prerequisites: MATH 1100 or higher
Recommended: AG_S_TCH 1040

F_S 4440: Principles of Winemaking and Wine Chemical Analysis
(cross-leveled with F_S 7440). The theoretical and practical basics needed by enologists/winemakers including sensory analysis of grapes; chemical, microbiological and technological aspects of winemaking; and the analytical methods used for juice and wine analysis. Graded on A-F basis only.

Credit Hours: 4
Recommended: 5 credit hours inorganic chemistry and organic chemistry or concurrent, or instructors consent

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F_S 4441: Cellar Operations and Special Vinifications
(cross-leveled with F_S 7441). The theoretical and practical basics needed by winemakers to supervise the operations of the winemaking, wine stabilization and packaging equipment. The theoretical and practical basics needed by winemakers to make special wines including rose, dessert, carbonic maceration, and sparkling wines. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: F_S 4440
Recommended: 5 credit hours inorganic chemistry and organic chemistry or instructor's consent

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F_S 4941: Internship in Food Science
Combines study, observation and employment in an area of food science and nutrition. Written reports, faculty evaluation.

Credit Hour: 1-6
Prerequisites: instructor's consent
Recommended: one Food Science course

F_S 4945: Experiential Learning in Industry Internship in Food Science
Learning experience combining observation, application, and reflection in a discipline-based industry internship. Course appears on transcript for zero credit and does not count toward full-time enrollment. No tuition or fees are charged. Graded on S/U basis only.

Credit Hours: 0
Prerequisites: instructor's consent

F_S 4970: Food Product Development
(cross-leveled with F_S 7970). Capstone course integrating the various disciplines of food science to create new food products.

Credit Hours: 3
Prerequisites: Junior or Senior standing, or instructor's consent. ENGLSH 1000 required if course is taught Writing Intensive
Recommended: 9 credit hours of Food Science

F_S 4970W: Food Product Development - Writing Intensive
(cross-leveled with F_S 7970). Capstone course integrating the various disciplines of food science to create new food products.

Credit Hours: 3
Prerequisites: Junior or Senior standing, or instructor's consent. ENGLSH 1000 required if course is taught Writing Intensive
Recommended: 9 credit hours of Food Science

F_S 4980: Food Quality Assurance
(cross-leveled with F_S 7360). Capstone course integrating various food science disciplines to comply with regulations concerned with protection of the nation's food supply. Applies practices to insure consumers of healthful foods.

Credit Hours: 3
Prerequisites: Junior or Senior standing or instructor's consent
Recommended: 9 credit hours of food science

F_S 7050: Zero Hunger Challenge
(same as BIOL_EN 7050; cross-leveled with F_S 4050, BIOL_EN 4050). Students from multidisciplinary background are formed into teams to address food and nutrition security. Students will learn about Sustainable Development Goal (SDG) 2: Zero Hunger, importance of partnership for the goals (SDG-17) to address grand global challenges. Transdisciplinary student teams will develop a proposal at the end of the course and are encouraged to participate in challenge competitions.

Credit Hours: 3

F_S 7160: Food Process Engineering
(same as BIOL_EN 7160, CH_ENG 7160; cross-leveled with F_S 4160, BIOL_EN 4160, CH_ENG 4160). This course introduces underlying engineering principles in food processing, and unit operations in food industries. Topics include fluid flow, heat transfer in food processing, preservation process, dehydration, refrigeration, food freezing, psychrometrics, emerging technologies, food packaging, and sustainability. Graded on A-F basis only.

Credit Hours: 3

F_S 7301: Topics in Food Science
(cross-leveled with F_S 4301). Instruction in specific subject matter areas in the field of food science. Graded on A-F basis only.

Credit Hour: 1-5

F_S 7310: Food Chemistry and Analysis
(cross-leveled with F_S 4310). Structure, composition and chemical properties of food.

