FOOD SCIENCE & TECHNOLOGY

DESCRIPTION

Food science and technology students find career opportunities with food processing firms, government agencies, and educational institutions. Types of positions available to food science and technology graduates include new product development, quality assurance, food plant management, food research, food marketing and sales, and education.

The curriculum includes a balance of courses in food science, biological sciences, physical sciences, mathematics, and social sciences and humanities. Food science courses include food engineering, food analysis, food chemistry, food microbiology, nutrition, quality assurance, and commodity processing courses. Students are encouraged to participate in an internship program that provides summer employment in the food industry.

College Requirements

College Admission

Requirements for admission into the College of Agricultural Sciences and Natural Resources (CASNR) are consistent with general University admission requirements (one unit equals one high school year): 4 units of English, 4 units of mathematics, 3 units of natural sciences, 3 units of social studies, and 2 units of foreign language. Students must also meet performance requirements (ACT composite of 20 or higher OR combined SAT score of 950 or higher OR rank in the top one-half of graduating class; transfer students must have a 2.0 (on a 4.0 scale) cumulative grade point average and 2.0 on the most recent term of attendance. For students entering the PGA Golf Management degree program, a certified golf handicap of 12 or better (e.g., USGA handicap card) or written ability (MS Word file) equivalent to a 12 or better handicap by a PGA professional or high school golf coach is required. For more information, please visit: http://pgm.unl.edu/requirements.

Admission Deficiencies/Removal of Deficiencies

Students who are admitted to CASNR with core course deficiencies must remove these deficiencies within the first 30 credit hours at UNL, or within the first calendar year at UNL, whichever takes longer, excluding foreign languages. Students have up to 60 credit hours to remove foreign language deficiencies. College-level course work taken to remove deficiencies may be used to meet degree requirements in CASNR.

Deficiencies in the required entrance subjects can be removed by completion of specified courses in the University or by correspondence.

The Office of Admissions, Alexander Building (south entrance), City Campus, provides information to new students on how deficiencies can be removed.

College Degree Requirements

Curriculum Requirements

The curriculum requirements of the College consist of three areas: ACE (Achievement-Centered Education); College of Agricultural Sciences and Natural Resources Core; and Degree Program requirements and electives. All three areas of the College Curriculum Requirements are incorporated within the description of the Major/Degree Program sections of the catalog. The individual major/degree program listings of classes insures that a student will meet the minimum curriculum requirements of the College.

Foreign Languages/Language Requirement

Two units of a foreign language are required. This requirement is usually met with two years of high school language.

Minimum Hours Required for Graduation

The College grants the bachelor’s degree in programs associated with agricultural sciences, natural resources and related programs. Students working toward a degree must earn at least 120 semester hours of credit. A minimum cumulative grade point average of C (2.0 on a 4.0 scale) must be maintained throughout the course of studies and is required for graduation.

Grade Rules

Removal of C-, D and F Grades

Only the most recent letter grade received in a given course will be used in computing a student’s cumulative grade point average if the student has completed the course more than once and previously received a grade or grades below C in that course.

The previous grade (or grades) will not be used in the computation of the cumulative grade point average, but it will remain a part of the academic record and will appear on any transcript.

A student can remove from his/her cumulative average a course grade of C-, D+, D, D- or F if the student repeats the same course at the University of Nebraska and receives a grade other than P (pass), I (incomplete), N (no pass), W (withdrawn), or NR (no report). If a course is no longer being offered, it is not eligible for the revised grade point average computation process.

For complete procedures and regulations, see the Office of the University Registrar website at http://www.unl.edu/regrec/course-repeats.

Pass/No Pass

Students in CASNR may take any course offered on a Pass/No Pass basis within the 24-hour limitation established by the Faculty Senate. However, a department may specify that the Pass/No Pass status of its courses be limited to non-majors or may choose to offer some courses for letter grades only.

GPA Requirements

A minimum cumulative grade point average of C (2.0 on a 4.0 scale) must be maintained throughout the course of studies and is required for graduation.

Transfer Credit Rules

To be considered for admission, a transfer student, Nebraska resident or nonresident, must have an accumulated average of C (2.0 on a 4.0 scale) and a minimum C average in the last semester of attendance at another college. Transfer students who have completed less than 12 credit hours of college study must submit either ACT or SAT scores.

