

# FOOD SCIENCE & NUTRITION

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<https://fsn.calpoly.edu>

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## Academic Programs

Program name	Program type
Food Science	BS, Minor
Nutrition	BS, Minor, MS

The department offers two bachelor's degrees and a master's degree. The bachelor's degrees are designed to prepare graduates for employment in the general areas of food science and human nutrition while the master's degree in Nutrition is designed to prepare graduates for advancement, specialization, and leadership in nutrition or healthcare careers.

Graduates with a bachelor of science in Food Science enjoy rewarding careers in food processing and product development, sales, research, quality assurance and government regulation. Graduates with a bachelor of science in Nutrition enjoy rewarding careers in dietetics and clinical nutrition, healthcare (medicine, dentistry, nursing, physician assistant, and chiropractic), public health, food industry, food systems management and education. Opportunities for private consulting and entrepreneurship are available to graduates in both majors. The department also offers minors in Food Science and Nutrition.

Students are involved in a number of clubs and teams, including the Food Science Club and Nutrition Club. Club activities involve a wide range of social, professional and service projects. Clubs provide opportunity for leadership training and participation in professional societies and organizations. Our students compete on teams in regional and national scholastic competitions such as Food Product Development teams and Nutrition and Food Science or Nutrition Quiz Bowl teams.

### Learn by Doing in Food Science and Nutrition

The department is equipped with a food processing pilot plant, and laboratories for food safety, food chemistry, nutritional science, metabolism, and culinary science. These facilities are designed for teaching courses in nutrition, foodservice management, sensory evaluation of foods, food chemistry, food product development, food processing and quality control. Students get hands-on experience with pilot scale commercial processing equipment.

Students can manufacture and market various food products, which are sold throughout the community. Projects are designed to simulate industry and business practices. Classroom learning in nutrition is complemented with opportunities for service, outreach and research in the community. Students are encouraged to gain valuable experience by working during the summer or by participating in internship programs.

### Dietetic Internship

Cal Poly's post-baccalaureate dietetic internship is accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND) of the Academy of Nutrition and Dietetics. This competitive program consists of at least 1,200 hours of supervised practice and at least 108 hours of class, seminars, and professional meetings. Upon completion, interns must pass a national examination administered

by the Commission of Dietetic Registration to qualify as a Registered Dietitian (R.D.). Applications for fall quarter are due mid-February.

## Undergraduate Programs

### BS Food Science

The program is designed to prepare students for employment in the food industry, government and for graduate study. Principal areas of instruction are food engineering, food processing, food safety and sanitation, quality assurance, food microbiology, food chemistry and analysis, product development, and sensory evaluation. Employment opportunities are strong in each of these areas.

### Concentrations

#### Advanced Food Science

The Advanced Food Science Concentration in BS Food Science is the curriculum approved by the Institute of Food Technologists (IFT.org (<http://www.ift.org>)), the key international professional society for food scientists. Students are strongly advised to follow this concentration if they anticipate graduate study following completion of the BS. Students enrolled in this concentration are eligible for IFT scholarships.

#### Applied Food Technology

The Applied Food Technology Concentration in BS Food Science allows students to select coursework focused in a commodity or other area where they have career interest. For example, with proper selection of approved electives and concentration area courses, students may earn minors in nutrition or packaging. Course selections could also focus in dairy products, culinary science, or agribusiness.

#### Culinary

is designed for students wanting to apply a strong science background in ingredient development, food product development, or in entrepreneurial pursuits. This concentration serves the need for food scientists who are positioned to make decisions that require a blend of management training, culinary expertise, and a technical science background. Graduates are prepared to pursue advanced degrees in food science or may choose to attend a professional culinary program.

## BS Nutrition

The program offers a broad preparation in nutritional science. In addition to preparatory science courses such as chemistry and biology, the program offers coursework in nutrient metabolism, clinical nutrition, community nutrition, and lifecycle nutrition, foods and food system management.

### Concentrations

#### Applied Nutrition

Applied Nutrition prepares students for careers in various areas of nutrition, including dietetics, food systems management, nutrition communications, and community nutrition. This concentration is a Didactic Program in Dietetics (DPD), accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND), of the Academy of Nutrition and Dietetics, 120 Riverside Plaza, Suite 2000, Chicago, IL 60606-6995, (800) 877-1600 Ext. 5400. Students in this concentration who graduate with a minimum higher education overall GPA of 2.75 *and* receive a Verification Statement are eligible to apply for admission to an accredited dietetic internship, upon completion of which the graduate must pass a national examination administered by the Commission on Dietetic Registration to qualify as a registered dietitian (RD). Graduates

also are prepared to pursue advanced degrees in foods and nutrition, public health, and food systems management.

