## FOOD SCIENCE AND NUTRITION (FDSN)

**FDSN 100**  
**Introduction to the Profession**  
In this course students will survey the professional landscape of the food industry. The course provides an introduction to the different career roles and opportunities within the food industry. The rich Chicago food industry will serve as a backdrop to learn about the current and emerging food ecosystem. Students will hear from industry guest speakers about the legacy and latest start-up enterprises that comprise various professional paths. Field trips to local food business incubators and food processing plants are planned. The course will also provide an introduction to food regulations.  
Lecture: 2 Lab: 0 Credits: 2

**FDSN 201**  
**Nutrition and Wellness**  
Introduction to the basic principles of nutrition and the relationship of the human diet to health. Overview of the nutrition profession, the biological uses of nutrients, and tools for dietary planning and assessment in various settings. Examination of specific issues such as weight management, sports nutrition, food safety, the diet-disease relationship, and global nutrition. Analysis of special nutritional requirements and needs during the life cycle.  
Lecture: 3 Lab: 0 Credits: 3  
Satisfies: Natural Science (N)

**FDSN 210**  
**Introduction to Culinology**  
This course gives a broad overview of the new field of culinology: the blending of culinary arts and food science training. Topics include Principles of Cooking, Formula and Recipe Development, Culinary Fundamentals and Production Systems, Culinary Uses and Applications of Products, Flavor Building, and Functional Ingredients, and how these all integrate with Food Safety and Sanitation Principles.  
Lecture: 2 Lab: 0 Credits: 2

**FDSN 300**  
**Nutrition Through the Life Cycle**  
This course analyzes the changing nutritional requirements and relative dietary and psycho-social issues which are specific to the different stages of the life cycle. Expected student outcomes include the following: (1) the student will be able to identify specific nutrient requirements for each stage of the life cycle; (2) the student will be able to relate nutrient needs to developmental levels, including biochemical and physiological structure/function of the body, and have a general understanding of dietary planning that will adequately meet nutritional needs of given levels; (3) the student will be able to describe the importance of environment, feeding skills, psychosocial situations, and other factors to total nutrition and eating habits through the life cycle (development through aging); (4) the student will be able to identify risk factors associated with major health problems over the life span and acquire appropriate knowledge for addressing through dietary and lifestyle choices; (5) the student will be able to select, utilize, and evaluate appropriate materials and methods for communication of nutrition information to a given audience; (6) the student will be able to evaluate dietary intakes and feeding programs for individuals throughout the life cycle; and (7) the student will effectively communicate knowledge through exams, writing, and/or oral projects.  
Prerequisite(s): (BIOL 107 or BIOL 115) and (FDSN 201 or FDSN 401)  
Lecture: 3 Lab: 0 Credits: 3  
Satisfies: Communications (C), Natural Science (N)

**FDSN 301**  
**Exploring Food Science & Tech**  
In this course students will explore the wide array of disciplines in which engineering, biological, and physical sciences are used to study and produce food products. An overview of the relationship between food nutrition, chemistry, microbiology, safety, processing, engineering, sensory, and product development will be discussed. The food science and technology industry will be studied to understand food processing, food safety, quality and packaging of specific categories of foods. The course also provides a brief introduction to different career opportunities within the food and technology industry.  
Lecture: 3 Lab: 0 Credits: 3
FDSN 304
Food Biotechnology
This course is designed for undergraduate students to learn various biotechnologies and applications used by modern food industry. These may include but limited to genetic engineering of microorganisms, polymerase chain reaction, molecular detection, DNA fingerprinting, and epidemiology of foodborne pathogen, genetically modified organisms (GMOs), food plant biotechnology, dairy and animal biotechnology, biotechnology in fermentation industry and dietary supplements, consumer perspectives and governmental regulations of GMOs, organic foods and more. Also covered in this course: fundamentals of microbial genomics and proteomics, introduction of bioinformatics tools including database search, gene prediction, PCR primer design, structural and functional prediction of proteins. Also examined are applications of high-throughput sequencing technology and data security in food safety and public health sectors.
Prerequisite(s): BIOL 210
Lecture: 3 Lab: 0 Credits: 3
Satisfies: Communications (C)

