# FOOD SCIENCE AND HUMAN NUTRITION

The Department of Food Science and Human Nutrition is jointly administered by the College of Agriculture and Life Sciences and the College of Human Sciences. All curricula offered by the department are available to students in either college. These majors include:

- Culinary food science
- Dietetics
- Diet and exercise
- Food science
- Nutritional science
- Nursing

Visit the department web site at: www.fshn.hs.iastate.edu (http://www.fshn.hs.iastate.edu).

## Undergraduate Study

### Culinary Food Science

Culinary food science is an interdisciplinary degree combining a strong food science foundation with acquisition of culinary skills. The program includes chemistry, organic chemistry, biology, microbiology, and biochemistry as well as quantity food production, fine dining management, and food safety and sanitation. Internship experience in the food industry or culinary business is required. Culinary food science graduates are qualified to work as managers and specialists in food research, product development, culinary applications, and food marketing and sales. For more information: https://fshn.hs.iastate.edu/find-your-major/culinary-food-science/

### Dietetics

The Didactic Program in Dietetics (DPD) is accredited by the Accreditation Council for Education in Nutrition and Dietetics, the accrediting agency of the Academy of Nutrition and Dietetics. The dietetics undergraduate curriculum meets the academic requirements as the DPD. Additionally, the curriculum for concurrent Bachelor's and Master's degrees in diet and exercise meets the academic requirements of the DPD. Graduates of the program are eligible to apply for admission to accredited dietetics internships/supervised practice programs. Upon successful completion of the experience program and a master's degree, graduates are eligible to take the national examination administered by the Commission on Dietetic Registration to become a Registered Dietitian Nutritionist (RDN) and to practice in the field of dietetics. There is a $30 fee for a statement of verification of completion of the DPD. For information about verification statements policies, see the dietetics program website: https://fshn.hs.iastate.edu/find-your-major/dietetics/.

The dietetics program includes study in basic sciences, nutrition, and food science with applications to medical dietetics, nutrition counseling and education, and community nutrition. Foodservice management is also an important aspect of the program. Graduates work in clinical settings, consulting, food companies, food services, sports or athletic programs, corporate wellness programs, care facilities for patients from neonatal to geriatric, and community or school health programs.

### Diet and Exercise

A program for concurrent Bachelor of Science and Master of Science (BS/MS) degrees in diet and exercise (https://fshn.hs.iastate.edu/find-your-major/diet-and-exercise/) is available. The program is jointly administered by the Department of Food Science and Human Nutrition (FS HN), within the College of Agriculture and Life Sciences and College of Human Sciences, and the Department of Kinesiology within the College of Human Sciences. Students interested in this program enroll as pre-diet and exercise students. In the fall of the third year, students apply for admission to the BS/MS program. Students not accepted into the program can continue toward completion of the BS degree in dietetics or kinesiology and health. Coursework has been designed to facilitate a 4-year graduation date for those students not accepted into the program and electing to complete a single undergraduate degree. Students accepted into the program will progress toward completion of BS/MS degrees in diet and exercise.

### Food Science

Food science is a discipline in which the principles of biological and physical sciences are used to study the nature of foods, the causes of their deterioration, and the principles underlying the processing and preparation of food. It is the application of science and technology to the provision of a safe, wholesome, and nutritious food supply. Biotechnology and toxicology interrelate with food science in the area of food safety. In the food industry, food scientists work in research and development of products or processes, production supervision, quality control, marketing and sales, test kitchens and recipe development, product promotion and communication. Food scientists also work in government regulatory agencies and academic institutions.

The food science major is approved by the Institute of Food Technologists, the national professional organization of food science. Career options include quality control/assurance; production supervision; management and sales; research careers in the food industry, government, or academia; business; journalism; food product formulation and recipe development; food promotion and communication; and consumer services in government and industry. For more information: https://fshn.hs.iastate.edu/find-your-major/food-science/

Students in food science have the opportunity to pursue a Master of Business Administration (http://www.fshn.hs.iastate.edu/undergraduate-programs/food-science/) (MBA) concurrently with the Bachelor of

Science (BS) degree in food science. The program is designed so students can earn both the BS in food science and MBA in five years, to meet the needs of students who are interested in management careers in the food industry. Students apply for admission to the MBA program in the spring of the third year. The program for concurrent BS in food science/MBA degrees is a rigorous 5-year program, and admission is very selective.

### Nutritional Science

Nutritional science looks at the connection between diet and health. Students learn how diet can play a crucial role in the cause, treatment, and prevention of many diseases. There are degree program focuses within nutritional science. The pre-health and research coursework prepares students for work in research laboratories, graduate study in nutrition or biological sciences, or entrance into health professional programs, such as medical, dental, physician assistant, and pharmacy schools. Students gain a strong science education along with human nutrition expertise. The health coach and nutrition and wellness coursework prepares students for work positions in program planning and evaluation for community, public health, non-profit, and corporate wellness programs addressing the growing public interest in nutrition, wellness, and preventative health. Students learn about the role of nutrition and healthy eating for disease prevention and wellness. For more information: https://fshn.hs.iastate.edu/find-your-major/nutritional-science/

### Nursing

The Bachelor of Science in Nursing (BSN) program at Iowa State University is a RN-to-BSN program, designed for those who are already a Registered Nurse (RN), and desire to further their nursing career and education to the next level. Iowa State's RN-to-BSN program provides interactive learning opportunities where students can apply their real-world experiences and education to inspire innovation in their places of care. RN-to-BSN students will be challenged to enhance health promotion and disease prevention, apply nursing science and evidenced-based patient-centered care, focus on the culture of health for nurses, individuals, and communities, and demonstrate the continuum of care, from a nurse's self-care to patient care to community and population health.

The baccalaureate nursing program at Iowa State University of Science and Technology located in Ames, Iowa is approved by the:

**Iowa Board of Nursing (IBON)**
Riverpoint Business Park
400 SW 8th St., Suite B
Des Moines, IA 50309
(515) 281-3255

The baccalaureate nursing program at Iowa State University of Science and Technology located in Ames, Iowa is accredited by the:

**Accreditation Commission for Education in Nursing (ACEN)**
3390 Peachtree Road NE, Suite 1400
Atlanta, GA 30326
(404) 975-5000

The most recent accreditation decision made by the ACEN Board of Commissioners for the baccalaureate nursing program is initial accreditation.

View the public information disclosed by the ACEN regarding this program at http://www.acenursing.com/accreditedprograms/programSearch.htm

For more information and RN-to-BSN learning outcomes: https://fshn.hs.iastate.edu/find-your-major/nursing/

## FS HN Departmental Learning Outcomes

Upon graduation, students should be able to:

- Communicate effectively in their field of study using written, oral, visual and/or electronic forms.
- Demonstrate proficiency in ethical data collection and interpretation, literature review and citation, critical thinking and problem solving.
- Participate effectively in a group or team.
- Integrate creativity, innovation, or entrepreneurship in ways that produce value.
- Describe sociocultural competence relative to diversity, equity and/or inclusion.
- Explain how human activities impact the natural environment and how societies are affected.
- Meet program specific learning outcomes.

For more information: https://fshn.hs.iastate.edu/staff-and-faculty/resources/outcomes-assessment/learning-outcomes/.

Communication Proficiency is certified by a grade of C or better in 6 credits of coursework in composition (ENGL 150 (http://catalog.iastate.edu/previouscatalogs/2023-2024/search/?P=ENGL%20150) Critical Thinking and Communication and ENGL 250 (http://catalog.iastate.edu/previouscatalogs/2023-2024/search/?P=ENGL%20250) Written, Oral, Visual, and Electronic Composition or other communication-intensive courses) and a grade of C or better in 3 credits of coursework in oral communication.

## Minors - Undergraduate

The department offers minors in:

- culinary food science
- food and society
- food safety (interdepartmental minor)
- food science
- nutrition

All minors require at least 15 credits, including at least 6 credits in courses numbered 300 or above taken at Iowa State University. The minor must include at least 9 credits that are not used to meet any other department, college, or university requirement.