### **Nutrition and Food Industries**

Nutrition and Food Industries is designed for students who want to apply knowledge of nutrition to careers in the food industry and related organizations (such as commodity and other non-profit organizations, pharmaceutical companies, or government). A Food Science or Agricultural Communications minor can be earned with proper course selection within this concentration and within the 180 unit degree requirement. Students are prepared for positions in food product research and development, quality and regulatory operations, food and health communications, public relations, extension, and technical sales. In addition, students are prepared for graduate study in food science, nutrition, or related fields.

### **Nutrition Science**

Nutrition Science emphasizes a strong background in basic sciences and human nutrition for students planning further study in graduate school or a health-related profession such as medicine, dentistry, nursing, pharmacy or physical therapy. Students need to check with their advisors for specific requirements for various health-related professions.

## **Minors**

The department offers minors in either food science or nutrition to qualified students from across campus. Specific criteria apply to entering into the minor program and interested students should see either of the minor advisors.

## **Food Science Minor**

The minor is principally designed for students majoring in related academic disciplines who desire employment in the food industry. Students acquire the fundamental technical skills necessary to understand basic issues and concepts in food science such as food processing, food safety, and quality assurance. See the department Food Science minor coordinator for criteria for admission into the Food Science minor.

## **Nutrition Minor**

The minor is designed for students majoring in science disciplines (Chemistry, Biological Sciences, Kinesiology), Agribusiness or Agricultural Communications, and other interested majors such as Business or Psychology. Students can enhance career opportunities or qualification for admission into graduate programs or allied health fields. See the department Nutrition minor coordinator for criteria for admission into the Nutrition minor.

## **Interdisciplinary Minors**

The department participates in offering interdisciplinary minors in Packaging (see Orfalea College of Business (<http://catalog.calpoly.edu/collegesandprograms/orfaleacollegeofbusiness>) section).

## **Graduate Programs**

Cal Poly offers an MS in Agriculture with a specialization in Food Science. Please refer to the MS Agriculture (<http://catalog.calpoly.edu/collegesandprograms/collegeofagriculturefoodenvironmentalsciences/>

#graduatetext) section in the College of Agriculture, Food and Environmental Sciences.

## **MS Nutrition**

### **General Characteristics**

The MS Nutrition program is designed to prepare graduates for advancement, specialization, and leadership in nutrition or healthcare careers. In addition, graduates will be prepared for further education in dietetic internships, professional schools, allied health professions, or doctoral studies in a number of academic areas including public health, animal science, or the social sciences.

The interdisciplinary Graduate Group in Nutrition (GGN) allows students to work with faculty from several departments and to choose a research topic from a broad range of themes including human nutrition, animal nutrition, kinesiology, public health, business, or social sciences.

Students select a suggested area of emphasis (Molecular Nutrition, Public Health Nutrition, or Health and Wellness) compatible with their interests and career goals. Students will complete coursework and a research-based thesis conducted under the supervision of a committee chair who must be a member of the GGN. A current list of GGN members and their research interests is available from the MS Nutrition Graduate Coordinator. In addition to the committee chair, the student's committee must have a minimum of two other qualified members. One of the three committee members must be a GGN member from the Food Science and Nutrition Department, the administrative home for the MS Nutrition program.

### **Admission Requirements**

To qualify for admission to a Master's program, you must meet the Cal Poly university admission requirements for graduate standing, which are described in the Graduate Education (<http://catalog.calpoly.edu/graduateeducation>) section of the Cal Poly Catalog, as well as professional, personal, scholastic and other standards as prescribed by the program. The program specific requirements for admission to the MS Nutrition program must be submitted via the Cal Poly Graduate Education website and are as follows:

- Statement of purpose
- Transcript(s) from institution granting bachelor's degree
- Three letters of academic and/or professional recommendation
- Results from Graduate Record Examination (GRE standard test); quantitative, verbal and writing scores should be at the 50 percentile or higher for consideration
- All applicants who do not speak and write English as their primary language are required to complete the Test of English as a Foreign Language (TOEFL), taken within the last 2 years with a minimum score of 550 (paper version), 213 (computerized version), or 80 (internet based). Submit scores electronically to Institution Code: 4038. This requirement does not apply if country citizenship is listed on Cal Poly Admissions website: <https://admissions.calpoly.edu/applicants/international/checklist.html>.

