Food Science and Nutrition

College of Agricultural Sciences and Technology

Department of Food Science and Nutrition
Sandra Witte, *Chair*
Christine Takahashi, *Administrative Support Coordinator*
Family and Food Sciences Building, Room 119, M/S FF17
(559) 278-2164
http://cast.csufresno.edu/fsn/

B.S. in Food and Nutritional Sciences
Options:
- Dietetics and Food Administration
- Enology — Wine Production
- Food Science

M.S. in Food and Nutritional Sciences

Minor in Food and Nutritional Sciences

Certificate of Advanced Study in Dietetics (Dietetic Internship)

Food Science and Nutrition

Join the leader in science, technology, and management. Students majoring within the Department of Food Science and Nutrition are prepared for a wide range of professions in the food industry — the largest single industry in the United States. California State University, Fresno is centered in the greatest food production and processing area in the world.

Some of the largest and best dairy and food companies cooperate with the university to provide students with a view of commercial realities in this industry. There is strong demand for dietitians and nutritionists by the health care and food service industries.

Instructional Facilities

The department facilities include the Dairy Processing Plant, Food Processing Research Laboratory, the Food Preparation and Product Development Laboratories, Food Science Analytical Laboratory, Food Sensory Laboratory, Dried Fruit Technology Laboratory, and the Computer Laboratory. These facilities are used by students and faculty to provide a practical education founded on science and technology.

Career Opportunities

Graduates of the Department of Food Science and Nutrition have enjoyed outstanding employment opportunities in the food industry. Historically, graduates have been placed in challenging positions with salary advancement and professional prestige envied by other industries throughout the world. The following options are available:

Dietetics and Food Administration. Graduates are prepared for challenging and rewarding employment in dietetics, nutrition, and food service. Employment is available in hospital dietetics, nutrition consulting, school and community nutrition, education, commercial and institutional food services.

This program is developmentally accredited by the Commission on Accreditation for Dietetics Education of the American Dietetic Association. The American Dietetic Association can be reached at 216 W. Jackson Bvd., Chicago, IL 60606-6995 or at (312) 899-4876. By completing the requirements for this option, students meet the American Dietetic Association didactic requirements for dietetic registration and are eligible to apply to a dietetic internship. To become a registered dietitian, graduates of this program must also complete a dietetic internship and pass the dietetic registration examination.

Enology. For information about the Enology program, see the *Department of Viticulture and Enology*, page 142. Requirements for the Bachelors of Science degree, Enology — Wine Production Option begin on page 123.

Food Science. Graduates are prepared for an endless variety of employment opportunities in the food industry, including laboratory, processing, production, and governmental roles. New product development, marketing, management, distribution, and field service opportunities are present in many scientific, technological, and business endeavors.

Faculty

The faculty members continue to be recognized for quality hands-on education as well as scholarly contributions to their academic disciplines. Each student is assigned to a faculty adviser to maximize the student's educational experience at California State University, Fresno. The faculty are noted for cooperation and activity within each industry to prepare and place graduates in their chosen career.

Sandra Witte, *Chair*

Coordinators:
Erin S. Dormedy, *Food Science Program*
Mollie Smith, *Internship Director*
Sandra Witte, *Dietetics and Food Administration Program and Graduate Program*

Joo I. Kim, *Stoller Distinguished Professor*
Dennis Ferris

Bachelor of Science Degree Requirements

Food and Nutritional Sciences Major — *Units*

Major 45

Options (select one) ..... (45)

Dietetics and Food Administration: FSC 1, 50, 150, 152; FSM 131, 133, 134; NUTR 54, 149, 153, 156, 157, 160, 166

Enology — Wine Production: ENOL 15, 45, 125, 135, 151, 163, 164, 166, 175; FSC 1, 110, 145, 178; select one of the following: FSC 50, 100, 115, 120, 144, 150; NUTR 54; plus 1-2 unit of restricted elective selected in consultation with adviser

Food Science: FSC 1, 41, 100, 112, 115, 120, 125, 141, 142, 144, 145, 178, 199; NUTR 54; plus 3 units of restricted electives selected in consultation with adviser