**Prerequisites:** Students must complete prerequisite requirements for courses included in the minor.

Minor in Culinary Food Science

| | | |
|---|---|---|
| FS HN 101 | Food and the Consumer | 3 |
| FS HN 115 | Food Preparation Laboratory | 1-2 |
| or FS HN 215 | Advanced Food Preparation Laboratory | |
| FS HN 214 | Scientific Study of Food | 3 |
| Select additional credits from the following list for a minimum of 15 credits for the minor: | | |
| FS HN 220 | American Food and Culture | 3 |
| FS HN 305 | Food Quality Management and Control | 2 |
| FS HN 311 & 311L | Food Chemistry and Food Chemistry Laboratory | 4 |
| FS HN 403 | Food Laws and Regulations | 2 |
| FS HN 411 | Food Ingredient Interactions and Formulations | 2 |
| FS HN 491D | Supervised Work Experience: Culinary Science | 1-4 |
| AN S 270 & 270L | Foods of Animal Origin and Foods of Animal Origin Laboratory | 3 |
| AN S 460 | Science and Technology of Value Added Meat Products | 3 |
| HSP M 133 | Food Safety Certification | 1 |
| HSP M 380 & 380L | Food Production Management and Food Production Management Experience | 6 |
| HSP M 383 | Wine and Spirits in Hospitality Management | 2 |
| or FS HN 509 | Sensory Evaluation of Wines | |
| HSP M 487 | Fine Dining Management | 3 |

Minor in Food and Society (16-17 credits required)

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|---|---|---|
| FS HN 101 | Food and the Consumer | 3 |
| FS HN 167 | Introductory Human Nutrition and Health | 3 |
| FS HN 242 | The US Food System | 3 |
| FS HN 342 | World Food Issues: Past and Present | 3 |
| FS HN 442 | Issues in Food and Society | 2 |
| Select 2-3 additional credits from: | | 2-3 |
| AGRON 450 | Issues in Sustainable Agriculture | |
| FS HN 220 | American Food and Culture | |
| FS HN 364 | Nutrition and Prevention of Chronic Disease | |
| FS HN 365 | Obesity and Health | |
| FS HN 403 | Food Laws and Regulations | |
| FS HN 460 | Global Nutrition and Health | |
| FS HN 463 | Community Nutrition and Health | |
| FS HN 496A | Food Science and Human Nutrition Travel Course: International travel | |
| SOC 220 | Globalization and Sustainability | |
| SOC 345 | Population and Society | |
| SOC 348 | Global Poverty, Resources and Sustainable Development | |
| SOC 444 | Sociology of Food and Agricultural Systems | |

Interdepartmental Minor in Food Safety

| | | |
|---|---|---|
| FS HN 101 | Food and the Consumer | 3 |
| or HSP M 233 | Hospitality Sanitation and Safety | |
| FS HN 403 | Food Laws and Regulations | 2 |
| FS HN 420 | Food Microbiology | 3 |
| FS HN 489 | Issues in Food Safety | 1 |
| Select 3 credits from the Food Microbiology area | | |
| FS HN/MICRO 407 | Microbiological Safety of Foods of Animal Origins | |
| FS HN/MICRO 421 | Food Microbiology Laboratory | |
| MICRO 310 | Medical Microbiology | |
| Select 3 credits from the Food Processing area: | | |
| FS HN 207 | Processing of Foods: Basic Principles and Applications | |
| FS HN 305 | Food Quality Management and Control | |
| AN S 270 & 270L | Foods of Animal Origin and Foods of Animal Origin Laboratory | |
| AN S 360 | Fresh Meat Science and Applied Muscle Biology | |
| FS HN 471 | Food Processing | |
| FS HN 472 | Food Processing Laboratory | |

Minor in Food Science:

| | | |
|---|---|---|
| FS HN 101 | Food and the Consumer | 3 |
| FS HN 207 | Processing of Foods: Basic Principles and Applications | 3 |
| Select 9 additional credits: | | |

| | | |
|---|---|---|
| Food chemistry: | | |
| FS HN 311 | Food Chemistry (lab optional: FS HN 311L) | 3 |
| FS HN 410 | Food Analysis | 3 |
| FS HN 411 | Food Ingredient Interactions and Formulations | 2 |
| Food microbiology: | | |
| FS HN 407 | Microbiological Safety of Foods of Animal Origins | 3 |
| FS HN 419 | Foodborne Hazards | 3 |
| FS HN 420 | Food Microbiology | 3 |
| FS HN 421 | Food Microbiology Laboratory | 3 |
| Food processing/engineering: | | |
| FS HN 351 | Introduction to Food Engineering Concepts | 3 |
| FS HN 471 | Food Processing | 3 |
| FS HN 472 | Food Processing Laboratory | 2 |
| General food science: | | |
| FS HN 305 | Food Quality Management and Control | 2 |
| FS HN 403 | Food Laws and Regulations | 2 |
| FS HN 406 | Sensory Evaluation of Food | 3 |
| Select additional credits from the following list to meet a minimum of 15 credits for the minor: | | |
| FS HN 314 | Professional Development for Culinary Food Science and Food Science Majors | 1 |
| FS HN 315 | Professional Skills for Culinary Food Science and Food Science Majors | 1 |

Minor in Nutrition: For students from outside the FSHN department

| | | |
|---|---|---|
| FS HN 167 | Introductory Human Nutrition and Health | 3 |
| FS HN 265 | Nutrition for Active and Healthy Lifestyles | 3 |
| FS HN 360 | Advanced Nutrition and the Regulation of Metabolism in Health and Disease | 3 |
| Select at least 6 credits from: | | |
| FS HN 361 | Nutrition and Health Assessment | 2 |
| FS HN 362 | Nutrition and Health Throughout the Lifecycle | 3 |
| FS HN 364 | Nutrition and Prevention of Chronic Disease | 3 |
| FS HN 365 | Obesity and Health | 3 |
| FS HN 463 | Community Nutrition and Health | 3 |
| FS HN 467 | Molecular Basis of Nutrition in Disease Etiology and Health Promotion | 3 |
| FS HN 492 | Research Concepts in Human Nutrition | 2 |
| NUTRS 501 | Biochemical and Physiological Basis of Nutrition: Macronutrients and Micronutrients | 4 |

Minor in Nutrition: For students majoring in culinary food science or food science

| | | |
|---|---|---|
| FS HN 265 | Nutrition for Active and Healthy Lifestyles | 3 |
| FS HN 360 | Advanced Nutrition and the Regulation of Metabolism in Health and Disease | 3 |
| Select at least 9 credits from: | | |
| FS HN 361 | Nutrition and Health Assessment | 2 |
| FS HN 362 | Nutrition and Health Throughout the Lifecycle | 3 |
| FS HN 364 | Nutrition and Prevention of Chronic Disease | 3 |
| FS HN 365 | Obesity and Health | 3 |
| FS HN 463 | Community Nutrition and Health | 3 |
| FS HN 467 | Molecular Basis of Nutrition in Disease Etiology and Health Promotion | 3 |
| FS HN 492 | Research Concepts in Human Nutrition | 2 |
| NUTRS 501 | Biochemical and Physiological Basis of Nutrition: Macronutrients and Micronutrients | 4 |

# Graduate Study

The Food Science and Human Nutrition (FSHN) Department offers coursework for the degrees master of science and doctor of philosophy with majors in food science and technology and in nutritional sciences, and minors in food science and technology and in nutrition. Graduate work in meat science is offered as a co-major in animal science and food science and technology.

Prerequisite to major work is a baccalaureate degree in food science, nutrition, or other physical or biological sciences or engineering that is substantially equivalent to those at Iowa State University.

Students taking major work for the degree doctor of philosophy either in food science and technology or in nutritional sciences may choose minors from other fields including anthropology, biorenewable resources and technology, chemistry, biochemistry, economics, education, journalism, microbiology, psychology, physiology, statistics, toxicology, or other related fields.

The Food Science and Technology (FST) graduate program offers MS and PhD degrees in the general areas of Food Chemistry and Functionality, Food Safety and Microbiology, and Food Processing. The FST core curriculum and interdisciplinary faculty team provides holistic graduate student training. Individuals with an undergraduate or graduate degree from a variety of academic training backgrounds, such as food sciences and the various disciplines of biology, chemistry, and agricultural sciences, may enter the FST program.

The interdepartmental graduate program in nutritional sciences, administered through the Graduate College, under the auspices of the Chairs of FSHN and Animal Science, will provide the structure for coordinating and enhancing interdisciplinary nutrition research and graduate education. Graduate students will be able to select from three specializations: animal nutrition, human nutrition, or

molecular/biochemical nutrition. The three main departments are FSHN, Animal Science, and Kinesiology, whereas other departments (such as; Biochemistry, Biophysics, and Molecular Biology; Agronomy; and Statistics) may also be involved. (See Nutritional Sciences interdepartmental graduate major).

The Master of Professional Practice in Dietetics program is an online, course-work only, 12-month long, integrated graduate program that combines didactic coursework and on-site supervised experiential learning to train future Registered Dietitian Nutritionists. In addition to the required didactic coursework, students complete a minimum of 1000 hours of supervised experiential learning to meet the eligibility requirements to take the national credentialing exam for Registered Dietitian Nutritionists. Prerequisite for the program is graduation from a Didactic Program in Dietetics.

The department also offers an online 12-13 credit Graduate Certificate in Food Safety and Defense, in conjunction with the University of Nebraska, Lincoln, Kansas State University and the University of Missouri through the Great Plains Interactive Distance Education Alliance. Course topics include food microbiology, food defense, food toxicology, HACCP, and additional topics related to food safety. Students may be admitted if qualified for admission to the food science master's degree program.