### **Prerequisites**

Applicants who lack the required preparatory coursework in basic sciences and nutrition must complete these courses prior to matriculation into the program. Basic science and nutrition courses include the following:

- Introductory chemistry series (one year), organic chemistry (min one course), biochemistry and an introductory biology course.
- FSN 328 Nutrient Metabolism I
- FSN 329 Nutrient Metabolism II

## Program of Study

Each graduate student shall develop a Working Formal Study Plan with their thesis committee chair and members, prior to submitting the Final Formal Study Plan. Graduate students must file the Formal Study Plan for the degree with the MS Nutrition Graduate Coordinator no later than the end of the quarter in which the 12<sup>th</sup> unit of approved courses is completed. The Formal Study Plan must include at least 45 units of committee-approved graduate coursework (including degree-required plus elective coursework). At least 60% of the units required by the committee as reflected on the Formal Study Plan must be at the 500 level. A minimum GPA of 3.0 is required for coursework on the Formal Study Plan.

## Blended BS Food Science + MS Agriculture, Specialization in Food Science

For motivated students, a blended program is available. The blended program allows students to simultaneously complete both a bachelor's degree in Food Science and a master's degree in Agriculture with a specialization in Food Science. The blended program offers promising individuals an opportunity to continue their studies in food science in a collaborative learning environment.

### Eligibility for the Blended Program

Food Science majors wishing to pursue a MS Agriculture degree with a specialization in Food Science may apply in their junior year, after completing at least two upper division Food Science courses (FSN 330 and FSN 364). Students must apply before they have completed 180 units. A faculty committee chaired by the graduate program coordinator reviews all applications and selects individuals with records that demonstrate success at the undergraduate level as well as potential to succeed at the graduate level. Candidates shall meet the University requirements, as a minimum, stated in Blended BS+MS Programs (<http://catalog.calpoly.edu/graduateeducation/#generalpoliciesgoverninggraduatestudies>) in the Graduate Education section of the catalog. Contact the Food Science and Nutrition department for additional information.

## FSN Courses

### FSN 101. Orientation to the Food Science and Nutrition Majors. 1 unit CR/NC

Term Typically Offered: F  
Understanding the depth and breadth of the Food Science and Nutrition programs. Emphasis on academic and career planning. Students are required to complete this course within their first year in the major. Separate sections will be offered for each major. Credit/No Credit grading only. 1 lecture.

### FSN 121. Fundamentals of Food. 4 units

Term Typically Offered: F, W, SP  
Theoretical aspects and practical applications of the principles of culinary science and food preparation. 3 lectures, 1 laboratory.

### FSN 125. Introduction to Food Science. 4 units

Term Typically Offered: F  
Basic principles of food science. Chemical, physical, and microbiological properties of foods. Ingredient properties, preservation, and processing. Overview of the commercial food processing industry at state and national levels. Field trip may be required. 3 lectures, 1 laboratory.

### FSN 200. Special Problems for Undergraduates. 1-4 units

Term Typically Offered: F, W, SP  
Prerequisite: Consent of instructor.

Individual investigation, research studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 4 units per quarter.

### FSN 201. Enterprise Project. 1-4 units

CR/NC  
Term Typically Offered: TBD  
Prerequisite: FSN 125 or FSN 230 or FSN 121 and consent of instructor.

Post-harvest processing of a high quality food product. Project participation is voluntary and subject to approval by the department head and the Cal Poly Corporation. Total degree credit for FSN 201 and FSN 401 combined limited to 12 units. Credit/No Credit grading only.

### FSN 204. Food Processing Operations. 4 units

Term Typically Offered: W  
Prerequisite: FSN 125 or FSN 230.

Applied food manufacturing and processing technology emphasizing unit operations. Water removal in foods (dehydration, spray drying, vacuum concentration), heat removal (refrigeration, freezing), and osmotic preservation. Students produce processed foods in a pilot plant. Field trip may be required. 3 lectures, 1 laboratory.

### FSN 210. Nutrition. 4 units

GE Area B5  
Term Typically Offered: F,W,SP,SU  
Introduction to the science of human nutrition. Nutrient structure, metabolism, function and requirements. Application of nutrition science principles to promote optimal health. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE B5.