Ordinarily, credits earned at an accredited college are accepted by the University. The College, however, will evaluate all hours submitted on an application for transfer and reserves the right to accept or reject any of them. Sixty is the maximum number of hours UNL will accept on transfer from a two-year college. Ninety is the maximum number of hours UNL will accept from a four-year college. Transfer credit in the degree program must be approved by the degree program advisor on a Request for Substitution Form to meet specific course requirements, group requirements, or course level requirements in the major. At least 9 hours
in the major field, including the capstone course, must be completed at UNL regardless of the number of hours transferred.

The College will accept no more than 10 semester hours of C, D+, D and D- grades from other schools. The C, D+, D and D- grades can only be applied to free electives. This policy does not apply to the transfer of grades from UNO or UNK to UNL.

**Joint Academic Transfer Programs**

The College of Agricultural Sciences and Natural Resources has agreements with many institutions to support joint academic programs. The transfer programs include dual degree programs and cooperative degree programs. Dual degree programs offer students the opportunity to receive a degree from a participating institution and also to complete requirements for a bachelor of science degree in CASNR. Cooperative programs result in a single degree from either UNL or the cooperating institution.

**Dual Degree Programs**

**A to B Programs**

The A to B Program, a joint academic program offered by the CASNR and participating community colleges, allows students to complete the first two years of a degree program at the participating community college and continue their education and study in a degree program leading toward a bachelor of science degree.

The A to B Program provides a basic knowledge plus specialized course work. Students transfer into CASNR with junior standing. Depending on the community college, students enrolled in the A to B Program may complete the requirements for an associate of science at the community college, transfer to UNL, and work toward a bachelor of science degree.

Participating community colleges include:

- Central Community College
- Metropolitan Community College
- Mid-Plains Community College
- Nebraska College of Technical Agriculture
- Northeast Community College
- Southeast Community College
- Western Nebraska Community College

**3+2 Programs**

Two specialized degree programs in **animal science** and **veterinary science** are offered jointly with an accredited college or school of veterinary medicine. These two programs permit CASNR animal science or veterinary science students to receive a bachelor of science degree from UNL with a degree in animal science or veterinary science after successfully completing two years of the professional curriculum in veterinary medicine at an accredited veterinary school. Students who successfully complete the 3+2 Program, must complete the “Application for Degree” form and provide transcripts to the Credentials Clerk, Office of the University Registrar, 107 Canfield Administration Building, UNL.

Students should discuss these degree programs with their academic advisor.

**Cooperative Degree Programs**

Academic credit from UNL and a cooperating institution is applied towards a four-year degree from either UNL (UNL degree-granting program) or the cooperating institution (non UNL degree-granting program). All have approved programs of study.

**UNL Degree-Granting Programs**

A UNL degree-granting program is designed to provide students the opportunity to complete a two-year program of study at one of the four-year institutions listed below, transfer to CASNR and complete the requirements for a bachelor of science degree.

**Chadron State College.** Chadron State College offers a 2+2 program leading to a grassland ecology and management degree program and a transfer program leading to a Bachelor of Science in Agricultural Education in the teaching option.

**Wayne State College.** Wayne State College offers a 3+1 program leading to a Bachelor of Science in Plant Biology in the ecology and management option.

**University of Nebraska at Kearney.** Transfer programs are available for students pursuing degree programs leading to a bachelor of science degree.

**University of Nebraska at Omaha.** The University of Nebraska at Omaha (UNO) cooperates with CASNR in providing four-quarter pre-agricultural sciences, pre-natural resources, pre-food science and technology, pre-horticulture and pre-turfgrass and landscape management transfer programs.

A student enrolled in these programs may transfer all satisfactorily completed academic credits identified in the suggested program of study, and enter CASNR to study toward a degree program leading to a bachelor of science degree. The total program would require a minimum of four years or eight semesters (16 credit hours/semester or 120 credit hours).

UNL CASNR faculty teach horticulture and food science and technology courses at UNO to assist an urban population in better understanding the food processing, horticulture, and landscape horticulture industries.

For more information, contact the CASNR Dean's Office, 800-472-8800, ext. 2541.