Credit Hours: 3
Prerequisites: 5 hours Chemistry or Biochemistry

F_S 7311: Investigation of Food Properties
(cross-leveled with F_S 4311). Study of the chemical and physical properties of foods and the interaction of food components. Lecture.

Credit Hours: 3

Prerequisites: F_S 4310 or F_S 7310 or equivalent, or instructor's consent

F_S 7315: Food Chemistry and Analysis Laboratory
(cross-leveled with F_S 4315). The quantitative determination of the constituents of food.

Credit Hours: 3
Prerequisites: F_S 4310 or concurrent enrollment

F_S 7330: Principles of Food Processing
(same as AG_S_TCH 7330; cross-leveled with F_S 4330). Basic principles of food processing, with emphasis on blanching, pasteurization, commercial sterilization, refrigeration, freezing, concentration, dehydration and packing. Impacts of processing on product quality are evaluated.

Credit Hours: 3

F_S 7331: Technology of Dairy Products and Ingredients
(cross-leveled with F_S 4331). Technology, chemistry, and nutrition of dairy foods as well as functional properties of dairy ingredients.

Credit Hours: 3
Prerequisites: one Chemistry course and F_S 3231 or equivalent

F_S 7344: Processing Muscle Foods
(same as AN_SCI 7344; cross-leveled with F_S 4344, AN_SCI 4344). Materials and technologies for the manufacture of muscle food products from red meats, poultry and seafood. Experience problem-solving through further processing of complex ingredients and develop skills by practicing operations in a pilot plant facility.

Credit Hours: 3
Prerequisites: one Chemistry course

F_S 7345: Principles of Viticulture and Winemaking
(same as PLNT_SCI 7345; cross-leveled with PLNT_SCI 4345, F_S 4345). This course will cover the basics needed by viticulturists and winemakers to understand grape vine growth and vineyard considerations along with winemaking principles. Viticultural topics will include grapevine growth and development, vineyard design and development, cultivar selection, grapevine propagation, training systems, and harvest and pruning. Winemaking topics will include sensory analysis of grapes, chemical, microbiological and technological aspects of winemaking, and the analytical methods used for juice and wine analysis. Graded on A-F basis only.

Credit Hours: 3

F_S 7350: Microbiology of Fermented Foods
Physiology, biochemistry, and genetics of microorganisms important in food fermentations. How microorganisms are used in fermentations and how raw materials are converted into finished fermented foods and beverages. Graded on A-F basis only.

Credit Hours: 2

F_S 7351: Food Laws and Regulations
Policy, law and regulation development related to food. Introduction to major US regulatory agencies impacting food law and discussion on major food safety and food labeling laws and regulations. Graded on A-F basis only.

Credit Hours: 2

F_S 7354: Physiology and Biochemistry of Muscle as Food
(same as AN_SCI 7354; cross-leveled with F_S 4354, AN_SCI 4354). Basic concepts in muscle growth and development of livestock evaluating the effects of environment, welfare, nutrition and genetics regarding muscle metabolism, physiology, and the ultimate condition of muscle as food.

Credit Hours: 3
Prerequisites: AN_SCI 3254 or MPP 3202 or BIO_SC 3700; AN_SCI 2001 or AN_SCI 2214 or AN_SCI 3214 or F_S 3214 or AN_SCI 3231 or F_S 3231
Recommended: Any Biochemistry or Organic Chemistry course

F_S 7360: Food Quality Assurance
(cross-leveled with F_S 4980). Capstone course integrating various food science disciplines to comply with regulations concerned with protection of the nation's food supply. Applies practices to insure consumers of healthful foods.

Credit Hours: 3

F_S 7370: Food Microbiology
(cross-leveled with F_S 4370). Study of bacteria, yeast and molds. Includes dominant flora, public health significance, characterization of organisms, examination of foods representative of major food groups, spoilage, preservation, food fermentations and physiological groups.

Credit Hours: 3
Prerequisites: F_S 2172 and one Biochemistry course or concurrent enrollment

F_S 7375: Food Microbiology Laboratory
(cross-leveled with F_S 4375). Examination of foods for microorganisms and characterization of major species.