The department offers work for concurrent B.S. and M.S. degree programs that allow students to obtain both the B.S. and M.S. degrees in 5 years. The programs are available to students majoring in nutritional science or pre-diet and exercise, and students progress toward M.S. degrees in nutritional sciences or diet and exercise, respectively. Students interested in these programs should contact the department for details. Application for admission to the Graduate College should be made during the junior year. Students begin research for the M.S. thesis or creative component during the summer after their junior year and are eligible for research assistantships.

Students graduating with advanced degrees in nutritional sciences and in food science and technology will demonstrate competency in their chosen discipline. Measurable outcomes will include the ability to:

- Apply scientific thinking to the analysis, synthesis and evaluation of knowledge within the discipline of food science, nutritional sciences, or dietetics
- Apply ethical reasoning within the discipline of food science, nutritional sciences or dietetics
- Effectively communicate discipline-specific information in written and oral forms to scientific audiences
- Effectively interact within scientific teams
- Facilitate learning within FSHN courses

## Minors - Graduate

The department offers coursework for graduate minors in:

- food science/technology (https://fshn.hs.iastate.edu/graduate-students/graduate-programs/food-science-and-technology/)
- nutritional sciences (https://fshn.hs.iastate.edu/graduate-students/graduate-programs/interdepartmental-graduate-program-in-nutritional-sciences/)

Food Science and Technology Graduate Minor students must complete the following:

- 9 to 12 credits. Students without a background in food chemistry, food engineering/processing, and/or food microbiology are required to take FS HN 511 and two 600-level courses in two different competency areas.
- 9 credits of graduate level food science coursework as approved by the POS committee.
- Maximum of 3 credits at the 400 level.

Nutritional Sciences Graduate Minor students must complete the following:

- 9 to 12 credits are required. Students who have not taken FS HN 360 or its equivalent (advanced nutrition with a biochemistry perquisite) will need to take FS HN 360, in which case the Nutrition Graduate minor will constitute 12 credits.
- 9 credits of graduate level nutrition courses as approved by the POS Committee.
- NUTRS 501

## Certificate - Undergraduate

Health Coach (https://kin.hs.iastate.edu/current-students/academics/health-coach-certificate/)

The undergraduate health coach certificate provides a rigorous academic and theoretical background in three components of health (nutrition, exercise and motivational coaching) required to prepare workers for the challenges of being a health coach.

## Certificates - Graduate

Food Safety and Defense (http://www.fshn.hs.iastate.edu/graduate-program/food-safety-defense/)

The department offers an online 12-13 credit Graduate Certificate in Food Safety and Defense, in conjunction with the University of Nebraska, Lincoln, Kansas State University and the University of Missouri through the Great Plains Interactive Distance Education Alliance. Students may be admitted if qualified for admission to the food science master's degree program .

**Courses primarily for undergraduates:**

**FS HN 101: Food and the Consumer**
(3-0) Cr. 3. F.S.SS.
The food system from point of harvest to the consumption of the food by the consumer. Properties of food constituents. Protection of food against deterioration and microbial contamination. Introduction of foods into the marketplace. Processes for making various foods. Government regulations. Use of food additives. Current and controversial topics. High school biology and chemistry or 3 credits of college level biology and chemistry recommended.

**FS HN 102: Nutrition for Sport Performance**
(1-0) Cr. 1. F.S.
A scientific evaluation of dietary needs, dietary supplementation, and pop-culture claims relative to physical/sport performance. Discussion of safe and effective practices to enhance physical/sport performance.

**FS HN 104: Introduction to Professional Skills in Culinary Science**
(0-6) Cr. 1. S.
*Prereq: Major or minor in CUFS A or CUFS H*
Introduction to culinary science. Students will develop fundamental culinary skills by arranged on-campus work experience (100 hours). Sessions with instructor arranged.

**FS HN 110: Professional and Educational Preparation**
(1-0) Cr. 1. F.S.
Introduction to professional and educational development within the food science and human nutrition disciplines. Focus is on university and career acclimation as well as enhancement of communication skills. Offered on a satisfactory-fail basis only.

**FS HN 111: Fundamentals of Food Preparation**
(2-0) Cr. 2. S.
*Prereq: (FS HN 101 or FS HN 167); concurrent enrollment in FS HN 115*
Principles involved in preparation of food products of standard quality. Influence of composition and techniques on properties of food products.

**FS HN 115: Food Preparation Laboratory**
(0-3) Cr. 1. F.S.
*Prereq: Credit or concurrent enrollment in FS HN 111 or FS HN 214*
Practice standard methods of food preparation with emphasis on quality, nutrient retention, and safety.

**FS HN 120: The Biochemistry of Beer**
(Cross-listed with BBMB). (2-0) Cr. 2. F.
An introduction to the major classes of biomolecules, basic biochemical concepts, enzymology, metabolism and genetic engineering as they apply to the production and flavor of beer. All aspects of the biochemistry of beer will be covered, including the malting of barley, starch conversion, yeast fermentation and the chemical changes that occur during the aging of beer. Intended for non-majors. Natural science majors are limited to elective credit only.

**FS HN 120L: Biochemistry of Beer Laboratory**
(Cross-listed with BBMB). Cr. 1.
*Prereq: Credit or concurrent enrollment in BBMB 120*
An introduction to biochemical methods related to the production of beer. Laboratory exercises related to water chemistry, mash enzymology, hop compound extraction and analysis, and yeast biology will be performed. Closely follows the material being taught in BBMB 120. Natural science majors are limited to elective credit only.

**FS HN 167: Introductory Human Nutrition and Health**
(3-0) Cr. 3. F.S.SS.
Understanding and implementing present day knowledge of nutrition. The role of nutrition in the health and well being of the individual and family. High school biology or 3 credits of biology recommended.

**FS HN 203: Contemporary Issues in Food Science and Human Nutrition**
(1-0) Cr. 1. F.S.
Introduction to presentation of published research and discussion of current issues in food science and human nutrition. Emphasis on sources of credible information, ethics, and communication.

**FS HN 207: Processing of Foods: Basic Principles and Applications**
(2-3) Cr. 3. S.
*Prereq: FS HN 101*
Lecture and lab-based instruction on principles of food processing and packaging. Food product-based discussion and activities will highlight raw food materials; unit operations; food quality and safety; processing plant sanitation; food forming and extrusion; fermentation; properties and selection of packaging materials.

**FS HN 214: Scientific Study of Food**
(3-0) Cr. 3. F.S.
*Prereq: (FS HN 167 or FS HN 265); (CHEM 231 or CHEM 331); concurrent enrollment in FS HN 115 or FS HN 215*
Composition and structure of foods. Principles of preparation of standard quality food products. Behavior and interactions of food constituents.

**FS HN 215: Advanced Food Preparation Laboratory**
(0-6) Cr. 2. F.S.
*Prereq: Credit or concurrent enrollment in FS HN 214*
Practice standard methods of food preparation with emphasis on quality, nutrient retention, and safety. Development of culinary skills and advanced food preparation.

**FS HN 220: American Food and Culture**
(3-0) Cr. 3. F.S.
American cuisine reflects the history of the U.S. It is the unique blend of diverse groups of people from around the world, including indigenous Native American Indians, Africans, Asians, Europeans, Pacific Islanders, and South Americans. Explore factors that impact the American Cuisine of today including diverse ethnic and cultural group influences, historical events related to food diversity in the U.S., and agriculture and industrial impacts on food production. Practical knowledge and basic food preparation techniques related to the U.S. food system and trends. Class sessions will include lectures, class discussions and Tasting Immersion activities.

**FS HN 241: Introduction to Manufacturing Processes for Plastics**
(Cross-listed with TSM). (1-2) Cr. 2. F.S.
*Prereq: MATH 145*
A study of selected materials and related processes used in plastics manufacturing. Lecture and laboratory activities focus on materials, properties, and processes.

**FS HN 242: The US Food System**
(3-0) Cr. 3. S.
*Prereq: FS HN 101 or FS HN 167*
Exploration of the components of our food system including production, processing, and access. A systems approach is used to evaluate the social, environmental, and nutrition/health implications of the US food system. Controversial topics related to how food is produced, processed, marketed and consumed will be discussed.

**FS HN 264: Fundamentals of Nutritional Biochemistry**
(3-0) Cr. 3. F.
*Prereq: FS HN 167; CHEM 163, CHEM 163L; 3 credits in BIOL*
Digestion, absorption, metabolism, and biochemical functions of nutrients. Biochemical aspects of nutrient deficiencies.

**FS HN 265: Nutrition for Active and Healthy Lifestyles**
(3-0) Cr. 3. S.SS.
*Prereq: FS HN 167; (FS HN 264 or 3 credits in BBMB)*
Fundamentals of nutrient metabolism and nutrient requirements. Role of macronutrient metabolism in physical performance and disease prevention. Effect of manipulation of macronutrient metabolism on physical performance and disease prevention. Applications of nutrient metabolism principles to dietary recommendations and planning.

