

# FOOD SCIENCE & NUTRITION

Agricultural Sciences Bldg. (11), Room 244

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<https://fsn.calpoly.edu>

Department Head: Stephanie Jung

## Academic Programs

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

The department offers two bachelor's degrees and two master's degrees. The bachelor's degrees are designed to prepare graduates for employment in the general areas of food science and human nutrition. The master's degree in Nutrition is designed to prepare graduates for advancement, specialization, and leadership in nutrition or healthcare careers. The master's degree in Food Science is designed to prepare graduates for pursuing a PhD and/or to enter the food industry at a higher level position. Students pursuing a bachelor's degree in Food Science may apply for the Blended 4+1 master's degree in Food Science program.

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 1,000 hours of supervised practice and at least 200 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.

#### Culinology

Culinology® is designed for students who want to blend culinary arts and food science principles in ingredient development, food product development, or in entrepreneurial pursuits. Successful completion of courses in this concentration fulfill the requirements for the Research Chefs Association Culinology® 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 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 (<https://catalog.calpoly.edu/collegesandprograms/orfaleacollegeofbusiness/>) section).

## Graduate Programs

### MS Food Science

#### General Characteristics

The MS Food Science program is designed to prepare graduates for advancement, specialization, and leadership in food science careers. In addition, graduates will be prepared for further education in doctoral studies in food science and related fields. The MS Food Science program integrates the disciplines of chemistry, microbiology, product development and processing/engineering, to prepare qualified graduates for food-related careers in industry, government and academia.

#### Additional Requirements:

- Statement of purpose
- Curriculum Vitae
- Three letters of academic and/or professional recommendation

### 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 nutrition, public health, animal science, or other health science-based disciplines.

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, or business.

Students may follow a suggested area of emphasis. Examples may include: Molecular Nutrition, Public Health Nutrition, or Health and Wellness. These would be compatible with the students 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.

#### Additional Requirements

- Statement of purpose
- Three letters of academic and/or professional recommendation
- Introductory chemistry series (one year), organic chemistry (min one course), biochemistry and an introductory biology course
- FSN 328 Nutrient Metabolism I or FSN 331 Macronutrient Metabolism
- FSN 329 Nutrient Metabolism II or FSN 332 Micronutrient Metabolism and FSN 333 Nutrient Metabolism Lab

## Blended BS + MS Programs

A blended program provides an accelerated route to a graduate professional degree, with simultaneous conferring of both Bachelor's and Master's degrees. Students in the blended program are provided with a seamless process whereby they can progress from undergraduate to graduate status. Students are required to complete all requirements for both degrees, including senior project for the Bachelor's degree.

Blended programs are available for the following Master's degrees offered by the Food Science and Nutrition department:

- MS Food Science
- MS Nutrition

#### Eligibility

Students majoring in BS Food Science with a concentration in Advanced Food Science are eligible for the blended program in MS Food Science.

Students majoring in BS Nutrition are eligible for the blended program in MS Nutrition.

Participation in a blended program is based upon prior academic performance and other measures of professional promise. Refer to [Graduate Education \(https://catalog.calpoly.edu/graduateeducation/#graduateandpostbaccalaureateadmissionrequirements/\)](https://catalog.calpoly.edu/graduateeducation/#graduateandpostbaccalaureateadmissionrequirements/) for more information and for the minimum criteria required to be eligible for a blended program at Cal Poly. Contact the Food Science or Nutrition Graduate Program Coordinator in the Food Science and Nutrition department for any additional eligibility criteria.

## FSN Courses

### FSN 101. Orientation to the Nutrition Major. 1 unit

Term Typically Offered: F  
CR/NC

Understanding the depth and breadth of the Nutrition program. Emphasis on academic and career planning. Students are required to complete this course within their first year in the major. Credit/No Credit grading only. 1 lecture.