Additional requirements 32-37

Dietetics and Food Administration ..... (32)
ACCT 4A; CHEM 3A, 8, 150; MICRO 20; PHYAN 65; PSYCH 10, 174; approved statistics course

Enology — Wine Production ..... (36-37)
BOT 10; CHEM 1A; CHEM 1B or 105; CHEM 8, 150; I T 52; MICRO 140; PHYS 2A; VIT 101, 102

Food Science ..... (32-33)
CHEM 1A, 1B, 8, 150; MATH 11; MATH 71, 72 or MATH 70*, 75** or MATH 75, 76; MICRO 20; PHYS 2A

General Education 51
(Includes 12 upper-division units, to be taken no sooner than the term in which 60 units of coursework are completed.)

Electives and remaining degree requirements 1-6
(See *Degree Requirements*); may be used toward a dual major or minor

Total requirements 128

* MATH 70 cannot be taken after MATH 75.
** MATH 75 recommended for Food Science Option.

Advising Notes

1. Students should contact the program coordinator to schedule an academic advising appointment. Since many courses are sequential in nature, it is important for new, transfer, or returning students to contact the program coordinator one semester prior to intended enrollment.
2. The total units reflect that each of the following required courses also satisfies 3 units of the General Education requirements, as follows: MATH 75 in Foundation B4; CHEM 1A or 3A or PHYS 2A in Breadth B1; BOT 10 in Breadth B2; and PSYCH 10 in Breadth D3. Consult your major adviser for details.
3. *CR/NC* grading is not permitted for courses included in the major and additional requirements, except work experience (ENOL 193, 194; FSC 193; FSM 193; and NUTR 193).
4. Grade Policy — all courses listed under major and additional requirements require a grade of *C* or better.
5. General Education courses designated as required by the department are prerequisite to many courses in the program of study.
6. The upper-division writing skills requirement can be met by passing the university upper-division writing examination or by taking an approved upper-division writing skills course. One unit of credit (in ENGL 100W) may be earned for passing the examination if requested by the student; by obtaining a letter grade of *C* or higher in an approved course (e.g., PLANT 110W) the student meets the university writing skills requirement.
7. One semester prior to graduation make an appointment with your academic adviser to prepare and file an official Certification of Major requirement form.

Food and Nutritional Sciences Minor

The Minor in Food and Nutritional Sciences consists of 21 units, of which 9 must be upper-division. All courses must be selected in consultation with the department chair. The minor program must be certified by the department chair. The certified minor program will be filed with the Office of Evaluations.

Note: The Food and Nutritional Sciences Minor also requires a 2.0 GPA and 6 upper-division units in residence.

Graduate Programs

The Master of Science in Food and Nutritional Sciences is a 30-unit degree program designed to provide the student with professional competence in the technology and science of food and nutrition-related disciplines: enology, food science, and nutrition.

Full-time graduate students may earn the degree within two years when working closely with an adviser. To accommodate part-time students, graduate courses are offered in the late afternoon or evenings.

Admission Materials. To be considered for admission to the graduate program, the candidate must submit the following materials: evidence of a baccalaureate degree in food science, nutrition, agricultural chemistry, or a related area from an accredited institution; official transcripts of all college work; official scores from the Graduate Record Examination Aptitude Test (GRE); a university application; three letters of reference from employers or faculty at the university most recently attended; and a statement of 500 words or less indicating reasons for pursuing a master's degree.

Admission Criteria. Candidates for admission will be evaluated using the following criteria: undergraduate coursework; grade point average of 3.0 or better (last 60 semester units); GRE scores (480V/580Q are equivalent to the 50th percentile), 500-word or less statement of professional goals; and letters of reference. Students lacking in any area with compensating strengths in other areas are encouraged to apply. Admission by the university does not imply acceptance in the Master of Science in Food and Nutritional Sciences program. Applicants whose preparatory education was in a language other than English must

earn a minimum TOEFL score of 550 and a minimum score of 4 on the Test of Written English (TWE).

Classified standing will be granted to students who meet all of the admission criteria.