**FS HN 276: Understanding Grape and Wine Science**
(Cross-listed with HORT). (2-2) Cr. 3. S.
A scientific introduction to viticulture (grape-growing) and enology (wine-making) and grape and wine chemistry. Topics include grape biology and cultivars, vineyard management, geography of wine, wine production, wine classification, grape and wine chemistry, wine sensory. No wine tasting.

**FS HN 301: Nutrigenomics: From Basic Science to Translational Impact**
(2-0) Cr. 1. F.
Introduction to the concepts of nutrigenomics and nutrigenetics and how it affects consumers of food, as well as the implications for human diseases. The potential impact of personalized nutrition and full genome sequencing on health maintenance, chronic disease prevention, and the ethical implications of this knowledge will be explored.

**FS HN 305: Food Quality Management and Control**
(2-0) Cr. 2. S.
*Prereq: 3 credits in STAT*
Fundamentals of statistical decision-making processes and quality control procedures used in food quality assurance programs.

**FS HN 311: Food Chemistry**
(3-0) Cr. 3. F.SS.
*Prereq: BBMB 300 or higher; (CHEM 231 or CHEM 331); ENGL 250*
The structure, properties, and chemistry of food constituents and animal and plant commodities.

**FS HN 311L: Food Chemistry Laboratory**
(0-3) Cr. 1. F.
*Prereq: Credit or concurrent enrollment in FSHN 311.*
The laboratory practices of structure, properties, and chemistry of food constituents.

**FS HN 314: Professional Development for Culinary Food Science and Food Science Majors**
(1-0) Cr. 1. F.
*Prereq: Major or minor in Culinary Food Science or Food Science; Junior or senior classification.*
Introduction to the roles culinary scientists and food scientists hold within industry. Discussions focused on professional and educational development and emerging issues and trends in the food industry.

**FS HN 315: Professional Skills for Culinary Food Science and Food Science Majors**
(1-0) Cr. 1. F.
*Prereq: Major or minor in FS HN*
Focus on the importance of professional skills and application of those skills to potential job situations. Professional skills include communication, team building, leadership vs. management styles, business ethics, and continual learning. Junior classification recommended.

**FS HN 340: Foundations of Dietetic Practice**
(2-0) Cr. 2. F.
*Prereq: Major in Dietetics (A or H) or Pre-Diet and Exercise; Junior classification*
Introduction to the profession of dietetics and responsibilities associated with dietetic professional practice. Emphasis on exploring career options in dietetics and preparation for supervised practice and graduate school. Leadership and professional career development for the dietitian is addressed through self reflection and creation of materials for post-baccalaureate programs. Professional issues related to dietetic practice include Code of Ethics, legal credentialing and standards of professional practice, leadership and future trends in the profession.

**FS HN 342: World Food Issues: Past and Present**
(Cross-listed with AGRON, ENV S). (3-0) Cr. 3. F.S.SS.
*Prereq: Junior classification*
Issues associated with global agricultural and food systems including ethical, social, economic, environmental, and policy contexts. Investigation of various causes and consequences of overnutrition/undernutrition, global health, poverty, hunger, access, and distribution. Meets International Perspectives Requirement.

**FS HN 351: Introduction to Food Engineering Concepts**
(3-0) Cr. 3. S.
*Prereq: (FS HN 207; [MATH 160 or MATH 165]; [PHYS 131 or PHYS 231]) or Permission of Instructor*
Methodology for solving problems in food processing and introduction to food engineering concepts including food properties, material and energy balances, sources of energy, thermodynamics, fluid flow, heat transfer, and mass transfer. Credit for only FS HN 351 or CH E 357 may be applied toward graduation for the Food Science major or Food Science minor

**FS HN 360: Advanced Nutrition and the Regulation of Metabolism in Health and Disease**
(3-0) Cr. 3. F.
*Prereq: ENGL 250; FS HN 265*
Physiological and biochemical basis for nutrient needs; assessment of nutrient deficiency and toxicity; examination of nutrient functions and the regulation of metabolism; nutrient-gene interactions; mechanistic role of nutrients in health and disease. 3 credits or concurrent enrollment in 300-level or above Biochemistry recommended. 3 credits in physiology recommended.

**FS HN 361: Nutrition and Health Assessment**
(1-3) Cr. 2. S.
*Prereq: FS HN 265*
The assessment of nutritional status in healthy individuals. Laboratory experiences in food composition and assessment of dietary intake, body composition, and biochemical indices of nutritional status.

**FS HN 362: Nutrition and Health Throughout the Lifecycle**
(3-0) Cr. 3. S.
*Prereq: FS HN 360; credit or concurrent enrollment in BIOL 256 or BIOL 335*
Molecular, biochemical and physiological basis to understand the nutritional aspects of human development and aging. Nutrient needs and various disease states at each stage of human life cycle.

**FS HN 364: Nutrition and Prevention of Chronic Disease**
(3-0) Cr. 3. F.
*Prereq: (BIOL 256; BIOL 256L) or enrolled in NRS major*
Overview of nutrients, their functions, metabolism, food sources and optimal choices for the promotion of health and wellness. Nutrition strategies for the prevention of chronic disease, including cancer, diabetes and obesity, as they apply to individuals or the wider population will be discussed.

**FS HN 365: Obesity and Health**
(3-0) Cr. 3. S.
Multifactorial aspects of obesity, maintenance of healthy weight, and the relationship of weight status and chronic disease prevention. Traditional and novel nutrition and exercise theories as well as current popular diet and exercise trends will be discussed.

**FS HN 366: Communicating Nutrition Messages**
(3-0) Cr. 3. S.
*Prereq: FS HN 264 or FS HN 265*
Theory and application of adult learning and behavior change as it relates to the role of nutrition in health promotion and disease prevention. Discussion of nutrition education and interventions relative to various models. Focus on communication strategies for providing nutrition messages to diverse community audiences using various forms of media and outreach.

**FS HN 367: Medical Terminology for Health Professionals**
(1-0) Cr. 1. F.S.SS.
An independent course focused on medical terminology, abbreviations, and simple clinical mathematical calculations.

**FS HN 392: Food and Nutrition Services Management**
Cr. 3. S.
*Prereq: HSP M 380; HSP M 380L*
Functions and responsibilities related to the management of foodservice systems and nutrition services, including planning, marketing, human resource management, and cost accounting. Only one of HSP M 392 or FS HN 392 may count toward graduation.

**FS HN 403: Food Laws and Regulations**
(2-0) Cr. 2. S.SS.
*Prereq: 3 credits in FS HN at 200-level or above*
History of food law in the US and the world. Relationship between policy, legislation and regulation. Introduction to primary US regulatory agencies and enforcement principles. Discussion of key laws related to food safety and nutrition. Overview of federal and independent research tools and sources of food law.

**FS HN 406: Sensory Evaluation of Food**
(Dual-listed with FS HN 506). (2-3) Cr. 3. F.
*Prereq: FS HN 305; FS HN 411; 3 credits in STAT*
Sensory evaluation techniques used to evaluate the appearance, aroma, flavor, texture and acceptability of foods. Relationships between sensory and instrumental measurements of color and texture. Work independently and cooperatively (in a team) to identify sensory evaluation objectives, write hypotheses, design and conduct experiments, and analyze and interpret data.

**FS HN 407: Microbiological Safety of Foods of Animal Origins**
(Dual-listed with FS HN 507). (Cross-listed with MICRO). (3-0) Cr. 3. F.S.
*Prereq: MICRO 201 or MICRO 302*
Examination of the various factors in the production of foods, from production through processing, distribution and final consumption which contribute to the overall microbiological safety of the food. Upon successful completion of this class, the student will receive both the Preventive Controls for Human Foods certificate (FDA program) and the International HACCP Alliance certificate (USDA-FSIS program). Recommended: FS HN 420 or MICRO 420 and one semester of Microbiology Laboratory.

**FS HN 408: Dairy Products Evaluation**
(0-3) Cr. 1. S.
Gain experience in identifying quality defects in dairy products including milk, cottage cheese, cheddar cheese, strawberry yogurt, butter, and vanilla ice cream. Intensive training for the National Collegiate Dairy Products Evaluation competition and for dairy product evaluation in the food industry.

**FS HN 410: Food Analysis**
(2-3) Cr. 3. F.
*Prereq: FS HN 311 or CHEM 211*
An introduction to the theory and application of chemical and instrumental methods for determining the constituents of food. Use of standard procedures for food analysis and food composition data bases.

