

# FOOD SCIENCE AND NUTRITION (FDSN)

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## 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 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 (FST 201 or FST 401 or FPE 201 or FPE 401)

**Lecture: 3 Lab: 0 Credits: 3**

**Satisfies:** 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 401

### Nutrition, Metabolism, and Health

Study of chemical structures, types, and metabolism of carbohydrates, lipids, and proteins. Discussion of the biological and chemical roles of vitamins and minerals. Application and integration of metabolic knowledge with health promotion and chronic disease.

**Lecture: 3 Lab: 0 Credits: 3**

## FDSN 402

### Development, Delivery, and Dissemination

This course is an introduction to writing and presenting on scientific research with a focus on skills necessary for research at IIT's Institute for Food Safety and Health. Topics will include defining a problem, structuring a literature review, creating a research proposal, and written and oral presentation of research results.

**Lecture: 3 Lab: 0 Credits: 3**

## FDSN 405

### Food and Behavior

The course aims to develop an understanding of food and food intake behavior by examining the intersection of nutritional science with other disciplines and expertise. The course will be an analysis of the factors that impact food choice/intake. Examination of physiological regulation, physiological and psychological moderators, food marketing, technology, economics, food policy and regulations, media, food safety, and agricultural practices as well as how food intake behavior feeds back and influences these factors. Influence of sex, BMI, and age will also be considered.

**Lecture: 3 Lab: 0 Credits: 3**

## FDSN 408

### Food Product Development

Students in this class will learn how to do the following: identify the key steps in the food product development process and stage gate concepts; develop a formulation approach with ability to effectively understand how to work well with vendors, handle labeling regulations, food safety, and consumer acceptability requirements; create a product unit costing with trade-offs and contingencies for market launch; identify key performance requirements for product shelf life testing and packaging specifications; evaluate product quality and safety with traditional and state of the art assessment tools; how to conduct consumer tests, plant trials, and introduce new products and processes into the manufacturing operation and contingency planning; and develop a strategy to monitor and improve product performance.

**Lecture: 3 Lab: 0 Credits: 3**

## FDSN 501

### Nutrition, Metabolism, and Health

Study of chemical structures, types, and metabolism of carbohydrates, lipids, and proteins. Discussion of the biological and chemical roles of vitamins and minerals. Application and integration of metabolic knowledge with health promotion and chronic disease.

**Lecture: 3 Lab: 0 Credits: 3**

### **FDSN 502**

#### **Development, Delivery, and Dissemination**

This course is an introduction to writing and presenting on scientific research with a focus on skills necessary for research at IIT's Institute for Food Safety and Health. Topics will include defining a problem, structuring a literature review, creating a research proposal, and written and oral presentation of research results.

**Lecture: 3 Lab: 0 Credits: 3**

### **FDSN 504**

#### **Food Biotechnology**

Introduction of biotechnology in the food industry including genetic engineering of microorganisms. Fundamentals of microbial genomics and proteomics. Practice of a variety of software and bioinformatics tools including database search, sequence alignment, phylogenetic and cluster analyses, gene production, genomic map construction, and structural and functional prediction of proteins. Applications of DNA fingerprinting techniques in food safety and public health.

**Lecture: 3 Lab: 0 Credits: 3**

### **FDSN 505**

#### **Food Microbiology**

Principles of occurrence and control. Importance of sanitation and prevention of public health problems. Microbiological contaminants and methods for their detection. Mechanisms of microbial inactivation.

**Lecture: 3 Lab: 0 Credits: 3**

### **FDSN 506**

#### **Food Microbiology Laboratory**

Introductory Microbiology. Basic microbiological techniques and safe laboratory practices. Introductory Food Microbiology. Isolation pathogenic bacteria. Spoilage microorganisms. Fermentation. Environmental Monitoring. Rapid Identification tests. Sporeformers.

**Lecture: 0 Lab: 3 Credits: 3**

### **FDSN 507**

#### **Food Analysis**

Techniques for analyzing food toxins, food constituents of public health concern, intentional and unintentional food additives, modern separation and analytic techniques.

**Lecture: 3 Lab: 0 Credits: 3**

### **FDSN 508**

#### **Food Product Development**

Students in this class will learn how to do the following: identify the key steps in the food product development process and stage gate concepts; develop a formulation approach with ability to effectively understand how to work well with vendors, handle labeling regulations, food safety, and consumer acceptability requirements; create a product unit costing with trade-offs and contingencies for market launch; identify key performance requirements for product shelf life testing and packaging specifications; evaluate product quality and safety with traditional and state of the art assessment tools; how to conduct consumer tests, plant trials, and introduce new products and processes into the manufacturing operation and contingency planning; and develop a strategy to monitor and improve product performance.