FDSN 310
Food Chemistry with Lab
The course applies basic scientific principles to food systems and practical applications. Chemical/biochemical reactions of carbohydrates, lipids, proteins, and other constituents in fresh and processed foods are discussed with respect to food quality. Reaction conditions and processes that affect color, flavor, aroma, texture, nutrition, and safety of food are emphasized. Other topics include activation and control of enzymatic reactions in fruits and vegetables; consequences of water migration on food quality; gelatinization#retrogradation in starch#based foods (e.g., pudding, bread, and rice); initiation and control of non#enzymatic browning (e.g., pretzels, meat); food emulsions (e.g., salad dressings, commutated meats products), crystal structures in foods and general properties of food materials. The interaction of food components with packaging and the environment will be examined.
Prerequisite(s): CHEM 237
Lecture: 2 Lab: 1 Credits: 3

FDSN 311
Food Analysis and Properties
In this course students will learn about the physical and chemical properties of foods that can be instrumentally measured as a means to derive product and ingredient specifications. Such measurements enable the food industry to define foods on an objective basis and meet regulatory requirements for food labeling. Properties such as color, acidity, total solids, viscosity, water activity, particle size and moisture content will be demonstrated in a hands-on lab experience setting. This course will also cover the types of instrumentation used for nutritional label contents (protein, fat, sugars, salt etc.) versus that used for research purposes and trouble-shooting for product design issues.
Lecture: 2 Lab: 1 Credits: 3

FDSN 312
Food and Natural Products Toxicology
Food toxicology is concerned with assessing the injurious effects on living systems of chemicals present in foods. The chemical agents can be man-made (e.g., pesticide residues, food additives, contaminants originating with processing machinery, or packaging materials) or of natural origin (e.g., microbial, animal or plant derived). They can also be generated in the course of preparing, processing, and preserving foods (e.g., mutagens and carcinogens). This course presents the chemical and biological principles that determine toxicity and, by presenting typical examples of the toxic substances found in foods, it hopes to let students become familiar with their properties, modes of action, and methods of analysis.
Prerequisite(s): CHEM 237 and BIOL 107
Lecture: 3 Lab: 0 Credits: 3

FDSN 314
Sustainable Food Systems
This course is designed to give students an appreciation of the complex intersections and relationships among food and culture, economics, the environment, labor, policy, population health, and social justice. Students will have opportunities to work on projects that model and analyze these relationships, and consider trade-offs impacting production and consumption, global nutrition and health, scarcity in resources, and more. Students will visit urban and rural farms, introduced to alternative farming techniques and their challenges, how sustainability is measured and reported in the food and related industries.
Lecture: 3 Lab: 0 Credits: 3
Satisfies: Communications (C)

FDSN 316
Cultural Foods with Lab
This course examines the regional, ethnic, cultural, religious, historical and social influences on food patterns and cuisine. Students will study cultural food and nutrition principles related to the following topics: Food as identity and food in social organization; Evolutionary and revolutionary developments in food and cuisine; Food as spectacle; Food technology in non-industrialized and industrialized food systems; Food and health: political inputs and obesity; Food branding and marketing; Food in world religions; Global hunger: root causes and proposed solutions; Hunger in America; and Food and social change.
Lecture: 2 Lab: 0 Credits: 3

FDSN 318
Culinary Entrepreneurship
This course surveys the new trends in food business entrepreneurship from a culinary perspective. Guest speakers with backgrounds in food science and culinary arts will review the steps in taking a kitchen recipe concept into the local marketplace. Topics will include formulating your business plan, preparing the product pitch for investors, choosing when to work with a shared kitchen versus a food incubator space, when and how to use consultants, building a support team and how to scale the product. Local chef and food entrepreneurs will co-instruct this course and students will visit several of Chicago's start-up entrepreneurial centers.
Lecture: 3 Lab: 0 Credits: 3
Food Science and Nutrition (FDSN)
FDSN 413
Food Fermentation (w/lab and plant field trips)
Role and history of fermentation; the role of microorganisms in fermentation; microbial growth kinetics during food fermentation; biological pathways in fermentation; factors affecting fermentation; fermented food products; industrial-scale fermentation; operation of fermenter; the role of sterilization in fermentation; design of a fermenter; role of different types of fermentation (alkaline, alcoholic, acetic acid, high salt, savory fermentation). Students will explore processing of fermented foods via in class and hands on learning experiences.
Prerequisite(s): CHEM 237 and BIOL 210
Lecture: 2 Lab: 0 Credits: 3