**FS HN 411: Food Ingredient Interactions and Formulations**
(1-3) Cr. 2. F.S.
*Prereq: (FS HN 214 or FS HN 311); 3 credits in STAT*
Application of food science principles to ingredient substitutions in food products. Laboratory procedures for standard formulations and instrumental evaluation, with emphasis on problem-solving and critical thinking.

**FS HN 412: Food Product Development**
(Dual-listed with FS HN 512). (1-6) Cr. 3. S.
*Prereq: FS HN 411; Senior classification*
Principles of developing consumer packaged food products. Application of skills gained in food chemistry, formulation, quality, sensory and processing. Some pilot plant experiences. Emphasis on teamwork and effective communication.

**FS HN 419: Foodborne Hazards**
(Cross-listed with MICRO, TOX). (3-0) Cr. 3. Alt. S., offered even-numbered years.
*Prereq: MICRO 201 or MICRO 302; 3 credits in BBMB*
Pathogenesis of human microbiological foodborne infections and intoxications, principles of toxicology, major classes of toxicants in the food supply, governmental regulation of foodborne hazards.

**FS HN 420: Food Microbiology**
(Cross-listed with MICRO, TOX). (3-0) Cr. 3. F.
*Prereq: MICRO 201 or MICRO 302*
Effects of microbial growth in foods. Methods to control, detect, and enumerate microorganisms in food and water. Foodborne infections and intoxications.

**FS HN 421: Food Microbiology Laboratory**
(Cross-listed with MICRO). (1-5) Cr. 3. S.
*Prereq: MICRO 201 or MICRO 302; MICRO 201L or MICRO 302L. Credit or enrollment in FS HN/MICRO 420*
Standard techniques used for the microbiological examination of foods. Independent and group projects on student-generated questions in food microbiology. Emphasis on oral and written communication and group interaction.

**FS HN 430: U.S. Health Systems and Policy**
(Dual-listed with FS HN 530). (2-0) Cr. 2. F.S.
*Prereq: Junior or Senior or Graduate classification*
Introduction to public policy for health care professionals. Emphasis on understanding the role of the practitioner for participating in the policy process, interpreting government policies and programs such as Medicare and Medicaid, determining reimbursement rates for eligible services, and understanding licensure and accreditation issues. Discussion and exploration of federal, state and professional policy-relevant resources.

**FS HN 435: Analysis of Food Markets**
(Cross-listed with ECON). Cr. 3. S.
*Prereq: ECON 235; ECON 301; STAT 226*
Food market analysis from an economics perspective; food markets and consumption; methods of economic analysis; food industry structure and organization; food and agriculture regulations; labeling; consumer concerns; agricultural commodity promotion. Final project required.

**FS HN 442: Issues in Food and Society**
(2-0) Cr. 2. F.
*Prereq: Sophomore classification*
In-depth discussion, synthesis, and analysis of domestic and global food issues from a systems approach. Mutually reinforcing interactions between culture, biology, and environmental influences on human dietary habits, nutrition and health will be emphasized. Historical and current foodways of cultural groups will be presented with specific attention to understanding cultural differences. Students will demonstrate how to locate, interpret, evaluate and use professional literature to inform about current food and society issues.

**FS HN 445: Strategies for Personal Food Waste Reduction**
(1-0) Cr. 1. S.
*Prereq: Junior classification*
In-depth analysis and discussion of economic, environmental, social, and ethical implications of food waste. Overview of personal food waste reduction strategies, food recycling/recovery, and responsible waste disposal methods. Discussion and application of advocacy tactics for the promotion of food waste reduction in local communities.

**FS HN 460: Global Nutrition and Health**
(Dual-listed with FS HN 560). (3-0) Cr. 3. S.
An overview of global nutrition issues, including the sociocultural, biological, economic, and environmental context of nutrition related topics. The etiology, epidemiology, and program/policy responses to issues will be presented. Areas to be covered include childhood malnutrition, growth stunting, micronutrient deficiencies, parasites and nutrition, sanitation, and obesity and chronic disease incidence in developing countries. Participatory course, students will engage in a series of class activities, discussions, and presentations.
Meets International Perspectives Requirement.

**FS HN 461: Medical Nutrition and Disease I**
(Dual-listed with NUTRS 561). (4-0) Cr. 4. F.
*Prereq: (BIOL 256 or BIOL 335); FS HN 360; FS HN 361; FS HN 367*
Pathophysiology of selected chronic disease states and their associated medical problems. Specific attention will be directed to medical nutrition needs of patients in the treatment of each disease state to optimize nutritional status and improve health.

**FS HN 463: Community Nutrition and Health**
(3-0) Cr. 3. F.
*Prereq: FS HN 361*
Dual-listed with NUTRS 563. Survey of current public health nutrition problems among nutritionally vulnerable individuals and groups. Discussion of the multidimensional nature of those problems and of community programs addressing them. Grant writing as a means for funding community nutrition program development. Significant emphasis on written and oral communication at the lay and professional level.

**FS HN 464: Medical Nutrition and Disease II**
(4-0) Cr. 4. S.
*Prereq: FS HN 461*
(Dual-listed with NUTRS 564) Pathophysiology of selected acute and chronic disease states and their associated medical problems. Specific attention will be directed to medical nutrition needs of patients in the treatment of each disease state to optimize nutritional status and promote health.

**FS HN 466: Nutrition Counseling and Education Methods**
(Dual-listed with FS HN 566). (2-2) Cr. 3. F.S.
*Prereq: FS HN 361 and FS HN 362*
Application of counseling and learning theories with individuals and groups in community and clinical settings. Includes discussion and experience in building rapport, assessment, diagnosis, intervention, monitoring, evaluation, and documentation. Literature review of specific counseling and learning theories.

**FS HN 467: Molecular Basis of Nutrition in Disease Etiology and Health Promotion**

(3-0) Cr. 3. S.

*Prereq: 3 credits of BBMB 200 or above or Permission of Instructor*

Understanding the molecular basis for the role of nutrients, nutrient-derivatives, and bioactive compounds in the development, prevention, and treatment of common diseases including diabetes, cancer, vascular disease, obesity, neurological disease, aberrant mineral metabolism, and autoimmune disease. Translating this understanding into practical approaches for improving the health of individuals and populations. Credit for FS HN 360 suggested.

**FS HN 471: Food Processing**

(3-0) Cr. 3. F.

*Prereq: A B E 451 or CH E 357 or FS HN 351*

Principles and application of food processing using both thermal (ex., blanching, pasteurization, canning, drying, freezing, evaporation, aseptic processing, extrusion) and non-thermal (ex., high pressure, irradiation, pulsed electric field, fermentation) unit operations. Emphasis on microbial inactivation, process heat and mass balance, and numerical problem solving.

**FS HN 472: Food Processing Laboratory**

(1-3) Cr. 2. S.

*Prereq: FS HN 471*

Hands-on and demonstration laboratory activities related to food processing principles and applications using lab and pilot-scale equipment. Laboratory experiences include important food processing operations, e.g., blanching/pasteurization, canning, freezing, drying, corn wet milling, fermentation, baking etc. Emphasis on mass balance, interpreting data, writing reports, and presentations. Occasional field trips.

**FS HN 489: Issues in Food Safety**

(Cross-listed with AN S, HSP M, VDPAM). (1-0) Cr. 1. S.

*Prereq: Credit or concurrent enrollment in (FS HN 101 or FS HN 272 or HSP M 233); FS HN 403; (FS HN 419 or FS HN 420)*

Capstone seminar for the food safety minor. Case discussions and independent projects about safety issues in the food system from a multidisciplinary perspective.

**FS HN 490: Independent Study**

Cr. 1-6. Repeatable, maximum of 6 credits. F.S.SS.

*Prereq: Permission of Instructor*

Independent work in food science, nutrition, or dietetics. A maximum of 6 credits of FS HN 490 may be used toward graduation.

**FS HN 490A: Independent Study: Dietetics**

Cr. 1-6. Repeatable, maximum of 6 credits. F.S.SS.

*Prereq: Permission of Instructor*

Independent work in food science, nutrition, or dietetics. A maximum of 6 credits of FS HN 490 may be used toward graduation.

**FS HN 490B: Independent Study: Food Science**

Cr. 1-6. Repeatable, maximum of 6 credits. F.S.SS.

*Prereq: Permission of Instructor*

Independent work in food science, nutrition, or dietetics. A maximum of 6 credits of FS HN 490 may be used toward graduation.

**FS HN 490C: Independent Study: Nutrition**

Cr. 1-6. Repeatable, maximum of 6 credits. F.S.SS.

*Prereq: Permission of Instructor*

Independent work in food science, nutrition, or dietetics. A maximum of 6 credits of FS HN 490 may be used toward graduation.

**FS HN 490D: Independent Study: International Experience**

Cr. 1-6. Repeatable, maximum of 6 credits. F.S.SS.

*Prereq: Permission of Instructor*

Independent work in food science, nutrition, or dietetics. A maximum of 6 credits of FS HN 490 may be used toward graduation.