Conditional classified standing may be granted to applicants with a 2.75 to 2.99 GPA (last 60 semester units) and/or those required to complete prerequisite coursework. Prerequisite coursework is not included in the 30-unit master's program. Students must request classified standing in the program by the semester in which a minimum of 10 units to be used toward the degree are completed.

Master of Science Program

Food and Nutritional Sciences

Mission. The Master of Science in Food and Nutritional Sciences at California State University, Fresno provides for development of advanced level knowledge, development of research abilities, and the mentoring of future leaders.

Outcomes. The program graduates will be able to (a) use knowledge and critical thinking skills to identify innovative solutions to problems, (b) communicate research findings through professional presentations and publications, (c) advance their careers, and (d) take an active role in their profession.

This program provides a graduate-level proficiency in enology, food science, or nutrition. The degree is applicable to specializations in food research, production, processing, chemistry, and microbiology; wine production and marketing; and dietetics, nutrition, nutrition education, and food service systems management.

Prerequisite Courses. The Master of Science in Food and Nutritional Sciences assumes preparation equivalent to a California State University, Fresno undergraduate major in food science, dairy science, enology, nutrition, dietetics and food administration, agricultural chemistry, or related areas.

Students with undergraduate degrees in other fields or from other institutions who need to make up course deficiencies should consult with the graduate coordinator. The following specific prerequisite foundation courses, or their equivalents, are required:

Agricultural Chemistry: ENOL 125, 164, and 166; FSC 110.

Food Science: FSC 110 or 112, 115, 125, 141, 144; NUTR 54

Nutrition/Dietetics: Completion of an ADA-accredited didactic program in dietetics as evidenced by a signed verification statement.

Program Requirements

All students must complete a 12-unit common core. Under the direction of the graduate adviser, students may focus a program in a specialized area to meet their career goals. This is accomplished by the selection of a minimum of 12 units of electives. A 6-unit thesis completes the program of study. A minimum of 21 units must be taken at the 200 level.

	Units
Core	
FN 200	**3**
200-level statistics course (See *Graduate Advising Notes*.)	**3**
FN 223	**3**
FN 229	**1+1+1**
Approved Electives	
200- or 100-level courses appropriate to individually designed program; must be approved by adviser prior to enrollment	**12**
Culminating Experience	
FN 299	**6**
Total minimum	**30**

Advising Notes for M.S. in Food and Nutritional Sciences

1. Several of the 200-level and approved elective courses have prerequisites other than courses listed as admission requirements.
2. The statistics requirement may be met with any adviser approved 200-level statistics course offered by the university.
3. Students should request specific information concerning the master of science degree and the program advising sheet from the department office.
4. Upon admission, students should see the department graduate program coordinator for assistance in selection of a graduate adviser.
5. To progress through the graduate program, the student must:
   a. Maintain a minimum of 3.0 GPA
   b. Complete all prerequisite coursework
   c. Attain classified standing
   d. Meet the graduate writing proficiency requirement
   e. File for advancement to candidacy
   f. Complete the program requirements
   g. File a master thesis committee assignment form
   h. Formally present and defend the thesis results
6. Students are required to receive a ***B*** or higher in FN 200 to meet the graduate writing proficiency requirement.
7. Advancement to candidacy requires the completion of 9 program units in residence, a minimum GPA of 3.0, meeting the graduate writing proficiency requirement, and filing a petition for advancement to candidacy a minimum of one semester prior to enrollment in thesis and within the deadline.
8. Students may apply a maximum of 3 units of FN 290 and/or 292 to their program.
9. See *Division of Graduate Studies* in this catalog for university requirements.

Certificate of Advanced Study in Dietetics (Dietetic Internship)

The Certificate of Advanced Study in Dietetics is a postbaccalaureate professional program that meets the requirements for supervised practice experience for entry-level generalist dietitians. The Commission on Accreditation for Dietetics Education of the American Dietetic Association has granted developmental accreditation to the program as a dietetic internship. The American Dietetic Association can be reached at 216 W. Jackson Blvd., Chicago, IL 60606-6995 or at (312)899-4876. Students completing the program will be eligible to take the dietetic registration exam administered by the Commission on Dietetic Registration of the American Dietetic Association.