### FSN 230. Elements of Food Processing. 4 units

Term Typically Offered: F, W, SP  
Principles of food processing operations covering thermal processing, freezing, dehydration, fermentation and raw material handling. Overview of food technology, food quality, spoilage, packaging and label requirements. For non-Food Science majors only. Field trip may be required. 3 lectures, 1 laboratory.

### FSN 244. Cereal and Bakery Science. 4 units

Term Typically Offered: TBD  
Prerequisite: FSN 125 or FSN 230.

Applied science of cereal-based products. Theory and practice underlying preparation of doughs, batters, fillings, and glazes. Chemistry of baking doughs and batters and storage of finished products. Marketing and product development of breads, cakes, cookies, and pastries. Comparative nutritional evaluation of flours, grains, and finished products. 3 lectures, 1 laboratory.

**FSN 250. Food and Nutrition: Customs and Culture. 4 units**

GE Area D4; USCP

Term Typically Offered: F,W,SP,SU

Anthropological perspective of traditional and contemporary food customs and culture. Major emphasis on U.S. cultures including Native American, Hispanic American, African American, and Asian American. Opportunities to explore personal cultural food experiences. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE D4 and USCP.

**FSN 275. Elements of Food Safety. 4 units**

Term Typically Offered: SP

Introduction to food safety from farm-to-fork. Topics include good agricultural practices, good manufacturing practices, food safety regulations, and an overview of Hazard Analysis Critical Control Point (HACCP). Emphasis on control of biological, chemical, and physical hazards to assure food safety. Not open to Food Science majors. 4 lectures.

**FSN 290. Selected Topics. 1-4 units**

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures.

**FSN 304. Advanced Culinary Principles and Practice. 4 units**

Term Typically Offered: TBD

Prerequisite: CHEM 127 and FSN 121.

Chemistry of starch, fat and proteins and its impact on texture, taste, flavor and appearance of food. Effects of microorganisms on changes of food during preparation and storage. 3 lectures, 1 laboratory.

**FSN 310. Maternal and Child Nutrition. 4 units**

Term Typically Offered: F, W, SP

Prerequisite: FSN 210 and junior standing.

Nutritional needs and related nutritional challenges of women and children, including fertility, pregnancy and lactation; physical, nutritional, social growth and development from infancy through adolescence. Current nutrition issues in maternal and child nutrition. 4 lectures.

**FSN 311. Sensory Evaluation of Food. 4 units**

Term Typically Offered: W

Prerequisite: STAT 218; FSN 125 or FSN 230.

Sensory attributes of food, physiological basis of sensory evaluation, sensory panels, environment for sensory evaluation, sample preparation and presentation, types of score cards, statistical methods for data analysis and interpretation. 3 lectures, 1 laboratory.

**FSN 315. Nutrition in Aging. 4 units**

Term Typically Offered: F, W, SP

Prerequisite: FSN 210; sophomore standing.

Nutrition issues in the middle and later years. Changes in organ systems, nutrient needs, functional status, and food preferences as adults age. Nutrition and chronic disease. Nutritional assessment and screening. Nutrition-related health care and social services. 4 lectures.

**FSN 319. Food Technology for the Consumer. 4 units**

GE Area F

Term Typically Offered: F, SP

Prerequisite: Junior standing and completion of GE Area B.

Overview of the science and technology used to produce the foods consumed on a daily basis. Food science, biotechnology, food law, processing, preservation, ingredient functionality, package label information, and food safety information. Not open to Food Science Majors. 4 lectures. Fulfills GE Area F.

**FSN 321. Contemporary Issues in Food Choice and Preparation. 4 units**

Term Typically Offered: W, SP

Prerequisite: FSN 121, FSN 210, sophomore standing.

Principles involved in the choice, purchase, and preparation of foods in a variety of settings and for various populations. Contemporary and ongoing issues associated with food and cooking in the context of nutrition and health. Planning and preparation of meals with emphasis on nutritional, aesthetic, economic and cultural aspects of food. 3 lectures, 1 laboratory.

**FSN 328. Nutrient Metabolism I. 4 units**

Term Typically Offered: F, W, SP

Prerequisite: BIO 161; CHEM 313 or CHEM 371; FSN 210; and junior standing.

Metabolism of carbohydrates, fats and proteins as it applies to human nutrition. Integration and regulation of metabolic pathways. 4 lectures.

**FSN 329. Nutrient Metabolism II. 4 units**

Term Typically Offered: F, W, SP

Prerequisite: FSN 328.

Continuation of FSN 328. Biochemical, molecular, and physiological functions of vitamins and minerals and their interaction with other nutrients. 3 lectures, 1 laboratory.