**Non UNL Degree-Granting Programs**

The CASNR cooperates with other institutions to provide course work that is applied towards a degree at the cooperating institution. Preprofessional programs offered by CASNR allow students to complete the first two or three years of a degree program at UNL prior to transferring and completing a degree at the cooperating institution.

**Chadron State College—Range Science.** The 3+1 Program in range science allows Chadron State College students to pursue a range science degree through Chadron State College. Students complete three years of course work at Chadron State College and one year of specialized range science course work (32 credit hours) at CASNR.

**Dordt College (Iowa) – Agricultural Education: Teaching Option.** This program allows students to pursue an Agricultural Education Teaching Option degree leading toward a bachelor of science in agricultural education. Students at Dordt College will complete 90 credit hours in the Agricultural Education: Teaching Option Transfer Program.

**Residency**

Students must complete at least 30 of the total hours for their degree using UNL credits. At least 18 of the 30 credit hours must be in courses offered through CASNR (≥299) including the appropriate ACE 10 degree requirement or an approved ACE 10 substitution offered through another UNL college and excluding independent study regardless of the number of hours transferred. Credit earned during education abroad may be used toward the residency requirement if students register through
UNL and participate in prior-approved education abroad programs. UNL open enrollment and summer independent study courses count toward residence.

1 Includes courses taught by CASNR faculty through interdisciplinary prefixes (e.g., LIFE, MBio, ENVR, SCIL, EAEP, HRTM, ENSC) and CASNR crosslisted courses taught by non-CASNR faculty.

Online and Distance Education
There are many opportunities to earn college credit online through the University of Nebraska—Lincoln. Some of these credits may be applicable not only as elective credits, but also toward the fulfillment of the College’s education requirements. Credits earned online may count toward residency. However, certain offerings may not be counted toward scholarship requirements or academic recognition criteria.

For further information, contact:
Office of Online and Distance Education
University of Nebraska—Lincoln
305 Brace Labs
Lincoln, NE 68588-0109
402-472-4681
http://online.unl.edu/

Independent Study Rules
Students wishing to take part in independent studies must obtain permission; complete and sign a contract form; and furnish copies of the contract to the instructor, advisor, departmental office, and the Dean’s Office. The contract should be completed before registration. Forms are available in 103 Agricultural Hall or online at the CASNR website.

Independent study projects include research, literature review or extension of course work under supervision and evaluation of a departmental faculty member.

Students may only count 12 hours of independent study toward their degrees and no more than 6 hours can be counted during their last 36 hours earned, excluding senior thesis, internships, and courses taught under an independent study number.

Other College Degree Requirements
Capstone Course Requirement
A capstone course is required for each CASNR degree program. A capstone course is defined as a course in which students are required to integrate diverse bodies of knowledge to solve a problem or formulate a policy of societal importance.

ACE Requirements
All students must fulfill the Achievement Centered Education (ACE) requirements. Information about the ACE program may be viewed at www.ace.unl.

The minimum requirements of CASNR reflect the common core of courses that apply to students pursuing degrees in the college. Students should work with an advisor to satisfy ACE outcomes 1, 2, 3, 4, 6 and 10 with the college requirements.

Catalog Rule
Students must fulfill the requirements stated in the catalog for the academic year in which they are first admitted to UNL or when they were first admitted to a Joint Academic Transfer Program. In consultation with advisors, a student may choose to follow a subsequent catalog for any academic year in which they are admitted to and enrolled as a degree-seeking student at UNL in the College of Agricultural Sciences and Natural Resources. Students must complete all degree requirements from a single catalog year. The catalog which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

Learning Outcomes
Majors in food science and technology will be able to:

1. Demonstrate ability to apply chemical, microbiological, and engineering principles to the processing and preservation of safe, nutritious and appealing food products.
2. Effectively communicate scientific, technical and other information, both orally and in writing, to supervisors, colleagues, subordinates and consumers.
3. Understand the role of government regulatory agencies, and other groups responsible for making and enforcing rules, regulations, and guidelines related to food composition, processing and safety.
4. Access and use technical and human resources, such as the World Wide Web, library systems, and consultants.
5. Represent the field of food science in a scientific and professional manner and to participate in professional societies.
6. Recognize ethical responsibilities regarding scientific and professional conduct, as well as the responsibility to the consumer to produce safe and nutritious food products.
7. Develop analytical and creative thinking skills necessary to approach scientific and other issues, problems, and situations.
8. Demonstrate ability to work effectively in a team or group.