**FS HN 490E: Independent Study: Entrepreneurship**

Cr. 1-6. Repeatable, maximum of 6 credits. F.S.SS.

*Prereq: Permission of Instructor*

Independent work in food science, nutrition, or dietetics. A maximum of 6 credits of FS HN 490 may be used toward graduation.

**FS HN 490H: Independent Study: Honors**

Cr. 1-6. Repeatable, maximum of 6 credits. F.S.SS.

*Prereq: Permission of Instructor*

Independent work in food science, nutrition, or dietetics. A maximum of 6 credits of FS HN 490 may be used toward graduation.

**FS HN 491: Supervised Work Experience**

Cr. 1-4. Repeatable, maximum of 4 credits. F.S.SS.

*Prereq: Permission of Instructor; Permission of Advisor*

Supervised off-campus work experience relevant to the academic major. Offered on a satisfactory-fail basis only. A maximum of 4 credits of FS HN 491 may be used toward graduation.

**FS HN 491A: Supervised Work Experience: Dietetics**

Cr. 1-4. Repeatable, maximum of 4 credits. F.S.SS.

*Prereq: Permission of Instructor; Permission of Advisor*

Supervised off-campus work experience relevant to the academic major. Offered on a satisfactory-fail basis only. A maximum of 4 credits of FS HN 491 may be used toward graduation.

**FS HN 491B: Supervised Work Experience: Food Science**
Cr. 1-4. Repeatable, maximum of 4 credits. F.S.SS.
*Prereq: Permission of Instructor; Permission of Advisor*
Supervised off-campus work experience relevant to the academic major. Offered on a satisfactory-fail basis only. A maximum of 4 credits of FS HN 491 may be used toward graduation.

**FS HN 491C: Supervised Work Experience: Nutrition**
Cr. 1-4. Repeatable, maximum of 4 credits. F.S.SS.
*Prereq: Permission of Instructor; Permission of Advisor*
Supervised off-campus work experience relevant to the academic major. Offered on a satisfactory-fail basis only. A maximum of 4 credits of FS HN 491 may be used toward graduation.

**FS HN 491D: Supervised Work Experience: Culinary Science**
Cr. 1-4. Repeatable, maximum of 4 credits. F.S.SS.
*Prereq: Permission of Instructor; Permission of Advisor*
Supervised off-campus work experience relevant to the academic major. Offered on a satisfactory-fail basis only. A maximum of 4 credits of FS HN 491 may be used toward graduation.

**FS HN 492: Research Concepts in Human Nutrition**
(1-3) Cr. 2. F.
*Prereq: (FS HN 360; Senior classification) or Permission of Instructor*
Students will develop and implement research projects with faculty supervision, based on knowledge gained from nutrition, biology and chemistry courses and write a formal science paper to share the results of their research. Students will gain appreciation for independent research and experience creative and innovative aspects of nutrition research.

**FS HN 493: Food Preparation Workshop**
(1-3) Cr. 1-3.
Selected topics in food preparation including scientific principles, culture and culinary techniques. Variable format may include laboratory, recitation, and lecture. Offered on a satisfactory-fail basis only.

**FS HN 495: Practicum**
(1-3) Cr. 2. F.S.
*Prereq: FS HN 366; FS HN 463; Senior classification; major in Nutritional Science-Nutrition and wellness option*
Students will develop, implement and assess a community-based project that engages groups in learning and practicing concepts related to nutrition and wellness. Assessed service learning component. Offered on a satisfactory-fail basis only.

**FS HN 496: Food Science and Human Nutrition Travel Course**
(Dual-listed with FS HN 596). Cr. 1-4. Repeatable. F.S.SS.
*Prereq: Permission of instructor*
(One credit per week traveled and 1 credit for pre-departure class, if offered.) Limited enrollment. Tour and study of food industry, culinary science, dietetic and nutritional agencies in different regions of the world. Pre-travel session arranged. Travel expenses paid by students.

**FS HN 496A: Food Science and Human Nutrition Travel Course: International travel**
(Dual-listed with FS HN 596A). Cr. 1-4. Repeatable. F.S.SS.
*Prereq: Permission of Instructor*
(One credit per week traveled.) Limited enrollment. Tour and study of food industry, dietetic and nutritional agencies in different regions of the world. Pre-travel session arranged. Travel expenses paid by students.
Meets International Perspectives Requirement.

**FS HN 496B: Food Science and Human Nutrition Travel Course: Domestic travel**
(Dual-listed with FS HN 596B). Cr. 1-4. Repeatable. F.S.SS.
*Prereq: Permission of Instructor*
(One credit per week traveled.) Limited enrollment. Tour and study of food industry, dietetic and nutritional agencies in different regions of the world. Pre-travel session arranged. Travel expenses paid by students.

**FS HN 498: Cooperative Education**
Cr. R. Repeatable, maximum of 2 times. F.S.SS.
*Prereq: Permission of Department Chair*
Required for students completing professional work periods in a cooperative education program. Students must register prior to commencing each work period. Offered on a satisfactory-fail basis only.

**FS HN 499: Undergraduate Research**
Cr. 1-6. Repeatable, maximum of 6 credits. F.S.SS.
*Prereq: Permission of Instructor*
Research under staff guidance. A maximum of 6 credits of FS HN 499 may be used toward graduation.

**Courses primarily for graduate students, open to qualified undergraduates:**

**FS HN 506: Sensory Evaluation of Food**
(Dual-listed with FS HN 406). (2-3) Cr. 3. F.
*Prereq: FS HN 305; FS HN 411; 3 credits in STAT*
Sensory evaluation techniques used to evaluate the appearance, aroma, flavor, texture and acceptability of foods. Relationships between sensory and instrumental measurements of color and texture. Work independently and cooperatively (in a team) to identify sensory evaluation objectives, write hypotheses, design and conduct experiments, and analyze and interpret data.

**FS HN 507: Microbiological Safety of Foods of Animal Origins**
(Dual-listed with FS HN 407). (Cross-listed with MICRO). (3-0) Cr. 3. F.S.
*Prereq: MICRO 201 or MICRO 302*
Examination of the various factors in the production of foods, from production through processing, distribution and final consumption which contribute to the overall microbiological safety of the food. Upon successful completion of this class, the student will receive both the Preventive Controls for Human Foods certificate (FDA program) and the International HACCP Alliance certificate (USDA-FSIS program). Recommended: FS HN 420 or MICRO 420 and one semester of Microbiology Laboratory.

**FS HN 508: Consumer Perceptions and Nutrition Communication**
(2-0) Cr. 2. SS.
*Prereq: Acceptance in the Master of Professional Practice in Dietetics program.*
Examination of current consumer food and nutrition trends. Critical analysis of consumer perceptions relative to current research base. Use of various media to create effective nutrition messages for consumers. Activities designed to meet accreditation standards.

**FS HN 509: Sensory Evaluation of Wines**
Cr. 2. S.
*Prereq: Must be at least 21 years of age; senior or graduate status.*
Principles of sensory evaluation and their application to wine evaluation. Sensory testing methods such as discrimination tests, ranking, descriptive analysis and scoring of wines will be covered. Students will have the opportunity to evaluate and learn about major types and styles of wines of the world. Lab fee.

**FS HN 511: Integrated Food Science**
(3-0) Cr. 3. F.
*Prereq: 3 credits in each of organic chemistry, physics, mathematics, and microbiology.*
Critical review of the key principles of food science and applications in the chemistry, microbiology, and processing of food. Understanding of the impact of processing on the quality of foods with respect to composition, quality and safety.

**FS HN 512: Food Product Development**
(Dual-listed with FS HN 412). (1-6) Cr. 3. S.
*Prereq: FS HN 411; Senior classification*
Principles of developing consumer packaged food products. Application of skills gained in food chemistry, formulation, quality, sensory and processing. Some pilot plant experiences. Emphasis on teamwork and effective communication.

**FS HN 516: Advanced Nutrition I**
(2-0) Cr. 2. F.
*Prereq: Acceptance in the Master of Professional Practice in Dietetics program.*
Examination of current literature relative to molecular, cellular, and physiologic aspects of macronutrient and micronutrient metabolism. Integration of current evidence-based information, including peer-reviewed literature, to inform nutrition practice. Activities designed to meet accreditation standards.

**FS HN 517: Gut Microbiome: Implications for Health and Diseases**
(Cross-listed with AN S, MICRO, V MPM). Cr. 3. F.
*Prereq: 2-3 credits in microbiology and/or immunology.*
Explore current research on gut microbiome including modern tools used to study the gut microbiome. Examine the linkages between gut microbiome and health status, diseases, and manipulation of gut microbiome to improve health.