**FSN 330. Introduction to Principles of Food Engineering. 4 units**

Term Typically Offered: F

Prerequisite: FSN 125; MATH 118 or equivalent; and PHYS 121.

Introduction to principles of food engineering and basic calculations needed for food plant operations. Unit conversions, material balance, heat balance, steam heating, psychrometry, vacuum and pressure. Field trip may be required. 3 lectures, 1 laboratory.

**FSN 334. Food Packaging. 3 units**

Term Typically Offered: SP

Prerequisite: FSN 125 and FSN 204.

Function of food packaging in food processing and preservation. Packaging materials and forms. Regulations and testing of food packaging material. Oral presentation required. 3 lectures.

**FSN 335. Food Quality Assurance. 4 units**

Term Typically Offered: F

Prerequisite: FSN 125 or FSN 230; junior standing.

Microbiological and physical methods of analyses of foods used in food quality assurance and product development laboratories. Organization and management of quality assurance programs utilizing basic statistical control. Development of food production standards and interpretation of specifications. Packaging and container evaluation. 3 lectures, 1 laboratory.

**FSN 341. Fermented Foods. 4 units**

Term Typically Offered: SP

Prerequisite: Junior standing and completion of GE Area B.

Processing, manufacturing, historical and bio-technical applications of fermentation technology for the production of food and beverages. Wines of the world, distilled beverages, beers, fermented dairy, vegetable and meat products important to the post-harvest economy of California. 4 lectures.

**FSN 342. Brewing Science. 4 units**

Term Typically Offered: TBD

Prerequisite: CHEM 313 and MCRO 221.

Scientific principles of malting and brewing. Chemistry, microbiology, and technology of the entire brewing process, from the raw ingredients (barley, malt, hops, water, yeast) to the production of beer and its quality assurance. 4 lectures.

**FSN 343. Institutional Foodservice I. 3 units**

Term Typically Offered: F, W

Prerequisite: FSN 121 and junior standing.

Principles of equipment selection and food service facility, planning with emphasis on sanitation and safety. 2 lectures, 1 laboratory.

**FSN 344. Institutional Foodservice II. 4 units**

Term Typically Offered: W, SP

Prerequisite: FSN 321, FSN 343.

Continuation of FSN 343. Economic principles and problems involved in planning and preparing food using institutional equipment to meet specific product standards for large groups. Field trip may be required. 3 lectures, 1 laboratory.

**FSN 346. Brewing Methods. 3 units**

Term Typically Offered: TBD

Prerequisite: FSN 342.

Introduction to brewing practices and hands-on instruction on industry standard laboratory methods for the analysis of barley, malt, hops, water, yeast, and beer. Perform pilot brews and apply methodologies for the analysis of raw ingredients, process control, and final product. Field trip required. 1 lecture, 2 laboratories. Students must be 18 years of age or older.

**FSN 354. Packaging Function in Food Processing. 3 units**

Term Typically Offered: SP

Prerequisite: Junior standing.

Basic food spoilage and preservation mechanisms. The role of food packaging in food processing. Package and food compatibility. For non-Food Science majors. 3 lectures.

**FSN 364. Food Chemistry. 4 units**

Term Typically Offered: F

Prerequisite: FSN 125 or FSN 230, CHEM 313.

Study of molecular properties of major food components such as water, carbohydrates, lipids, proteins, vitamins, minerals, pigments, enzymes and other important molecules as well as chemical reactions of these compounds occurring as a result of processing and or storage. Laboratory focus on assessment of the role of food components in food systems and food products. 3 lectures, 1 laboratory.

**FSN 368. Food Analysis. 4 units**

Term Typically Offered: W

Prerequisite: FSN 364.

Principles of chemical and biochemical methods and techniques for measuring food protein, carbohydrates, lipids, water, vitamins, minerals and other components of foods using approved methods. 3 lectures, 1 laboratory.

**FSN 370. Food Plant Sanitation and Prerequisite Programs. 4 units**

Term Typically Offered: W

Prerequisite: FSN 204 and MCRO 221.

Principles and practice of food plant sanitation and prerequisite programs to ensure production of a safe and wholesome food supply. Topics include good manufacturing practices, sanitary design, cleaning and sanitizing compound selection, pest management, waste treatment, and allergen control programs. Field trips required. 4 lectures.

**FSN 374. Food Laws and Regulations. 4 units**

Term Typically Offered: W

Prerequisite: FSN 125 or FSN 230 or WVIT 102.