Admission Requirements. Candidates for admission will be evaluated using the following criteria: undergraduate coursework, grade point average of 3.0 or better (last 60 semester units/90 quarter units), completion of an accredited/approved didactic program in dietetics within the last five years, GRE scores (480V/580Q recommended), statement of professional goals, and letters of reference. Preference is given to those applicants with work or volunteer experience in dietetics. Applicants whose native language is other than English must earn a minimum TOEFL score of 550.

Admission Materials. Prospective students must submit an application to the university for postbaccalaureate standing, evidence of an acceptable baccalaureate degree from an accredited institution, two official transcripts of all college work, official report of GRE scores, an application to the dietetic internship, three letters of reference from employers or faculty, statement of professional goals, and a verification statement or declaration of intent from a didactic program in dietetics. Applicants must also apply to D & D Digital Systems for enrollment in the computer matching process. For more information on computer matching, contact D & D Digital Systems at (515) 292-0490.

Program Requirements

	Units
FN 221T	**3**
FN 229	**2**
FN 230	**3**
FN 290	**1**
NUTR 193	**4**
FSM 193	**3**

COURSES

Note: Active immunization against tetanus (available through Student Health Services) is a prerequisite for registration in any laboratory course in agriculture and for any student employment on the University Farm.

Food Science (FSC)

1. Introduction to Food Science and Technology (3)
Survey of specific types of industries, chemical composition, microbiological concerns, processing, and environmental risks and their control to ensure food quality and safety. Introduction to governmental regulation. Current issues in the food industry.

3. Introduction to Dairy Industry (3)
History and processing of dairy products including their composition and description with emphasis on fluid milk. Introduction to dairy chemistry and microbiology. Laboratory includes plant tours and recognizing defects in finished dairy products. (Field trips) (2 lecture, 3 lab hours)

41. Introduction to Food Processing (2)
Prerequisites: FSC 1. Introduction to the technology of processing foods with special reference to unit operations and sanitation. Laboratory includes computer applications related to food technology. (1 lecture, 3 lab hours) (Field trips)

50. Basic Foods (3)
Introduction to high quality food. Emphasis on principles of food safety, nutrition, food preparation, and sensory evaluation. (2 lecture, 2 lab hours) (CAN H EC 8)

100. Sensory Evaluation (3)
Prerequisite: adviser approved general statistics class. Analysis, measurement, and methods used in sensory evaluation of foods. (2 lecture, 3 lab hours)

110. Food Chemistry and Biochemistry (4)
Prerequisites: CHEM 1B; CHEM 150 or concurrently. Chemical and biochemical changes in foods during production, processing, and utilization.

112. Functional Properties of Food Components (4)
Prerequisites: CHEM 150 or concurrently; FSC 41. Study of the functional properties of water, dispersed systems, carbohydrates, proteins, enzymes, lipids, and colligative properties with respect to their role in processing and shelf-life. Computer applications. (3 lecture, 3 lab hours)

115. Food Analysis (4)
Prerequisites: FSC 41, 110 or 112; adviser approved general statistics class; permission of instructor. Application of analytical techniques and instrumental methods used in the analysis of food composition. Laboratory analyses include proximate, fatty acids, °Brix, titratable acidity, mineral, peroxidase, peroxide values, reducing sugars, vitamins, and filth. (2 lecture, two 3-hour labs)

120. Quality Assurance in the Food Industry (4)
Prerequisites: FSC 1 or 3; FSC 178; CHEM 1A; MICRO 20; adviser approved general statistics class; junior standing or consent of the instructor. Physical, chemical, and microbiological methods for determining quality in food processing. Total Quality Management (TQM) and Statistical Quality Control (SQC) principles utilized. Food product standards and Hazard Analysis Critical Control Points (HACCP) guidelines and applications. Computer applications. (3 lecture, 3 lab hours) (Field trips)

123. Dairy and Food Plant Sanitation (3)
Prerequisites: FSC 3; MICRO 20 or equivalent; or permission of instructor. Food plant and dairy farm sanitation as related to food safety. Public health issues. Requirements of regulatory agencies. Cleaning, sanitation procedures, housekeeping, and waste disposal. (Field trips)