### FSN 102. Orientation to the Food Science Major. 1 unit

Term Typically Offered: F  
CR/NC

Understanding the depth and breadth of the Food Science program. Emphasis on the Food Science major, the Food Science and Nutrition Department, related club and professional organization activities, and academic and career planning. 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. Not open to students with credit in FSN 230. 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

Term Typically Offered: TBD  
CR/NC

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 202. Introduction to Human Nutrition. 4 units

Term Typically Offered: F, W, SP

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.

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

Term Typically Offered: W

Prerequisite: FSN 125 or FSN 230; MATH 141 or MATH 161; PHYS 121.

Explore unit operations (drying, heating, etc.) in food processing. Introduction to basic concepts of engineering (unit conversion, mass balance and heat transfer). Operate pilot scale processing equipment and evaluate the results of those operations. Students produce processed foods in a pilot plant. Field trip required. 3 lectures, 1 laboratory.

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

Term Typically Offered: W

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. Not open for students with credit in FSN 125. 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: Culture and Customs. 4 units

Term Typically Offered: F,W,SP,SU

2019-20 or later catalog: GE Area E

2017-19 or earlier catalog: GE Area D4

USCP

Sustainability Related

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 Area E (GE Area D4 for students on the 2017-19 or earlier catalogs) and USCP.

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

Term Typically Offered: F

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 281. Writing in Nutrition Science. 2 units**

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs); completion of GE Area A3 with a grade of C- or better; and FSN 202.

Introduction to writing in nutrition science. Foundations in scientific writing processes, scientific reading, literature review, reference management. Emphasis on identifying and summarizing reliable sources, analyzing the audience, and revising for complexity and depth. 2 activities.

**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 Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

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

Term Typically Offered: SP

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 305. Nutrition & Exercise for Health & Disease Prevention. 4 units**

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Introduction, integration, and application of nutrition and exercise sciences and recommendations for attaining health and preventing disease development, including obesity, diabetes, and cardiovascular disease. Development of personalized diet and exercise plan for health and disease prevention. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

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

Term Typically Offered: F, W, SP

Prerequisite: FSN 202 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. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

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

Term Typically Offered: W

Prerequisite: FSN 125 or FSN 230; and STAT 314.

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. Course may be offered in classroom-based or hybrid format. 3 lectures, 1 laboratory.

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

Term Typically Offered: F, W, SP

Prerequisite: FSN 202 and 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. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

**FSN 319. The Science of Food for the Consumer. 4 units**

Term Typically Offered: F,W,SP, SU

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Overview of the science and processes 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. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

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

Term Typically Offered: F, W

Prerequisite: FSN 121, FSN 202 or 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 323. Culinary Internship. 1 unit**

Term Typically Offered: F

Prerequisite: FSN 121 and FSN 321.

Independent internship experience conducted under faculty supervision focusing on culinary science. This course is only open to students enrolled in the Culinology® concentration and satisfies the culinary internship requirement per the Research Chefs Association's Culinology® concentration. 1 laboratory.

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

Term Typically Offered: TBD

Prerequisite: BIO 161; CHEM 313 or CHEM 314 or CHEM 369 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: TBD

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. Principles of Food Engineering. 4 units**

Term Typically Offered: W  
Prerequisite: FSN 204.

Fundamental engineering principles related to heat transfer in food processing unit operations. Engineering properties of foods, mass and energy balances, thermodynamics, and heat transfer in various unit operations (drying, mixing, refrigeration). Sustainability applied to unit operations will be introduced. Field trip required. 3 lectures, 1 laboratory.

**FSN 331. Macronutrient Metabolism. 4 units**

Term Typically Offered: F, W, SP  
Prerequisite: Junior standing; BIO 161; FSN 202; and CHEM 313 or CHEM 314 or CHEM 369 or CHEM 371.

Metabolism of carbohydrates, fats, and proteins as it applies to human nutrition. Integration and regulation of metabolic pathways. Not open to students with credit in FSN 328. 4 lectures.