FDSN 414
Unit Operations in Food Processing
This course will introduce the students to various food processing technologies used in the food industry. Students will learn about a wide range of unit operations such as mixing, separation, concentration, blanching, pasteurization, evaporation, extrusion, dehydration, baking, roasting, frying, chilling, controlled atmospheric storage, freeze drying, coating, enrobing, filling and sealing. The emphasis will be on implementation of unit operations in the food industry and the impact of these unit operations on food safety, nutrition and consumer acceptability.
Lecture: 3 Lab: 0 Credits: 3

FDSN 417
Management of Food Quality Control
This course centers on the modern food processing facility which requires full time quality control management. A unique QC lab mock-up is used to provide a hands-on training experience to prepare the student for management of a QC lab. Taught by faculty with in-plant experience, students will learn how to select and integrate modern ingredient and finished product test methods with operational data from the production line. Statistical Process Control (SPC) charting methods, design of sampling protocols, handling of retention samples, dealing with product recall plans, record keeping and management of consumer complaint data will be discussed.
Prerequisite(s): FDSN 311*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 Lab: 0 Credits: 3

FDSN 418
Introduction to Food Design
Food design is a relatively new field to the food industry but is increasingly a critical aspect of bringing a successful food product to market. Students will learn the basic tools of human centric design thinking. This will include how to gain insights from observing and listening to the consumer. Skills for understanding unmet needs and how to frame the problem will be taught through team product design challenges sourced from the local community. Teams will have the opportunity to validate their design concepts to invited industry mentors. This course is co-taught with the IIT Design Institute in the Kaplan Institute.
Lecture: 3 Lab: 0 Credits: 3

FDSN 420
US Food Safety Regulatory Systems
This course gives a broad overview of the food safety regulatory systems in the US. It will cover the roles of FDA, USDA, EPA, CDC, DoS in regulating the production and sale of food. Regulations covered include Low Acid Canned Foods, HACCP, dietary supplements, infant formula, food additives and packaging, and the six parts of the Food Safety Modernization Act (FSMA).
Lecture: 3 Lab: 0 Credits: 3

FDSN 430
FDSN Capstone
Students choose one of two options based on area of focus: FSMA or Human Nutrition. The FSMA capstone will include hands-on team-based practical experience implementing the Food Safety Modernization Act (FSMA) Preventative Controls for Human Foods. The experience will involve the drafting a food safety plan consistent with current laws and regulations. The Human Nutrition capstone will be hands-on team-based practicum designing foods for specific claims petition, including developing validation strategy and drafting appropriate claims petition consistent with current law/regulations.
Prerequisite(s): FDSN 420 or (FDSN 405 and FDSN 401)
Lecture: 3 Lab: 0 Credits: 3

FDSN 435
Performance Management in Food Operations
Creating an organization-wide culture of quality and performance is critical to managing the unique demands of a food processing company. Learn how to develop, manage, and improve food production processes, implement lean principles to eliminate waste and improve yields, and measure operational performance. Topics covered include budgeting and financial tools, introducing new food products and processes, Total Quality Management (TQM), evaluation and management of supply chain activities, and strategy deployment techniques. This course includes a Project Team Assignment from the participating plant personnel with at least one - two visits to a Food Processing Plant in the Chicago Area. An introductory course in Food Processing or Food Safety is helpful. Experience in MS Excel Worksheets, MS Word, and MS Power Point is highly recommended. This course ideally follows the FSN 408 508 Food Product Development Course as it teaches the final phases of food product development of taking a product into a manufacturing operation and how to ensure optimum performance in production.
Lecture: 3 Lab: 0 Credits: 3

FDSN 480
Juice HACCP Short Course
This two-day Juice HACCP course is an instructor-led interactive course, using the FDA-recognized standardized Juice HACCP curriculum that was developed by the Illinois Tech IFISH/NCFST led Juice HACCP Alliance. This course is designed to meet the HACCP training requirements established under 21 CFR Part 120.13 of the U.S. Food and Drug Administration’s mandatory juice HACCP inspection program.
Lecture: 1 Lab: 0 Credits: 1
FDSN 494
Special Projects
Advanced projects in food processing and packaging, food microbiology and safety, food chemistry, and nutrition.
Credit: Variable