125. Food Microbiology (4)
Prerequisites: FSC 41, 178; MICRO 20; or consent of the instructor. Physical, chemical, and biological control of microorganisms in foods. Beneficial microorganisms used in food production. Laboratory emphasis on microbiological methods used in examining foods. Computer applications. (2 lectures, two 3-hour labs) (Field trips)

141. Fruit and Vegetable Processing (3)
Prerequisites: CHEM 8; FSC 41, 178; MATH 72; PHYS 2A; MICRO 20. Characteristics of raw fruits and vegetables. Application of storage and thermal dehydration, refrigeration/freezing, and packaging principles that influence quality. Computer applications. (2 lecture, 3 lab hours) (Field trips)

142. Dairy Processing (3)
Prerequisite: FSC 3 and A SCI 65; or FSC 115 and 125; or consent of the instructor. Manufacture of high temperature short time (HTST), ultra high temperature (UHT), and evaporated milks, cream, non fat dried milk (NFDM) powder, ice cream, butter, and cheese. Laboratory includes routine chemical and microbiological analysis of raw and finished products. (2 lecture, 3 lab hours) (Field trips)

144. Food Engineering (4)
Prerequisites: FSC 41; PHYS 2A; MATH 75 or equivalent; or permission of instructor. The application of the engineering concepts and unit operations that include energy balance, heat transfer, fluid flow, thermodynamics, and mass transfer. (2 lectures, two 3-hour labs) (Field trips)

145. Food Industry Waste Management (2)
Prerequisite: PHYS 2A. Waste material, collection and transportation. Mechanical and thermal processing, composting, and energy recovery. Management, reduction and recycling in food plants. (1 lecture, 2 activity hours) (Field trips)

150. Advanced Foods (3)
Prerequisites: FSC 50; CHEM 1A or 3A; permission of instructor. Experimental approach to foods emphasizing sensory and objective tests, standards for high quality foods and scientific principles that affect food preparation and product development. (2 lecture, 3 lab-discussion hours)

152. Food for Health (3)
Prerequisites: FSC 50; NUTR 53 or 54; computer competency required. Planning a nutritious diet implementing the Dietary Guidelines for Americans. Cooking principles, recipe modification, and food selection at supermarkets and restaurants to

increase dietary complex carbohydrates and decrease fat, sugar, and sodium. (2 lecture, 2 lab hours)

162T. Topics in Food Science (1-4; max total 12 if no topic repeated)
Prerequisites: FSC 50; NUTR 54. Topics relating to food science. Some topics may have labs.

178. Food Laws, Regulations, Inspection, and Grading (2)
Prerequisites: FSC 1. Federal and state laws and regulations pertaining to the food industry. Federal Register, Code of Federal Regulations, United States codes, California state codes, and other government documents as they pertain to the FDA, USDA, EPA, and other agencies. Grading and inspection of food products. (1 lecture, 2 activity hours)

180. Undergraduate Research (1-4; max total 4)
Prerequisites: junior or senior standing and permission of instructor. Exploratory work on a suitable problem in food science. Approved for ***SP*** grading.

190. Independent Study (1-3; max total 6)
See *Academic Placement — Independent Study*. Approved for ***SP*** grading.

192. Readings and Conference (1-3; max total 3)
Prerequisite: permission of instructor. Individually directed readings; reports and evaluation. (Hours arranged)

193. Supervised Work Experience (1-6; max total 6)
Prerequisites: second semester junior standing and permission of instructor. Supervised work experience in food science. ***CR/NC*** grading only.

199. Senior Seminar (1)
Prerequisites: permission of instructor. Faculty, student, and industry presentations of current food science topics. Discussion of topics of practical importance to graduating students.

Food Systems Management (FSM)

131. Introduction to Food Systems Management (3)
Prerequisite: FSC 50. A managerial and systems approach to foodservice operations. Impact of legislation, labor relations, and marketing on industry.