**FS HN 518: Advanced Nutrition II**
(3-0) Cr. 3. S.
*Prereq: Acceptance in the Master of Professional Practice in Dietetics program.*
Principles of research design/methods and interpreting results/statistics in the current peer-reviewed scientific literature. Critical evaluation of the evidence-base to inform nutrition practice. Activities designed to meet accreditation standards.

**FS HN 521: Microbiology of Food**
(2-0) Cr. 2. S.SS.
*Prereq: A course in microbiology with laboratory; enrollment in GP-IDEA Food Safety and Defense Graduate Certificate or permission of instructor.*
Identification, enumeration, and characterization of bacteria, yeasts, and mold associated with foods and food processing. Effects of physical and chemical agents on micro-organisms will be studied. Microbiological problems in food spoilage, food preservation, food fermentation, and food-borne disease will be discussed.

**FS HN 522: Advanced Food Microbiology and Biotechnology**
(2-0) Cr. 2. Alt. S., offered odd-numbered years.
*Prereq: Food microbiology, a course in biochemistry; enrollment in GP-IDEA Food Safety and Defense Graduate Certificate or permission of instructor.*
Basic principles in biotechnology and applied food microbiology, including current topics of interest in food biotechnology. Introduction to recombinant DNA techniques and how they are applied to genetically modify microorganisms, the use of nucleic acids as tools of rapid detection of microorganisms in foods, basic enzyme immobilization and down-stream processing techniques, and regulatory aspects of food biotechnology.

**FS HN 523: A Multidisciplinary Overview of Food Safety and Security**
(2-0) Cr. 2. F.SS.
*Prereq: A course in biology or chemistry; enrollment in GP-IDEA Food Safety and Defense Graduate Certificate or permission of instructor.*
Multidisciplinary food safety and security perspectives provided by numerous subject matter experts. Topics include food safety policy, ag bioterrorism, border security, animal ID, food defense and site security, risk analysis, crisis communication, epidemiology, HACCP, and more.

**FS HN 524: Food Microbiology**
(3-0) Cr. 3. F.
*Prereq: A course in microbiology with laboratory; enrollment in GP-IDEA Food Safety and Defense Graduate Certificate or permission of instructor.*
Food Microbiology looks at the nature, physiology, and interactions of microorganisms in foods. The course is an introduction to food-borne diseases, the effect of food processing systems on the microflora of foods, principles of food preservation, food spoilage, and foods produced by microorganisms. Additionally, the course looks at food plant sanitation and criteria for establishing microbial standards for food products.

**FS HN 525: Principles of HACCP**
(2-0) Cr. 2. F.
*Prereq: Undergraduate biology and chemistry courses; enrollment in GP-IDEA Food Safety and Defense Certificate or permission of instructor.*
A comprehensive study of the Hazard Analysis and Critical Control Point System and its application in the food industry.

**FS HN 526: Ethnic Foods: Food Safety, Food Protection and Defense**
(2-0) Cr. 2. SS.
*Prereq: Graduate standing; enrollment in GP-IDEA Food Safety and Defense Graduate Certificate or permission of instructor.*
Understanding of the various factors that impact safety of ethnic and imported ethnic foods; knowledge about the handling, preparation, processing and storage of ethnic and imported foods and food products; science-based characterization of representative ethnic foods.

**FS HN 527: Microbiology of Fermented Foods**
(2-0) Cr. 2. SS.
*Prereq: Food microbiology; enrollment in GP-IDEA Food Safety and Defense Graduate Certificate or permission of instructor.*
Microbiology of fermented foods covers the physiology, biochemistry, and genetics of microorganisms important in food fermentations. The course looks at how microorganisms are used in fermentations and the effects of processing and manufacturing conditions on production of fermented foods.

**FS HN 528: Food Protection and Defense-Essential Concepts**
(2-0) Cr. 2. S.
*Prereq: Enrollment in GP-IDEA Food Safety and Defense Graduate Certificate or permission of instructor.*
This course will provide students with an understanding of the principles required in a food defense program for a food manufacturing, warehousing or distribution center. The topics covered include: defining threats and aggressors; the Bioterrorism Act; food defense teams; vulnerability assessments; security programs; recall and traceability basics; security inspections; crisis management; emergency preparedness; and workplace violence.

**FS HN 530: U.S. Health Systems and Policy**
(Dual-listed with FS HN 430). (2-0) Cr. 2. F.S.
*Prereq: Junior or Senior or Graduate classification*
Introduction to public policy for health care professionals. Emphasis on understanding the role of the practitioner for participating in the policy process, interpreting government policies and programs such as Medicare and Medicaid, determining reimbursement rates for eligible services, and understanding licensure and accreditation issues. Discussion and exploration of federal, state and professional policy-relevant resources.

**FS HN 533: Diet and Integrative Therapies for Prevention and Treatment of Diseases**
(2-0) Cr. 2. F.
*Prereq: Acceptance in the Master of Professional Practice in Dietetics program.*
Explore the role of specific nutrients, dietary bioactive compounds and integrative therapies on disease prevention and treatment. Activities designed to meet accreditation standards.

**FS HN 537: Leadership and Management in Dietetics**
(3-0) Cr. 3. SS.
*Prereq: Acceptance in the Master of Professional Practice in Dietetics program*
Application of leadership and management theories and approaches relevant to dietetics practice. Use of self-reflection and self-assessment to assist in recognition and development of leadership behaviors. Activities designed to meet accreditation standards.

**FS HN 538: Advanced Medical Nutrition Therapy**
(3-0) Cr. 3. S.
*Prereq: Acceptance in the Master of Professional Practice in Dietetics program.*
Nutritional biochemistry and physiology related to selected pathophysiology of disease with emphasis on treatment of complex medical problems and current issues. The nutrition care process will be utilized. Evidenced-based practice will be integrated into each disease state covered to optimize nutritional status and promote health. Activities designed to meet accreditation standards.

**FS HN 542: Introduction to Molecular Biology Techniques**
(Cross-listed with B M S, EEOB, GDCB, HORT, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. F.S.SS.
Sessions in basic molecular biology techniques and related procedures. Offered on a satisfactory-fail basis only.

**FS HN 542A: Introduction to Molecular Biology Techniques: DNA Techniques**
(Cross-listed with B M S, BBMB, EEOB, GDCB, HORT, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. F.S.
Includes genetic engineering procedures, sequencing, PCR, and genotyping. Offered on a satisfactory-fail basis only.

**FS HN 542B: Introduction to Molecular Biology Techniques: Protein**
(Cross-listed with B M S, BBMB, EEOB, GDCB, HORT, NREM, NUTRS, VDPAM). Cr. 1. Repeatable. S.SS.
Techniques. Includes: fermentation, protein isolation, protein purification, SDS-PAGE, Western blotting, NMR, confocal microscopy and laser microdissection, Immunophenotyping, and monoclonal antibody production. Sessions in basic molecular biology techniques and related procedures. Offered on a satisfactory-fail basis only.

**FS HN 542C: Introduction to Molecular Biology Techniques: Cell Techniques**
(Cross-listed with B M S, BBMB, EEOB, GDCB, HORT, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. F.S.
Includes: immunophenotyping, ELISA, flow cytometry, microscopic techniques, image analysis, confocal, multiphoton and laser capture microdissection. Offered on a satisfactory-fail basis only.

**FS HN 542D: Introduction to Molecular Biology Techniques: Plant Transformation**
(Cross-listed with B M S, BBMB, EEOB, GDCB, HORT, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. S.
Includes: Agrobacterium and particle gun-mediated transformation of tobacco, Arabidopsis, and maize, and analysis of tranformants. Offered on a satisfactory-fail basis only.

**FS HN 542E: Introduction to Molecular Biology Techniques: Proteomics**
(Cross-listed with B M S, BBMB, EEOB, GDCB, HORT, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. F.
Includes: two-dimensional electrophoresis, laser scanning, mass spectrometry, and database searching. Offered on a satisfactory-fail basis only.

**FS HN 542F: Introduction to Molecular Biology Techniques: Metabolomics**
(Cross-listed with B M S, BBMB, EEOB, GDCB, HORT, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. F.
Includes: metabolomics and the techniques involved in metabolite profiling. For non-chemistry majoring students who are seeking analytical aspects into their biological research projects. Offered on a satisfactory-fail basis only.

**FS HN 542G: Introduction to Molecular Biology Techniques: Genomic**
(Cross-listed with B M S, BBMB, EEOB, GDCB, HORT, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. S.
Offered on a satisfactory-fail basis only.

**FS HN 544: Pediatric Clinical Nutrition**
(3-0) Cr. 3. F.
*Prereq: Enrollment in GP-IDEA MFCS in Dietetics*
Examines the physiological, biochemical and nutritional aspects of disease processes relevant to infants and children up to 18 years of age. Discussion of medical nutrition therapy for a variety of medical conditions in this population including inborn errors of metabolism, food hypersensitivity, obesity, and diseases of the major organ systems.