MAJOR REQUIREMENTS

College Integrative Course

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>SCIL 101</td>
<td>Science and Decision-Making for a Complex World</td>
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Natural Sciences

Select one of the following: 4-5

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>BIOC 321</td>
<td>Elements of Biochemistry and Laboratory for Elements of Biochemistry</td>
</tr>
<tr>
<td>&amp; BIOC 321L</td>
<td></td>
</tr>
<tr>
<td>BIOC 431 /</td>
<td>Structure and Metabolism and Biochemistry Laboratory</td>
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<tr>
<td>BIOS 431 /</td>
<td></td>
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<tr>
<td>CHEM 431</td>
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<tr>
<td>&amp; BIOC 433 /</td>
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<td>BIOS 433 /</td>
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<td>CHEM 433</td>
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<tr>
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<tbody>
<tr>
<td>LIFE 120</td>
<td>Fundamentals of Biology I</td>
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<tr>
<td>&amp; LIFE 120L</td>
<td>and Fundamentals of Biology I laboratory</td>
<td></td>
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<tr>
<td>LIFE 121</td>
<td>Fundamentals of Biology II</td>
<td>4</td>
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<td>&amp; LIFE 121L</td>
<td>and Fundamentals of Biology II Laboratory</td>
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<td>BIOS 312</td>
<td>Microbiology</td>
<td>3</td>
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<tr>
<td>CHEM 109</td>
<td>General Chemistry I</td>
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<td>CHEM 110</td>
<td>General Chemistry II</td>
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<tr>
<td>CHEM 251</td>
<td>Organic Chemistry I 1</td>
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<td>or CHEM 255</td>
<td>Biological Organic Chemistry</td>
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<tr>
<td>CHEM 253</td>
<td>Organic Chemistry I Laboratory 1</td>
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<td>or CHEM 257</td>
<td>Biological Organic Chemistry Laboratory</td>
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Select one of the following: 5

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<td>BIOS 433 /</td>
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<td>CHEM 433</td>
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<td>LIFE 121</td>
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<td>CHEM 251</td>
<td>Organic Chemistry I 1</td>
<td>3</td>
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<tr>
<td>or CHEM 255</td>
<td>Biological Organic Chemistry</td>
<td></td>
</tr>
<tr>
<td>CHEM 253</td>
<td>Organic Chemistry I Laboratory 1</td>
<td>1</td>
</tr>
<tr>
<td>or CHEM 257</td>
<td>Biological Organic Chemistry Laboratory</td>
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</tr>
</tbody>
</table>

Select one of the following: 5
MSYM 109 & MSYM 109L  
Physical Principles in Agriculture and Life Sciences  
and Physical Principles in Agriculture and Life Sciences Laboratory

PHYS 151 & PHYS 153  
Elements of Physics  
and Elements of Physics Laboratory

Credit Hours Subtotal: 32

Mathematics and Statistics

STAT 218  
Introduction to Statistics  
or ECON 215  
Statistics

MATH 102  
Trigonometry

Select one of the following: 3-5

MATH 104  
Applied Calculus
MATH 106  
Calculus I

Credit Hours Subtotal: 8

Communications

ACE Outcome 1

Select one of the following: 3

ENGL 150  
Writing and Inquiry
ENGL 151  
Writing and Argument
ENGL 254  
Writing and Communities
JGEN 120  
Basic Business Communication
JGEN 200  
Technical Communication I
JGEN 300  
Technical Communication II

Credit Hours Subtotal: 6

Economics, Humanities and Social Sciences

Select one of the following: 3

ECON 211  
Principles of Macroeconomics
ECON 212  
Principles of Microeconomics
AECN 141  
Introduction to the Economics of Agriculture (ACE 6)