**FSN 332. Micronutrient Metabolism. 4 units**

Term Typically Offered: F, W, SP  
Prerequisite: FSN 331.

Continuation of FSN 331. Biochemical, molecular, and physiological functions of vitamins and minerals and their interaction with other nutrients. Not open to students with credit in FSN 329. 4 lectures.

**FSN 333. Nutrient Metabolism Lab. 1 unit**

Term Typically Offered: F, W, SP  
Prerequisite: FSN 328 or FSN 331. Corequisite: FSN 332.

Application of biochemical, absorptiometry, calorimetry, and other methods to assess health indicators and nutritional status. 1 laboratory.

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

Term Typically Offered: SP  
Prerequisite: 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. Field trip required. Course may be offered in classroom-based or online format. 3 lectures.

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

Term Typically Offered: F  
Prerequisite: Junior standing; FSN 125 or FSN 230; and STAT 218.  
Recommended: STAT 314.

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 340. Fermented Foods. 4 units**

Term Typically Offered: F,W,SP,SU  
2020-21 or later: Upper-Div GE Area B  
2019-20 or earlier catalog: GE Area B5, B6, or B7  
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

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. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

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

Term Typically Offered: TBD  
Prerequisite: CHEM 313 or CHEM 314 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. Foodservice Operations I. 3 units**

Term Typically Offered: F, W  
Prerequisite: FSN 121 and junior standing.

Principles of equipment selection and foodservice facility, planning with emphasis on sanitation and safety. Field trip required. 2 lectures, 1 laboratory.

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

Term Typically Offered: W, SP  
Prerequisite: FSN 321 and 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 or CHEM 314.

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: F

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 381. Critical Evaluation of Nutrition Research. 4 units**

Term Typically Offered: F, W, SP

Prerequisite: FSN 281 and STAT 218. Corequisite: FSN 329 or FSN 332.

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. Formerly FSN 420.

**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 405. Advanced Sport Nutrition & Exercise Metabolism. 4 units**

Term Typically Offered: TBD

Prerequisite: FSN 328 or FSN 331.

Advanced topics in sports nutrition and interaction of exercise and nutrition, including classic and recent findings related to mechanisms of nutrient effects on exercise performance, metabolism, muscle physiology, body composition, and health. 4 lectures.

**FSN 407. Food Ingredient Functionality. 3 units**

Term Typically Offered: TBD

Corequisite: FSN 364.

Relationship between the structure of food ingredients and their functionality through the application of food chemistry and food processing principles. Functionality and application of various ingredients for the safe production of commercial food and beverage products. Course may be offered in classroom-based or hybrid format. 2 lectures, 1 laboratory.

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

Term Typically Offered: F, SP

Prerequisite: FSN 311; FSN 330; and senior standing. Recommended: FSN 407.

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, W

Prerequisite: Senior standing; and FSN 328 or FSN 331. Corequisite: FSN 329; or FSN 332 and FSN 333.

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: W, SP

Prerequisite: FSN 310; FSN 315; FSN 328 or FSN 331; and senior standing. Recommended: 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 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: TBD

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: TBD

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 431. Medical Nutrition Therapy I. 2 units**

Term Typically Offered: F, W, SP

Prerequisite: BIO 231. Corequisite: FSN 329; or FSN 332 and FSN 333.

An introduction to working in clinical nutrition. Topics include the Nutrition Care Process and the specialized practices of medical nutrition therapy documentation, nutrition assessment, and formulating a nutrition diagnosis. 1 lecture, 1 activity.

**FSN 432. Medical Nutrition Therapy II. 4 units**

Term Typically Offered: F, W, SP

Prerequisite: BIO 232; FSN 310; FSN 315; and FSN 431.

Application of the nutrition care process to physiological disorders which may alter nutritional requirements and require dietary modifications for: Diabetes Mellitus, enteral and parenteral nutrition, anemias, acid-base conditions, cardiovascular disease, obesity, and upper and lower GI diseases. Not open to students with credit in FSN 429 or FSN 430. 3 lectures, 1 laboratory.