133. Quantity Food Production (4)
Prerequisites: FSM 131; FSC 150; health clearance and health and accident insurance required. Preparation and service of conventional and convenience foods in quantity foodservice operations. Menu planning, recipe standardization, equipment and layout, production controls, work simplification, and quality assurance. *Serv Safe* certification. (3 lecture, 3 lab hours)

134. Cost Analysis in Food Systems Management (3)
Prerequisites: FSM 133; ACCT 4A; computer competency required. Advanced concepts of planning, analyzing, decision-making and reporting procedures unique to food systems management. Cost analysis and control, computer applications, and purchasing in food service. (2 lecture, 2 lab hours)

135. Institutional Experience (3)
Prerequisites: FSM 134; health clearance and health and accident insurance required. Supervised work experience in food systems management. (1 lecture, 4 lab hours)

162T. Topics in Food Systems Management (1-4; max total 12 if no topic repeated)
Prerequisites: FSC 50; NUTR 54. Topics relating to food systems management.

180. Undergraduate Research (1-4; max total 4)
Prerequisites: junior or senior standing and permission of instructor. Exploratory work on a suitable problem in food systems management. Approved for ***SP*** grading.

190. Independent Study (1-3; max total 6)
See *Academic Placement — Independent Study*. Approved for ***SP*** grading.

192. Readings and Conference (1-3; max total 3)
Prerequisite: permission of instructor. Individually directed readings; reports and evaluation. (Hours arranged)

193. Supervised Work Experience (1-6; max total 6)
Prerequisites: second semester junior standing and permission of instructor. Supervised work experience in food systems management. ***CR/NC*** grading only.

Nutrition (NUTR)

53. Nutrition and Health: Realities and Controversies (3)
Optimal nutrition to reduce the risk of cancer, heart disease, allergies, obesity, and other diseases. Social, psychological, and cultural dictates that affect food selection and health. Personal strategies to develop a nutrition plan for better health. G.E. Breadth E1.

54. Elementary Nutrition (3)
Application of chemical and biological principles to carbohydrates, proteins, fats, vitamins, minerals and water in human nutrition; recommended nutrient allowances and dietary evaluation; determination of energy needs; and relationship of nutrition to health and disease.

147. Nutrition and the Athlete (3)
Prerequisite: PHYAN 33 or 65. Physiological principles underlying the normal nutritional requirements and the application of these principles to athletic performance. Role of diet in training.

149. Food and Nutrition Communication (4)
Prerequisites: FSC 50; NUTR 153; computer competency required. Integrating and translating food and nutritional science concepts into easily understood consumer messages. Activities include developing instructional materials, writing lesson plans, and making presentations to a target audience.

153. Advanced Nutrition (3)
Prerequisites: NUTR 54; CHEM 150. Relationship of nutrients to maintenance of homeostasis. Factors affecting the nutrient demands with interpretation of biochemical indices. Structural and functional properties of nutrients. Gross and microscopic structures related to cell metabolism, digestion, bone mineralization and body composition.

156. Nutrition Assessment (3)
Prerequisites: NUTR 153; PHYAN 65 or concurrently. Assessment of nutritional status emphasizing dietary evaluation, nutrition care planning, and intervention. Application of dietary standards and principles for disease prevention and control. Methods for monitoring quality of nutritional care. (2 lecture, 3 lab hours) (Formerly NUTR 157A)

157. Medical Nutritional Therapy (4)
Prerequisite: NUTR 156. Advanced concepts of nutritional therapy in disease. Identification of goals of nutritional therapy, principles of dietary modification, and meal planning for specific conditions. Calculation of diet prescriptions. Application of nutrition counseling skills to therapeutic diets. (3 lecture, 3 lab hours) (Formerly NUTR 157B)

160. Nutrition across the Life Cycle (3)
Prerequisite: NUTR 54 or equivalent. The influence of nutrition on age, growth, and normal development. Nutrition recommendations from conception through late adulthood. Socioeconomic, cultural, and psychological factors influencing food and nutrition behavior. The role of exercise throughout the life cycle.

161. Professional Issues in Dietetics (1)
Prerequisite: permission of instructor. Promotion of food and nutrition services and programs. Identification of ethical and legislative issues in dietetics. Development of individual career plan. Preparation for dietetic internships. (1 lecture)

162T. Topics in Nutrition (1-4; max total 12 if no topic repeated)
Prerequisites: FSC 50; NUTR 54. Topics relating to nutrition. Some topics may have labs.