Federal, state, and local laws and regulations affecting the production, processing, packaging, marketing, and distribution of food. Emphasis on FDA, USDA and California codes. 4 lectures.

**FSN 375. Food Safety. 4 units**

Term Typically Offered: SP

Prerequisite: FSN 370.

Principles, practices, and regulations governing and ensuring the chemical, physical, and biological safety of the food supply. Topics include Hazard Analysis Critical Control Point (HACCP), risk assessment, import safety, food bioterrorism and defense, product recalls, and traceability. 3 lectures, 1 activity.

**FSN 400. Special Problems for Advanced Undergraduates. 1-4 units**

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 4 units per quarter.

**FSN 401. Advanced Enterprise Project. 1-4 units**

Term Typically Offered: TBD

Prerequisite: FSN 201 and junior standing and consent of instructor.

Leadership responsibility on enterprise projects. Lead students, under the supervision of instructor, will be accountable for all phases of the project: scheduling times, securing raw product, record keeping, and marketing of the product. Total degree credit for FSN 201 and FSN 401 combined limited to 12 units.

**FSN 408. Food Product Development. 4 units**

Term Typically Offered: F, SP

Prerequisite: FSN 311; FSN 368; and senior standing.

Functionality of water, carbohydrates, proteins, lipids, additives and other food ingredients used in the formulation, development, and processing of foods. Product development processes from idea generation to marketing to consumer guided technical prototype development will be completed. 3 lectures, 1 laboratory.



**FSN 410. Nutritional Implications of Food Industry Practices. 4 units**

Term Typically Offered: TBD

Prerequisite: FSN 210; FSN 125 or FSN 230; and junior standing.

Methods for assessing nutritional quality of foods/diets. Nutrient databases for raw and processed foods. Effects of food industry practices (e.g., processing, fortification, new product development, biotechnology) on nutritional quality of foods/diets. Evolution of public policy. 4 seminars.

**FSN 415. Nutrition Education and Communications. 4 units**

Term Typically Offered: F, SP

Prerequisite: Senior standing. Corequisite: FSN 329.

Application of appropriate behavior and learning theories in nutrition education and communications across diverse population groups. Effective use of techniques, materials, and computer-based technology to enhance communications. Includes community-based learning projects. 4 lectures.

**FSN 416. Community Nutrition. 4 units**

Term Typically Offered: F, SP

Prerequisite: FSN 328; senior standing. Recommended: FSN 310, FSN 315 and FSN 415.

Federal, state and local nutrition assessment activities and program services. Emphasis on public health, health promotion and disease prevention. Development of skills in assessing community nutrition problems and planning community interventions. 4 lectures.

**FSN 417. Nutrition Counseling. 4 units**

Term Typically Offered: W, SP

Prerequisite: Senior standing, PSY 201/202. Corequisite: FSN 415.

Communication, behavioral, and counseling theories as they relate to nutrition counseling. Emphasis on development of skills to promote healthy eating behaviors. Examination of eating disorders and obesity, including preventative and therapeutic interventions. 4 lectures.

**FSN 420. Critical Evaluation of Nutrition Research. 4 units**

Term Typically Offered: F, W, SP

Prerequisite: STAT 218. Corequisite: FSN 329.

Nutrition research terminology and methods. Critical evaluation and interpretation of nutrition research with emphasis on human studies of diet-health relationships. Evidence based review. 4 seminars.

**FSN 426. Nutrition and Foodservice Systems Management. 4 units**

Term Typically Offered: F, SP

Prerequisite: FSN 344.

Principles of successful organization and management with their application to the effective operation of clinical, community and foodservice systems. Administrative responsibilities of nutrition and foodservice directors. Management theories and practice. Labor relations. Discipline and performance appraisal. 4 lectures.

**FSN 429. Clinical Nutrition I. 4 units**

Term Typically Offered: F, W, SP

Prerequisite: BIO 231 (ZOO 331 equivalent); BIO 232 (ZOO 332 equivalent); and senior standing. Corequisite: FSN 329.

Application of the nutrition care process to physiological disorders which may alter nutritional requirements or require dietary modifications. Anthropometric, biochemical, clinical, and dietary assessment. Diabetes mellitus, electrolytes, acid-base balance, hydration and enteral and parenteral nutrition. Anemias, pharmacology, cardiovascular disease and obesity. 3 lectures, 1 laboratory.