Credit Hours: 2
Prerequisites: F_S 4370 or concurrent enrollment

F_S 7380: Sensory Analysis of Food and Beverages
(cross-leveled with F_S 4380). Methodological principles of the sensory analysis of food and beverages.

Credit Hours: 3
Prerequisites: F_S 1030; junior or senior standing
Recommended: one statistics course

F_S 7390: Optimization and Management of Food and Agriculture Systems
(same as AG_S_TCH 7390, HSP_MGMT 7390; cross-leveled with F_S 4390, AG_S_TCH 4390). This course is designed to introduce the student to the concept of layers and interacting systems within an operation and the analytical methods of modeling and simulation to make effective management decisions for optimal system design and function.

Credit Hours: 3
Prerequisites: MATH 1100 or higher
Recommended: AG_S_TCH 1040

F_S 7440: Principles of Winemaking and Wine Chemical Analysis
(cross-leveled with F_S 4440). The theoretical and practical basics needed by enologist/winemakers including sensory analysis of grapes; chemical, microbiological and technological aspects of winemaking; and the analytical methods used for juice and wine analysis. Graded on A-F basis only.

Credit Hours: 4
Prerequisites: 5 hours inorganic chemistry and organic chemistry or concurrent, or instructor's consent

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F_S 7441: Cellar Operations and Special Vinifications
(cross-leveled with F_S 4441). The theoretical and practical basics needed by winemakers to supervise the operations of the winemaking, wine stabilization and packaging equipment. The theoretical and practical basics needed by winemakers to make special wines including rose, dessert, carbonic maceration, and sparkling wines. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: 5 credit hours inorganic chemistry and organic chemistry and F_S 4440 or instructor's consent

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F_S 7941: Internship in Food Science
Combines study, observation and employment in an area of food science and nutrition. Written reports, faculty evaluation.

Credit Hour: 1-6
Prerequisites: One Food Science course and instructor's consent

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F_S 7970: Food Product Development
(cross-leveled with F_S 4970). Capstone course integrating the various disciplines of food science to create new food products.

Credit Hours: 3
Prerequisites: ENGLSH 1000, and instructor's consent

F_S 8085: Problems in Food Science
Individual studies include a minor research problems.

Credit Hour: 1-99
Prerequisites: Restricted to Food Science MS Students only

F_S 8087: Seminar in Food Science
Provides students with opportunities for development in depth of advanced aspects of food science through reviews of research in progress and of current scientific publications.

Credit Hour: 1
Prerequisites: Masters standing

F_S 8090: Research in Food Science
Original investigations, usually in connection with one of the research projects of Agricultural Experiment Station. Written report required. Graded on S/U basis only.

Credit Hour: 1-99

F_S 8301: Ethnic Foods: Food Safety, Food Protection and Defense Challenges
An overview of the safety concerns and risks associated with ethnic and imported ethnic foods. Graded on A-F basis only.

Credit Hours: 2

F_S 8302: Food Protection and Defense-Essential Concepts
This course presents foundational concepts relevant to protecting the food supply from intentional contamination. Graded on A-F basis only.

Credit Hours: 2

F_S 8303: A Multidisciplinary Overview of Food Safety and Security
This course provides students with an understanding of a host of multidisciplinary aspects of food safety, particularly in the context of public health. Graded on A-F basis only.

Credit Hours: 2

F_S 8304: HACCP
This course focuses on procedures and processes which can affect the overall microbiological safety of food and the Hazard Analysis Critical Control Point (HACCP) system. Graded on A-F basis only.

Credit Hours: 2

F_S 8401: Topics in Food Science
Specialized topics in the area of food science and nutrition.

Credit Hour: 1-99
Prerequisites: instructor's consent

F_S 8402: Research Methods in Food Science
(same as BIOL_EN 8402). Introduction to research. Defining research problems, developing hypotheses, searching scientific literature, designing experiments, presenting data, writing scientific papers and theses, making oral presentations.