ACE Courses

Select one course each from ACE outcomes 5, 7, 8, and 9 12

Credit Hours Subtotal: 15

Food Science & Technology Requirements

Core Courses

FDST 101  
Introductory Food Science
FDST 132  
Practical Applications in Food Science
FDST 280  
Contemporary Issues in Food Science
FDST 403  
Food Quality Assurance
FDST 451  
Food Science and Technology Seminar
FDST 460  
Food Product Development Concepts I

Process Technology Courses

FDST 363 / MSYM 363  
Heat and Mass Transfer
FDST 465 / MSYM 465  
Food Engineering Unit Operations

Select two of the following: 6

ASCI 310  
Fresh Meats
or ASCI 410  
Processed Meats
FDST 412  
Cereal Technology
FDST 429  
Dairy Products Technology
FDST 420  
Food Engineering Unit Operations
FDST 455 & FDST 455L  
Microbiology of Fermented Foods  
and Microbiology of Fermented Foods Laboratory

Food Chemistry

FDST 205  
Food Composition and Analysis
FDST 448  
Food Chemistry
FDST 449  
Food Chemistry Laboratory
FDST 458  
Advanced Food Analysis

Food Microbiology

FDST 405 / BIOS 445  
Food Microbiology
FDST 406 / BIOS 446  
Food Microbiology Laboratory

Nutrition

ASCI 421  
Advanced Animal Nutrition
or NUTR 455  
Advanced Nutrition

Credit Hours Subtotal: 42

Technical Electives

Select 10-11 hours of the following areas: 10-11

ACCT, AECN (except 100), AGRO (except 110), ALEC (except 134), ASCI (except 101), BIOC (except 101), BIOS, BLAW, BSAD (except 111), BSEN (except 100), CHEM (except 101), CHME (except 113), CSCE, ECON, FDST (except 101, 131, 372), FINA, HORT (352, 353, 354, 471), MATH 107 or higher, MNGT, MRKT, MSYM, NUTR (except 150, 372), PHYS, VBMS (except 101)

Credit Hours Subtotal: 10

Free Electives

Select 0-4 hours

Credit Hours Subtotal: 4

Total Credit Hours 120

1 Students interested in a career in research, or planning to seek an advanced degree should take CHEM 251 Organic Chemistry I, CHEM 252 Organic Chemistry II, CHEM 253 Organic Chemistry II Laboratory and CHEM 254 Organic Chemistry II Laboratory.

2 Students are encouraged to consider Sensory Evaluation (FDST 430) as one of the courses used to fulfill the technical electives.

ADDITIONAL MAJOR REQUIREMENTS

Grade Rules

Pass/No Pass

Students in food science and technology may not take food science and technology courses Pass/No Pass, except for Independent Study.
Requirements for Minor Offered by Department

12-Credit-Hour Minor

Requirements for the minor include a minimum of 12 credits in food science and technology at the 300 level or above, including the following specified courses:

Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>FDST 405 / BIOS 445</td>
<td>Food Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>FDST 406 / BIOS 446</td>
<td>Food Microbiology Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>FDST 448</td>
<td>Food Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>FDST 449</td>
<td>Food Chemistry Laboratory</td>
<td>1</td>
</tr>
</tbody>
</table>

Select one of the following:

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<tbody>
<tr>
<td>FDST 363 / MSYM 363</td>
<td>Heat and Mass Transfer</td>
<td>3</td>
</tr>
<tr>
<td>FDST 465 / MSYM 465</td>
<td>Food Engineering Unit Operations</td>
<td>2</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 12

Total Credit Hours: 12

18-Credit-Hour Minor

Requirements for the minor include a minimum of 18 credits in food science and technology, including a minimum of 6 hours at the 300 level or above. No more than 3 credits of FDST 396 Independent Study in Food Science and Technology can be applied to the minor.

Core Courses

Select one of the following: 2-3

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>FDST 101</td>
<td>Introductory Food Science</td>
<td>2</td>
</tr>
<tr>
<td>FDST 131 / CHEM 131 / NUTR 131</td>
<td>The Science of Food</td>
<td>3</td>
</tr>
<tr>
<td>FDST 205</td>
<td>Food Composition and Analysis</td>
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</tr>
<tr>
<td>FDST 280</td>
<td>Contemporary Issues in Food Science</td>
<td>2</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 7-8

Additional FDST courses

Select 10-11 credits 10-11

Credit Hours Subtotal: 10-11

Total Credit Hours: 17-19

FDST 107 Introduction to the Companion Animal Food Industry
Crosslisted with: ASCI 107

Description: The companion animal food industry, products, processes, and career opportunities.