**FSN 430. Clinical Nutrition II. 4 units**

Term Typically Offered: F, W, SP

Prerequisite: FSN 429.

Continuation of FSN 429. Application of the nutrition care process to physiological and metabolic disorders which may alter nutritional requirements or require dietary modifications. GI disease, respiratory diseases, metabolic stress, burns, cancer, inborn errors of metabolism, cardiovascular disease, liver disease, and renal disease. 3 lectures, 1 laboratory.

**FSN 440. Internship. 1-12 units**

Term Typically Offered: TBD

Prerequisite: Junior standing and consent of instructor.

Career experience with private or public agencies. Total credit limited to 12 units. Maximum of 6 units may be applied toward degree requirements.

**FSN 444. Food Engineering. 4 units**

Term Typically Offered: W

Prerequisite: FSN 204 and FSN 330.

Engineering principles governing heat transfer, fluid flow, and introductory mass transfer and application of these principles to selected unit operations; theoretical aspects of the scientific and engineering principles of fluid flow and the transfer and change of materials and energy primarily by physical means during processing of food. 3 lectures, 1 laboratory.

**FSN 461. Senior Project I. 3 units**

Term Typically Offered: F, W, SP

Prerequisite: For FDSC majors: Senior standing; completion of GE Area A3 with a grade of C- or better; FSN 364; and STAT 218. For NUTR majors: Senior standing; completion of GE Area A3 with a grade of C- or better; and STAT 218. Corequisite for NUTR majors: FSN 329 and FSN 420.

Selection of scientific research topic in major area. Development of literature review, research questions in Senior Project I. Research design, data collection, and analysis in Senior Project II. Project requires a formal report which must follow departmental guidelines. Minimum of 90 hours per quarter.

**FSN 462. Senior Project II. 3 units**

Term Typically Offered: F, W, SP

Prerequisite: FSN 461.

Selection of scientific research topic in major area. Development of literature review, research questions in Senior Project I. Research design, data collection, and analysis in Senior Project II. Project requires a formal report which must follow departmental guidelines. Minimum of 90 hours per quarter.

**FSN 463. Professional Practice in Nutrition and Dietetics. 2 units**

CR/NC

Term Typically Offered: F

Prerequisite: Senior standing. Recommended: FSN 329.

Exploration of students' transition to professional practice, career opportunities, and factors to be considered in career decisions. Application of strategic planning, critical thinking, written and oral communication skills in preparation for nutrition and dietetics professions. 2 lectures.

**FSN 470. Selected Advanced Topics. 1-4 units**

Term Typically Offered: TBD

Prerequisite: Senior standing.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class Schedule will list topic selected. Total credit limited to 8 units. 1-4 lectures.

**FSN 471. Selected Advanced Laboratory. 1-4 units**

Term Typically Offered: TBD

Prerequisite: Senior standing.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class Schedule will list topic selected. Total credit limited to 8 units. 1-4 laboratories.

**FSN 474. Advanced Food Processing. 4 units**

Term Typically Offered: SP

Prerequisite: FSN 444 and senior standing.

Advanced topics in processing operations with emphasis on thermal processing. Non-traditional processing technology such as microwave, ionizing radiation, and high pressure. 3 lectures, 1 laboratory.

**FSN 485. Cooperative Education Experience in Food Science and Nutrition. 6 units**

CR/NC

Term Typically Offered: TBD

Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience with an approved Food Science or Nutrition firm engaged in production or related business, industry or governmental agency. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 12 units. Degree credit limited to 6 units. Credit/No Credit grading only.

**FSN 495. Cooperative Education Experience in Food Science and Nutrition. 12 units**

CR/NC

Term Typically Offered: TBD

Prerequisite: Sophomore standing and consent of instructor.

Full time work experience with an approved Food Science or Nutrition firm engaged in production or related business, industry or governmental agency. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 12 units. Degree credit limited to 6 units. Credit/No Credit grading only.

**FSN 500. Individual Study. 1-6 units**

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing, consent of supervising faculty member and graduate advisor.

Advanced independent study planned and completed under the direction of a member of the department faculty. Total credit limited to 6 units.

**FSN 501. Lipid Metabolism and Nutrition. 3 units**

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Digestion, absorption and metabolism of lipids with emphasis on lipoprotein metabolism, regulation of lipid metabolism, effects of gene expression, essential fatty acid requirements and functions. 3 seminars.

**FSN 505. Orientation to Food Science and Nutrition Graduate Studies. 1 unit**

CR/NC

Term Typically Offered: F

Prerequisite: Graduate standing.