**Lecture: 3 Lab: 0 Credits: 3**

### **FDSN 509**

#### **Fundamentals of Biostatistics and Epidemiology in Food Science and Nutrition**

This course covers fundamental concepts in biostatistics and epidemiology with an emphasis on applications to food science, food safety, and nutrition. The course will emphasize study designs and epidemiologic and statistical methods used to investigate the relationships between health-related variables with particular attention to food-related exposures in health and disease.

**Corequisite(s): FDSN 510**

**Lecture: 3 Lab: 0 Credits: 3**

### **FDSN 510**

#### **Fundamentals of Biostatistics and Epidemiology Laboratory in Food Science and Nutrition**

This laboratory course covers fundamental concepts in biostatistics and epidemiology with an emphasis on applications to food safety and nutrition. The course will emphasize study designs and epidemiologic and statistical methods used to investigate the relationships between health-related variables with particular attention to food-related exposures in health and disease. Self-directed course.

**Corequisite(s): FDSN 509**

**Lecture: 0 Lab: 2 Credits: 1**

### **FDSN 511**

#### **Food Law and Regulations**

Legal and scientific issues in regulating the nation's food supply and nutritional status. Roles of regulatory agencies; Federal Food, Drug and Cosmetic Act; definitions and standards for food and adulterated foods. Manufacturing processed foods in compliance with regulations.

**Lecture: 3 Lab: 0 Credits: 3**

### **FDSN 519**

#### **Food Process Engineering Lab**

This course provides hands on experience to students on various unit operations. Students will be exposed to heat and mass transfer in food processing, fluid flow, preservation processes, cooling, freezing, freeze drying, thermometry and alternative methods of food processing.

**Lecture: 0 Lab: 3 Credits: 3**

### **FDSN 520**

#### **Low-Acid Canned Food Regulations and Microbiology**

Regulatory requirements for the U. S. Food and Drug Administration and the broad microbial issues associated with low-acid canned foods (LACF) products. Topics will include the U. S. Food Drug & Cosmetic (FD&C) Act, Emergency Permit Control, 21 Code of Federal Register (CFR) parts 108, 113, and 114, record requirements, sources of microbial contamination, characteristics of clostridium botulinum, mesophilic sporeformers, indicator organisms, and introduction to microbial heat resistance.

**Lecture: 3 Lab: 0 Credits: 3**

**FDSN 521****Food Process Engineering**

Food engineering fundamentals, heat transfer in food processing, food rheology, freezing of foods, food dehydration, kinetics of chemical reactions in foods, refrigeration and thermal process calculations, and alternative methods of food processing.

**Lecture: 3 Lab: 0 Credits: 3**

**FDSN 522****Advanced Food Process Engineering**

Process calculations for food processing methods such as canning, aseptic processing, ohmic heating, microwave processing and pulsed energy processing. Extrusion techniques in food processing. Discussion of new food processing techniques and safety implications.

**Lecture: 3 Lab: 0 Credits: 3**

**FDSN 523****Food Engineering Process Delivery**

Requirements for the U. S. Food and Drug Administration food canning regulations, including system design, process establishment, operational, and inspection records. Operations and calibration requirements of thermal processing equipment. Process design, documentation of process deviation, and calculation of process delivery.

**Prerequisite(s):** FDSN 522 with min. grade of C

**Lecture: 3 Lab: 0 Credits: 3**

**FDSN 524****Fundamentals of Food Science**

This course will cover the central food science issues encountered with storage and processing of all major American food commodities including meats, grains, confections, vegetables, eggs, and dairy. It will also review the relevant chemistry, physics, and engineering required to understand common food-related unit operations such as drying, freezing, sterilization, and radiation treatment of foods. An introduction to microbial and chemical issues of food quality and safety will also be covered.

**Lecture: 3 Lab: 0 Credits: 3**

**FDSN 526****Engineering Principles of Food**

Methods for conducting seal integrity examinations, spoilage diagnosis, and traceability, defining and classifying package defects. Types of packaging materials, including metal, glass, plastics, flexible and composite containers, and their closure and sealing systems. Aseptic and alternative process delivery systems.

**Lecture: 3 Lab: 0 Credits: 3**

**FDSN 531****HACCP Planning and Implementation**

Examination of the Hazard Analysis and Critical Control Point (HACCP) principles; microbiological and process overviews; generic HACCP models, Good Manufacturing Practices (GMP); monitoring of critical control points (CCPs), process control and implementation.