Credit Hours: 1

Max credits per semester: 1

Max credits per degree: 1

Format: LEC

FDST 131 The Science of Food
Crosslisted with: CHEM 131, NUTR 131

Description: General scientific concepts in biology, chemistry, and physics using food as a model. What food is from both chemical and nutritional perspectives, and the fate of food from when it leaves the farm to when it becomes a part of the individual. Assists students in making intelligent decisions about many food related controversial issues (e.g., food irradiation, food additives, health foods).

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Prerequisite for: FDST 301

ACE: ACE 4 Science

FDST 131L Science of Food Lab

Prerequisites: FDST 131 or parallel.

Description: Introduction to laboratory techniques: food chemistry, food biochemistry, food analysis, food safety microbiology, and food fermentation.

Credit Hours: 1

Max credits per semester: 1

Max credits per degree: 1

Format: LAB

FDST 132 Practical Applications in Food Science

Prerequisites: Food science and technology major or permission.

Description: Food processing, preservation, nutrition, safety, quality, marketing, and related topics. Food processing procedures and equipment. Microbiological and chemical procedures.

Credit Hours: 1

Max credits per semester: 1

Max credits per degree: 1

Format: LAB

FDST 205 Food Composition and Analysis

Description: Major components of foods, their structures, and their role in the functional and nutritional properties of foods. Chemical methods for the determination and characterization of major food components.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

FDST 280 Contemporary Issues in Food Science

Prerequisites: CHEM 109, FDST 101 or 131.

Description: Current issues in food science, food safety problems, the impact of biotechnology on food production and processing, organic foods, functional foods and other contemporary topics.

Credit Hours: 2

Max credits per semester: 2

Max credits per degree: 2

Format: LEC
FDST 301 Chemistry of Food  
**Prerequisites:** FDST 101 or FDST 131 or permission  
**Notes:** FDST 301 will not count toward a FDST major.  
**Description:** Emphasizes essential principles of chemistry and their application to food systems. Covers the molecular properties of major food components (proteins, carbohydrates and lipids) and their chemical reactions. Provides understanding of how chemistry impacts food quality and contributes to wellness.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC  
**Offered:** SPRING  
**ACE:** ACE 4 Science

FDST 363 Heat and Mass Transfer  
**Crosslisted with:** MSYM 363  
**Prerequisites:** MATH 104 or 106; MSYM 109 or PHYS 141 or 151.  
**Description:** Fundamentals of food engineering including material and energy balances, fluid mechanics, heat transfer and mass transfer.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC  

FDST 372 Food Safety and Sanitation  
**Crosslisted with:** NUTR 372  
**Prerequisites:** One course in chemistry and one course in biological sciences.  
**Description:** Various factors that result in food illness: food allergy, natural toxins, parasites, microbial and viral food borne infections and food borne intoxications. Students will assess hazards, identify critical control points and establish monitoring and system verification procedures.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

FDST 396 Independent Study in Food Science and Technology  
**Prerequisites:** Permission.  
**Description:** Individual or group projects in research, literature review, or extension of course work under supervision and evaluation of a departmental faculty member.  
**Credit Hours:** 1-5  
**Min credits per semester:** 1  
**Max credits per semester:** 5  
**Max credits per degree:** 12  
**Format:** IND

FDST 401 Teaching Applications of Food Science  
**Crosslisted with:** FDST 801  
**Prerequisites:** BIOS 101 and CHEM 109  
**Description:** Overview of the science of food and how food can be used in the classroom to enhance science education.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

FDST 403 Food Quality Assurance  
**Crosslisted with:** FDST 803  
**Prerequisites:** FDST 205; STAT 218.  
**Description:** Quality related issues as they pertain to manufacturing, processing, and/or testing of foods, with a major emphasis on food regulations, statistical process control and Hazard Analysis of Critical Control Points (HACCP).  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