Orientation to and discussion of research interests in food science and nutrition. Discussion of policy and ethical issues in the conduct of research. Intended for entering graduate students in Food Science or Nutrition. Credit/ No Credit grading only. 1 seminar.

**FSN 508. Food Product Innovation. 4 units**

Term Typically Offered: TBD

Prerequisite: FSN 408.

Focus on product innovation strategies, project management, product life cycle, project development team management, product innovation metrics, process optimization and cost management. Plan and execute an industry-relevant specialized project. 3 lectures, 1 laboratory.

**FSN 516. Population Health and Epidemiology. 3 units**

Term Typically Offered: SP

Prerequisite: FSN 416 and graduate standing.

Advanced concepts and issues in population health and epidemiology. Covers epidemiologic methods, study design, and conceptual frameworks from public health perspective. Analytical considerations related to population health will be presented. Emphasis on nutrition-related issues at national and global levels. 3 lectures.

**FSN 528. Biochemical and Molecular Aspects of Human Macronutrient Metabolism. 4 units**

Term Typically Offered: W

Prerequisite: FSN 328 and graduate standing.

Advanced topics in the human metabolism of carbohydrates, lipids and proteins. Classic and recent findings related to mechanisms of nutrient-regulated gene expression. Metabolism related to specific diseases will also be covered. 4 lectures.

**FSN 529. Metabolic and Molecular Aspects of Vitamins. 2 units**

Term Typically Offered: SP

Prerequisite: FSN 329 and graduate standing.

Advanced topics in the molecular roles and functions of vitamins. Classic and recent findings related to mechanisms of vitamin-regulated gene expression. Specific aspects of vitamin deficiencies and toxicities will also be covered. 2 lectures.

**FSN 530. Metabolic and Molecular Aspects of Minerals. 2 units**

Term Typically Offered: SP

Prerequisite: FSN 329 and graduate standing.

Advanced topics in the molecular roles and functions of minerals. Classic and recent findings related to mechanisms of mineral-regulated gene expression. Specific aspects of mineral deficiencies and toxicities will also be covered. 2 lectures.

**FSN 541. Dietetic Internship Seminar. 2 units**

CR/NC

Term Typically Offered: TBD

Prerequisite: Acceptance into the Cal Poly, San Luis Obispo Dietetic Internship, a special session program in Extended Education.

A forum for dietetic interns to make presentations and share their experiences in their supervised practice. Guest presentations on current issues in nutrition therapy, foodservice management and community nutrition. Total credit limited to 6 units, with a maximum of 2 units per quarter. Credit/No Credit grading only. 2 seminars.

**FSN 564. Chemistry of Food Systems. 4 units**

Term Typically Offered: TBD

Prerequisite: FSN 364 or graduate standing.

Integration of food chemistry concepts to develop an in-depth understanding on the role of structural and functional properties of components in food systems. Research topics for components in specific food systems. 4 lectures.

**FSN 570. Selected Topics in Food Science and Nutrition. 1-4 units**

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 12 units. 1 to 4 seminars.

**FSN 571. Selected Advanced Laboratory in Food Science and Nutrition. 1-4 units**

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class Schedule will list topic selected. Total credit limited to 8 units. 1-4 laboratories.

**FSN 574. Food Process Failure Analysis. 4 units**

Term Typically Offered: TBD

Prerequisite: FSN 335 or graduate standing; FSN 444; and FSN 474.

Analysis of root causes and impacts of failure scenarios within the food industry. Corrective actions relative to safety, quality, and economics of the affected products will be assessed. 3 lectures, 1 activity.

**FSN 575. Advanced Food Safety. 4 units**

Term Typically Offered: TBD

Prerequisite: FSN 375 or graduate standing; and MCRO 421.

In-depth analysis of food safety issues including outbreaks, risk assessment, Food Safety Modernization Act (FSMA), product and process assessments. Special emphasis on the critical evaluation, development and execution of food safety research. 3 lectures, 1 laboratory.

**FSN 581. Graduate Seminar in Food Science and Nutrition. 1-3 units**

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Current findings and research problems in the field and their application to food science and nutrition. Class Schedule will list topic selected. Total credit limited to 6 units with approval of advisor. 1-3 seminars.

**FSN 599. Thesis. 1-6 units**

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing and consent of instructor.

Individual research in food science and nutrition under faculty supervision leading to a graduate thesis of suitable quality. Total credit limited to 6 units.