**Lecture: 3 Lab: 0 Credits: 3**

**FDSN 535****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 541****Principles of Food Packaging**

Type and application of packaging materials. Migration theories and food package interaction, package testing to ensure safety, and recycling of package materials.

**Lecture: 3 Lab: 0 Credits: 3**

**FDSN 591****Research and Thesis**

Research and Thesis for Master of Science Degree students.

**Credit: Variable**

**FDSN 593****Seminar on Food Safety and Technology**

Students attend seminars offered during the semester. Each student is also required to give a 30 minute presentation on a topic of his/her interest or a research project on which she/he has worked.

**Lecture: 0 Lab: 1 Credits: 1**

**FDSN 594****Special Projects**

Advanced projects in food processing and packaging, food microbiology and safety, food chemistry, and nutrition.

**Credit: Variable**

**FDSN 597****Special Problems**

Independent study of advanced topics in food science and nutrition including food processing and packaging, food microbiology and safety, food chemistry, and nutrition.

**Credit: Variable**

**FDSN 600****Continuing of Residence**

Continuing of residence.

**Lecture: 0 Lab: 1 Credits: 1**

#### **FDSN 610**

##### **Advanced Topics in Food Microbiology**

This course is an advanced course in food safety microbiology covering the latest development and trends in food safety related microbiology, including emerging foodborne pathogens of public health significance, as well as the use of the latest technologies for the detection and control of these microbial food safety hazards. This course can be used as credits towards candidature for a Ph.D. degree in Food Safety and Technology/Food Science and Nutrition.

**Lecture: 2 Lab: 0 Credits: 2**

#### **FDSN 620**

##### **Advanced Topics in Food Chemistry**

This course can be used as credits towards candidature for a Ph.D. degree in Food Science and Nutrition. This course is expected to cover advanced knowledge in the chemistry of the components of foods, their physiochemical properties and chemical interactions, and the chemical changes that occur during processing, storage, and packaging. Students are expected to work on evidence derived from original research literature, interpretation of research findings, and problem solving based on the scientific principles of food chemistry. This advanced program is open to individuals who hold undergraduate degrees in chemistry, food science, or related disciplines. Students who have completed the FDSN 524 Fundamentals of Food Science and Technology and FDSN 507 Food Analysis courses with a B or higher may also apply. Upon successful completion of this course, students are expected to be able to translate theory and research into practice.

**Lecture: 2 Lab: 0 Credits: 2**

#### **FDSN 630**

##### **Advanced Topics in Nutrition**

This course can be used as credits towards candidature for a Ph.D. degree in Food Science and Nutrition. This course is expected to cover advanced knowledge in nutrition, metabolism, disease prevention and health promotion. This advanced program is open to individuals who hold undergraduate degrees in nutritional science, food science, health science, biology, biochemistry, chemistry or related disciplines. Students who have completed the FDSN 501 course with a B or higher may also apply. Upon successful completion of this course, students are expected to be able to translate theory and research into practice.

**Lecture: 2 Lab: 0 Credits: 2**

#### **FDSN 640**

##### **Advanced Topics in Food Process Engineering**

This course covers recent advancements and developments in food engineering and food processing including novel and emerging processing technologies, advanced thermal process calculations, modeling, simulation, sustainable food processing, process controls & automation and kinetics of food transformations, energy reduction, and food rheology. This course can be used towards candidature for a Ph.D. degree in Food Safety and Technology/Food Science and Nutrition.

**Lecture: 2 Lab: 0 Credits: 2**

#### **FDSN 691**

##### **Research and Thesis**

Research and Thesis for Ph.D. Food Science Candidates.

**Credit: Variable**

#### **FDSN 695**

##### **Food Science and Nutrition Research Seminar**

This course is designed for Ph.D. students to attend research seminars that are presented by invited speakers from academia, food industry and federal government agencies to broaden their understandings and knowledge of various scientific topics and original research in Food Science and Nutrition. This course is mandatory for all Ph.D. students enrolled in the FDSN program. A minimum of 2 credits or 2 semesters of attendance is required for each student. It does not deal with specific techniques per se, but rather with the assumptions and the logic underlying food science and nutrition research. Students will become acquainted with a variety of approaches to research design from the speakers which, in turn, will help to develop their own research projects. A written report that summarizes the major impacts and findings of all presentations is due at the end of the semester.

**Lecture: 1 Lab: 0 Credits: 1**