**FSN 433. Medical Nutrition Therapy III. 4 units**

Term Typically Offered: F, W, SP

Prerequisite: FSN 432.

Continuation of Medical Nutrition Therapy series. Application of the nutrition care process to diseases and disorders including hepatobiliary, pancreatic, renal, and respiratory diseases, metabolic stress, trauma, burns, cancer, and metabolic disorders. Not open to students with credit in FSN 429 or FSN 430. 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: SP

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 457. Food Science Senior Project - Scientific and Technical Writing Course. 3 units**

Term Typically Offered: W

Prerequisite: FSN 364; STAT 218 or STAT 314; and senior standing.

Directed culminating experience for Food Science students choosing the senior project scientific writing option. 3 lectures.

**FSN 458. Food Science Senior Project - Research. 3 units**

Term Typically Offered: F, W, SP

Prerequisite: FSN 364; STAT 218 or STAT 314; senior standing; and consent of instructor.

Directed culminating experience for Food Science students choosing the senior project research option. Required for Blended MS in Food Science.

**FSN 459. Food Science Senior Project - Internship. 3 units**

Term Typically Offered: F,W,SP,SU

Prerequisite: Two of the following: FSN 330, FSN 335, FSN 364, FSN 370, or FSN 375; and senior standing.

Directed culminating experience for Food Science students choosing the senior project internship option. Required for Culinology concentration. Students must complete a project as a component of their internship. Course may be offered in classroom-based or online format. Minimum 90 hours required.

**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 or FSN 332 and 333; and FSN 381.

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**

Term Typically Offered: F

CR/NC

Prerequisite: Senior standing. Recommended: FSN 329 or FSN 332.

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 469. Food Science Exit Exam. 0 unit**

Term Typically Offered: F, SP

CR/NC

Concurrent: FSN 408.

Assessment of BS Food Science program through completion of a senior exit survey. Results will only be used to improve the curriculum. Course offered online only. Credit/No Credit grading only.

**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. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 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. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 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 478. Senior Project Experiential Learning in Nutrition. 2 units**

Term Typically Offered: TBD

Prerequisite: FSN 381; senior standing; and consent of instructor.

Directed individual or group experiential learning/research on advanced topics in nutrition. Content generated will be used for synthesizing students' senior project. 2 activities.

**FSN 479. Senior Project Advanced Topics. 2 units**

Term Typically Offered: TBD

Prerequisite: FSN 381; senior standing; and consent of instructor.

Directed group study of selected advanced topics for nutrition senior project. This course separates the report from learning advanced topics; FSN 481 is required in addition to FSN 479 for senior project credit. The Class Schedule will list topic selected. 2 lectures.

**FSN 481. Advanced Nutrition Senior Project Scientific Writing. 1 unit**

Term Typically Offered: TBD

Prerequisite: FSN 478 or FSN 479; and senior standing.

Directed culminating experience in writing across the curriculum. Senior project scientific writing for nutrition students.

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

Term Typically Offered: TBD

CR/NC

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 490. Food Safety Modernization Act: Human Food Safety. 2 units**

Term Typically Offered: TBD

Prerequisite: FSN 375.

Food Safety Modernization Act training on the implementation of hazard analysis risk-based preventive controls for human food. 2 lectures.

**FSN 491. Food Safety Modernization Act: Produce Safety. 2 units**

Term Typically Offered: TBD

Prerequisite: FSN 375.

Produce safety, the Food Safety Modernization Act (FSMA) Produce Safety Rule, Good Agricultural Practices (GAPs), and co-management of natural resources and food safety. Field trip required. 2 lectures.

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

Term Typically Offered: TBD

CR/NC

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 505. Orientation to Graduate Studies. 1 unit**

Term Typically Offered: F

CR/NC

Prerequisite: Graduate standing.