166. Community Nutrition (3)
Prerequisite: NUTR 54. Survey of nutrition programs created to improve community health. Development and examination of public health nutrition policy. Proposal writing.

180. Undergraduate Research (1-4; max total 4)
Prerequisites: junior or senior standing and permission of instructor. Exploratory work on a suitable problem in nutrition and dietetics. Approved for ***SP*** grading.

190. Independent Study (1-3; max total 6)
See *Academic Placement — Independent Study*. Approved for ***SP*** grading.

192. Readings and Conference (1-3; max total 3)
Prerequisite: permission of instructor. Individually directed readings; reports and evaluation. (Hours arranged)

193. Supervised Work Experience (1-6; max total of 6)
Prerequisites: second semester junior standing and permission of instructor. Supervised work experience in dietetics and nutrition. ***CR/NC*** grading only.

GRADUATE COURSES

(See *Course Numbering System*.)

The following graduate courses are open to students who have been accepted into the graduate program. Students who are not in graduate standing should contact the department graduate coordinator prior to enrolling.

Food and Nutrition (FN)

200. Research Methods in Food and Nutrition (3)
Prerequisite: permission of instructor. Quantitative and qualitative research design in food and nutritional sciences. Methods of data collection and analysis. Evaluation of research design and outcomes. Reporting research results. Students will develop a research proposal.

204. Food Carbohydrates and Sweeteners (3)
Prerequisites: CHEM 150 and FSC 110 or 150. Advanced studies in the chemical and biochemical changes of food carbohydrates during processing and storage; quality control; nutritional aspects. (Formerly AGRI 204)

205. Food Lipids (3)
Prerequisites: CHEM 150 and FSC 110 or 150. Advanced studies in the chemical and biochemical changes of food lipids during processing and storage. Mechanisms of formation and degradation. Importance in flavor and texture; quality control; and nutritional aspects. (Formerly AGRI 205)

206. Proteins (3)
Prerequisite: CHEM 150. Advanced studies in the chemical and biochemical properties of protein. Synthesis and catabolism of tissue proteins. Protein quality. Functional properties of proteins in foods. (Formerly AGRI 206)

209. Vitamins and Biocatalysts (3)
Prerequisite: CHEM 150. Mechanisms of action of vitamins, coenzymes, and cofactors in biological transformations involving food processing and human nutrition. Emphasis on the fundamental nature of biochemical reactions related to food science and nutrition. (Formerly AGRI 209)

221T. Topics in Food Science and Nutrition (3; max total 9)
Prerequisites: upper-division food science and nutrition course appropriate to study topic; permission of instructor. Advanced studies in a given area of food science and nutrition. Some topics may require lab hours. (Formerly AGRI 221T)

223. Food, Nutrition, and Health (3)
Prerequisite: CHEM 150. Review and discussion of the recent scientific literature relating to food consumption, nutrient intake, and human health. (Formerly AGRI 223)

229. Seminar (1; required total 3)
Prerequisite: permission of instructor. Students investigate and present current research problems. Observation and evaluation of additional assigned seminars. Oral and written reports required. (Formerly AGRI 229)

230. Advanced Nutrition Counseling (3)
Advanced counseling techniques including learning and behavioral theories and principals of goal setting. Design, delivery, and evaluation of nutrition counseling. Development and evaluation of nutrition education materials. Role-playing and case studies assigned. (Formerly FN 221T)

290. Independent Study (1-3; max total 3)
See *Academic Placement — Independent Study*. Approved for ***SP*** grading. (Formerly AGRI 290)

292. Readings in Food Science and Nutrition (1-3; max total 3)
Prerequisite: permission of instructor. Individually directed readings in a field of special concern to students in the graduate program; appropriate reports and evaluations required; individual conferences, no formal class meetings. Approved for ***SP*** grading.

299. Thesis (2-6; max total 6)
Prerequisite: prior advancement to candidacy. See *Criteria for Thesis and Project*. Preparation, completion, and submission of an acceptable thesis for the master's degree. Approved for ***SP*** grading. (Formerly AGRI 299)