**FS HN 554: Supervised Experience in Food Systems Management**
(0-22) Cr. 3. SS.
*Prereq: Acceptance in the Master of Professional Practice in Dietetics program.*
Supervised experiential learning in food service and management. Capstone project. Experiences and activities designed to meet accreditation standards.

**FS HN 555: Supervised Experience in Community Nutrition**
(0-18) Cr. 3. F.
*Prereq: Acceptance in the Master of Professional Practice in Dietetics program.*
Supervised experiential learning in community nutrition. Capstone project. Experiences and activities designed to meet accreditation standards.

**FS HN 556: Supervised Experience in Medical Nutrition Therapy**
(0-22) Cr. 5. S.
*Prereq: Acceptance in the Master of Professional Practice in Dietetics program.*
Supervised experiential learning in medical nutrition therapy. Capstone project. Experiences and activities designed to meet accreditation standards.

**FS HN 560: Global Nutrition and Health**
(Dual-listed with FS HN 460). (3-0) Cr. 3. S.
An overview of global nutrition issues, including the sociocultural, biological, economic, and environmental context of nutrition related topics. The etiology, epidemiology, and program/policy responses to issues will be presented. Areas to be covered include childhood malnutrition, growth stunting, micronutrient deficiencies, parasites and nutrition, sanitation, and obesity and chronic disease incidence in developing countries. Participatory course, students will engage in a series of class activities, discussions, and presentations.
Meets International Perspectives Requirement.

**FS HN 562: Advanced Nutrition Assessment**
(4-0) Cr. 4. F.
*Prereq: Acceptance in the Master of Professional Practice in Dietetics program.*
Overview and practical applications of methods for assessing nutritional status, including: theoretical framework of nutritional health and disease, dietary intake, biochemical indices, nutrition focused physical exam and body composition across the lifecycle. Activities designed to meet accreditation standards.

**FS HN 566: Nutrition Counseling and Education Methods**
(Dual-listed with FS HN 466). (2-2) Cr. 3. F.S.
*Prereq: FS HN 361 and FS HN 362*
Application of counseling and learning theories with individuals and groups in community and clinical settings. Includes discussion and experience in building rapport, assessment, diagnosis, intervention, monitoring, evaluation, and documentation. Literature review of specific counseling and learning theories.

**FS HN 575: Processed Foods**
(3-0) Cr. 3. Alt. S., offered odd-numbered years.
*Prereq: FS HN 214 or FS HN 311; a course in nutrition*
This course will examine effect of industrial and domestic food processing on the nutrient content of food and risk of developing chronic disease.

**FS HN 580: Orientation to Food Science and Nutrition Research**
(1-0) Cr. 1. F.
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 students in FS HN. Offered on a satisfactory-fail basis only.

**FS HN 581: Seminar**
(1-0) Cr. 1. S.
Discussion and practice of oral presentation of scientific data in a professional setting. Discussion of issues related to data presentation. Intended for graduate students in their first or second semester in FS HN.

**FS HN 589: Systems Neuroscience: Brain, Behavior, and Nutrition-Related Integrative Physiology**
(Cross-listed with GERON, NEURO, NUTRS, PSYCH). Cr. 2. S.
*Prereq: Graduate standing, or undergraduate with consent of instructor.*
Structural, functional, and biochemical aspects of brain and non-motor behavior across the human lifespan. Types of neuroimaging used to assess the brain. Current research is leveraged to gauge how nutrition, diseases related to nutrition, and associated physiological processes influence the brain, particularly for common developmental, psychological, and neurological disorders.

**FS HN 590: Special Topics**
Cr. 1-3. Repeatable, maximum of 6 credits. F.S.SS.

**FS HN 590A: Special Topics: Nutrition**
Cr. 1-3. Repeatable, maximum of 6 credits. F.S.SS.

**FS HN 590B: Special Topics: Food Science**
Cr. 1-3. Repeatable, maximum of 6 credits. F.S.SS.

**FS HN 590C: Special Topics: Teaching**
Cr. 1-3. Repeatable, maximum of 6 credits. F.S.SS.

**FS HN 596A: Food Science and Human Nutrition Travel Course: International travel**
(Dual-listed with FS HN 496A). Cr. 1-4. Repeatable. F.S.SS.
*Prereq: Permission of Instructor*
(One credit per week traveled.) Limited enrollment. Tour and study of food industry, dietetic and nutritional agencies in different regions of the world. Pre-travel session arranged. Travel expenses paid by students.
Meets International Perspectives Requirement.

**FS HN 596B: Food Science and Human Nutrition Travel Course: Domestic travel**
(Dual-listed with FS HN 496B). Cr. 1-4. Repeatable. F.S.SS.
*Prereq: Permission of Instructor*
(One credit per week traveled.) Limited enrollment. Tour and study of food industry, dietetic and nutritional agencies in different regions of the world. Pre-travel session arranged. Travel expenses paid by students.

**FS HN 599: Creative Component**
Cr. arr.
Nonthesis option only.

**Courses for graduate students:**

**FS HN 606: Advanced Food Analysis and Instrumentation**
(2-3) Cr. 3. Alt. F., offered even-numbered years.
*Prereq: FS HN 311, or FS HN 410, or FS HN 511 or equivalent.*
Instrumental methods for measuring chemical and physical properties of foods, food quality and functionality. Techniques for methods development, sample preparation, optimization of operating conditions, and data analysis needed to obtain accurate, reproducible results by means of instrumentation.

**FS HN 611: Advanced Food Processing**
(3-0) Cr. 3. Alt. F., offered odd-numbered years.
*Prereq: FS HN 311, or FS HN 471/472 or equivalent, or FS HN 511.*
Recent advances in the science and technology of food processing and preservation; examples include both thermal and non-thermal processes, including cold plasma, nanotechnology, and extrusion. Advances in extraction and separation technologies, by-product utilization, and sustainability in food processing industry will also be discussed. Students to research on select topics and present.

**FS HN 612: Advanced Food Chemistry**
(3-0) Cr. 3. Alt. S., offered even-numbered years.
*Prereq: FS HN 311, or FS HN 411, or FS HN 511, or BBMB 404, or equivalent.*
Structure, chemical and physical properties of lipids, proteins and carbohydrates, and their food and industrial applications. Changes in functionalities during processing and storage.

**FS HN 626: Advanced Food Microbiology**
(Cross-listed with MICRO, TOX). (3-0) Cr. 3. Alt. S., offered odd-numbered years.
*Prereq: FS HN 420 or FS HN 421 or FS HN 504*
Topics of current interest in food microbiology, including new foodborne pathogens, rapid identification methods, effect of food properties and new preservation techniques on microbial growth, and mode of action of antimicrobials.

**FS HN 627: Rapid Methods in Food Microbiology**
(Cross-listed with MICRO, TOX). (2-0) Cr. 2. Alt. F., offered even-numbered years.
*Prereq: FS HN 420 or FS HN 421 or FS HN 504*
Provides an overview of rapid microbial detection methods for use in foods. Topics include historical aspects of rapid microbial detection, basic categories of rapid tests (phenotypic, genotypic, whole cell, etc.), existing commercial test formats and kits, automation in testing, sample preparation and "next generation" testing formats now in development.

**FS HN 653: Food and Agricultural Traceability**
(3-0) Cr. 3. F.
*Prereq: Enrollment in The Ivy Executive MBA program within the Ivy College of Business at Iowa State University*
Current issues and concepts of food and agricultural product traceability in the U.S., from production to consumption. Food types, microbial agents of concern, adulterants, disease investigations, risk analysis, risk mitigation, prevention and regulatory policy and advocacy. Travel to Washington, D.C.

**FS HN 681: Seminar**
(1-0) Cr. 1. Repeatable, maximum of 2 credits. F.S.SS.
Presentation of thesis or dissertation research. Must be taken once for each graduate program; once for the M.S. program and once for the Ph.D. program.

**FS HN 682: Seminar Reflection**
Cr. R. Repeatable. F.S.
Active listening and critical thinking activities related to research seminars in food science and human nutrition. Required each semester for all FSHN graduate students. Electronic documentation.

**FS HN 690: Special Problems**
Cr. arr. Repeatable. F.S.SS.
*Prereq: FS HN 502 or FS HN 503 or FS HN 504 or FS HN 553 or FS HN 554*

**FS HN 695: Grant Proposal Writing**
(Cross-listed with NUTRS). (1-0) Cr. 1. F.
*Prereq: 3 credits of graduate course work in food science and/or nutritional sciences*
Grant proposal preparation experiences including writing and critiquing of proposals and budget planning. Understanding the grant funding process from federal, foundation, and commodity agencies. Includes preparing a grant for possible submission and participation in the review of proposals. Discussion of the role of successful grant writing in career development.

**FS HN 699: Research in Food Science and Technology**
Cr. arr. Repeatable. F.S.SS.
Offered on a satisfactory-fail basis only.