Orientation to graduate school and discussion on topics that will help students to be successful. Discussion of policy and ethical issues in the conduct of research, how to find appropriate resources, and understanding the process of presenting and publishing research. Intended for entering graduate students. 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: TBD

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: F

Prerequisite: FSN 328 or FSN 331; 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: W

Prerequisite: FSN 329, or FSN 332 and FSN 333; 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, or FSN 332 and FSN 333; 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 531. Lipid Metabolism and Nutrition. 3 units**

Term Typically Offered: SP

Prerequisite: Graduate standing or consent of instructor. Recommended: FSN 331.

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 lectures.

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

Term Typically Offered: TBD

CR/NC

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 550. Nutrition & Dietetics Leadership & Professionalism Seminar. 1 unit**

Term Typically Offered: F, W, SP

Prerequisite: Admission into Cal Poly's dietetic internship programs.

Seminar focused on professionalism and leadership in dietetics and current issues in medical nutrition therapy, food service management, and management and community nutrition. Field trip may be required. Degree credit limited to 3 units. Total credit limited to 6 units.

**FSN 551. Medical Nutrition Therapy Practicum I. 1 unit**

Term Typically Offered: F, W, SP

Prerequisite: Admission into Cal Poly's dietetic internship programs.

Supervised practice providing medical nutrition therapy for patients with lower-acuity care needs/low-moderate nutrition risk in outpatient and inpatient medical facilities. Degree credit limited to 4 units. Total credit limited to 6 units.

**FSN 552. Medical Nutrition Therapy Practicum II. 1 unit**

Term Typically Offered: F,W,SP, SU

Prerequisite: Admission into Cal Poly's dietetic internship programs.

Supervised practice providing medical nutrition therapy for patients with mid-level acute care needs/moderate nutrition risk. Degree credit limited to 4 units. Total credit limited to 6 units.

**FSN 553. Medical Nutrition Therapy Practicum III. 1 unit**

Term Typically Offered: F,W,SP, SU

Prerequisite: Admission into Cal Poly's dietetic internship programs.

Supervised practice providing medical nutrition therapy for patients with high-level acute care needs/high nutrition risk. Degree credit limited to 4 units. Total credit limited to 6 units.

**FSN 554. Community Nutrition Practicum. 1 unit**

Term Typically Offered: F,W,SP, SU

Prerequisite: Admission into Cal Poly's dietetic internship programs.

Supervised practice in community nutrition settings. Degree credit limited to 4 units. Total credit limited to 6 units.

**FSN 556. Food & Nutrition Service Management Practicum. 1 unit**

Term Typically Offered: F,W,SP,SU

Prerequisite: Admission into Cal Poly's dietetic internship programs.

Supervised practice in food and nutrition service and management facilities, such as hospitals and school districts. Degree credit limited to 4 units. Total credit limited to 6 units.

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

Term Typically Offered: SP

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 Class Schedule will list topic 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. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 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: W

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. The Class Schedule will list topic selected. Total credit limited to 6 units with approval of advisor. 1 to 3 seminars.

**FSN 582. Current Nutrition Research. 1 unit**

Term Typically Offered: W, SP

Prerequisite: Graduate standing or consent of instructor.

Directed group study and presentation of selected nutrition research topics for graduate and advanced undergraduate students. Students will select, read, critically analyze and present nutrition research within designated themes. Total credit limited to 3 units. 1 seminar.

**FSN 598. Nutrition & Dietetics Capstone Project. 1 unit**

Term Typically Offered: F, W, SP

Prerequisite: Admission into Cal Poly's dietetic internship programs; and STAT 511.

Capstone project for students to apply and synthesize their knowledge and experiences to address current issues in nutrition and dietetics practice. Course offered in hybrid format with classroom-based and online learning. Degree credit limited to 6 units. Total credit limited to 9 units.

**FSN 599. Thesis. 1-9 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 9 units.