Credit Hours: 2

F_S 8404: Advanced Food Microbiology and Biotechnology
Covers basic principles in biotechnology and applied food microbiology, including current topics of interest in food biotechnology. May be repeated for credit. Graded on A-F basis only.

Credit Hours: 2

F_S 8405: Advanced Food Microbiology and Biotechnology
Advanced applied food microbiology and microbial physiology, and basic principles in biotechnology and genetic engineering, including current topics of interest and case studies in food biotechnology.

Credit Hours: 3
Prerequisites: F_S 4370 or equivalent or instructor's permission

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F_S 8406: Foodborne Toxicants
This course covers human risks from foodborne toxicants, remediation and detoxification strategies for key foodborne toxicants and major modes of toxicity of key foodborne toxicants. Principles of food toxicology will be applied to optimize hazard analysis within HACCP for the prevention of foodborne toxicities. Graded on A-F basis only.

Credit Hours: 2

F_S 8408: Risk Assessment for Food, Agriculture and Veterinary Medicine
Risk assessment principles as applied to biological systems. Exposure and effects characterization in human and animal health and ecological risk assessment. Risk analysis frameworks and regulatory decision-making. Introduction to quantitative methods for risk assessment using epidemiological and distributional analysis. Uncertainty analysis. Graded on A-F basis only.

Credit Hours: 2

F_S 8410: Food Chemistry II
Study of chemical content of food, emphasizing aspects that exist uniquely in food.

Credit Hours: 4
Prerequisites: F_S 4310 or equivalent

F_S 8414: Meat Quality
(same as AN_SCI 8414). Discussion of factors affecting meat quality in beef, pork, lamb and poultry. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: F_S 3214 or equivalent

F_S 8424: Meat Investigations
(same as AN_SCI 8424). Discussion of literature, special reports, assigned readings, techniques, interpretation of results.

Credit Hours: 3
Prerequisites: F_S 4344 and F_S 4310 or equivalent

F_S 8440: Functional Foods and Nutraceuticals
Principles and challenges involved in developing foods with health benefits beyond basic nutrition; efficacy, safety, regulatory and marketing aspects of functional foods and nutraceutical; current controversies and evidence of therapeutic properties of functional foods and Dietary supplements. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: BIOCHM 3630 or equivalent and F_S 4310 or equivalent, or instructor's consent

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F_S 8460: Food Biopolymers
Study of physical, chemical, and functional properties of food biopolymers and their applications in food and other industries. Graded on A-F basis only.

Credit Hours: 3
Recommended: Organic chemistry and food chemistry

F_S 8470: Advanced Food Technology
To understand the physical and chemical changes that occur during the processing and storage of food; study the quality and safety issues of foods and learn traditional and recent advances in food science and technology.

Credit Hours: 3
Prerequisites: F_S 4310, or equivalent or instructor's consent

F_S 9085: Problems in Food Science
Individual studies includes minor research problems.

Credit Hour: 1-99
Prerequisites: Food Science PhD students

F_S 9087: Seminar in Food Science
Provides students with opportunities for development in depth of advanced aspects of food science through reviews of research in progress and of current scientific publications. Prerequisites: PhD standing

Credit Hour: 1

F_S 9090: Research in Foods Science
Original investigation of advanced nature, leading to dissertation. Graded on a S/U basis only.

Credit Hour: 1-99

F_S 9402: Advanced Research Methods in Food and Hospitality Systems
This course provides doctoral students with introduction and review of research methods available for use in the study of food science, hospitality management and agricultural system management. Hence, the emphasis of this course is on empirical studies in the field, and will examine research conducted by scholars in the academic area. This course assists as baseline preparation for graduate students' continuing work in the graduate program. Specifically, the course provides students with knowledge and research experience in regard to 1) research fundamentals and backgrounds, 2) types of research, and 3) data analysis.

Credit Hours: 3
Prerequisites: Introductory research method course or statistics course; instructor's consent required