FDST 405 Food Microbiology  
**Crosslisted with:** BIOS 445, BIOS 845, FDST 805  
**Prerequisites:** BIOS 312; CHEM 251; BIOC 321.  
**Description:** Nature, physiology, and interactions of microorganisms in foods. 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. Food plant sanitation and criteria for establishing microbial standards for food products.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC  
**Prerequisite for:** FDST 460, FDST 860; FDST 908B

FDST 406 Food Microbiology Laboratory  
**Crosslisted with:** BIOS 446, BIOS 846, FDST 806  
**Prerequisites:** Parallel in FDST 405/805/BIOS 445/845, FDST 406/806/BIOS 446/846.  
**Description:** The microorganisms in foods and the methods used to study them.  
**Credit Hours:** 2  
**Max credits per semester:** 2  
**Max credits per degree:** 2  
**Format:** LAB

FDST 412 Cereal Technology  
**Crosslisted with:** FDST 812  
**Prerequisites:** FDST 205.  
**Description:** Chemistry and technology of the cereal grains. Post-harvest processing and utilization for food and feed. Current industrial processes and practices, and the theoretical basis for these operations.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

FDST 415 Molds and Mycotoxins in Food, Feed, and the Human Environment  
**Crosslisted with:** FDST 815  
**Prerequisites:** FDST 405/805/BIOS 445/845 and FDST 406/806/BIOS 446/846.  
**Description:** Occurrence, growth, and mycotoxin production of molds in human foods, animal feeds, and the human environment. Spoilage, mycotoxin production conditions, toxicity, and pathological effects. Culture media, methods and techniques for enumerating and identifying molds, analytical methods for mycotoxins, and effects of food and feed processing on mycotoxin stability.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC
FDST 419 Meat Investigations
Crosslisted with: ASCI 419, ASCI 819, FDST 819
Prerequisites: ASCI 210 or permission.
Description: Conduct independent research and study meat industry problems in processing, production, storage, and preparation of meat and meat products.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

FDST 420 Fruit and Vegetable Technology
Crosslisted with: FDST 820
Prerequisites: FDST 205.
Description: Harvesting and postharvest handling of fruit and vegetables, processing and safety issues, processes of ripening and/or maturation in fresh fruits and vegetables.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

FDST 425 Food Toxicology
Crosslisted with: FDST 825
Prerequisites: FDST 405/805, BIOC 321, or equivalent, or permission.
Description: Toxic substances that may be found in foods with emphasis on bacterial toxins, mycotoxins, and naturally occurring toxicants of plants, animals, and seafood. Basic toxicological methodology and the effects of food processing and handling on food-borne toxicants.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LEC

FDST 429 Dairy Products Technology
Crosslisted with: FDST 829
Prerequisites: FDST 205.
Notes: Offered spring semester of odd-numbered calendar years.
Description: Physical, chemical, and microbiological properties of milk. Principles of milk processing and manufacture of cultured dairy products, cheeses, ice cream, and concentrated dairy products.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

FDST 430 Sensory Evaluation
Crosslisted with: FDST 830, STAT 430, STAT 830
Prerequisites: Introductory course in statistics.
Description: Food evaluation using sensory techniques and statistical analysis.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

FDST 441 Functional Properties of Food
Crosslisted with: FDST 841, NUTR 441, NUTR 841
Prerequisites: NUTR 245 and BIOC 321; or FDST 448.
Description: Relationship of structure and functionality of ingredients in food systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

FDST 442 Omnivore's Digestive-Tract Microbiome
Crosslisted with: FDST 842
Prerequisites: BIOS 312 or equivalent
Description: Detailed examples and conceptual overview of studies that define the digestive tract microbial ecosystem both at the local and systemic scale in the context of omnivores such as humans and animals are presented. The concepts in focus are associated with high-dimensional datasets (or big data) used for studying these complex biosystems, and the multi-dimensional interactions between the microbiomes in its ecosystem. Topics include the host-cycle of life in health and disease in relation to the bacteria of the digestive tract, as well as the modification of their ecology due to health issues, nutrition, and microbial competition or chemical modification.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Offered: SPRING

FDST 445 Experimental Foods
Crosslisted with: FDST 845, NUTR 445, NUTR 845
Prerequisites: NUTR 244 and 245; BIOC 321.
Description: Introduction to food research. Application of research techniques to selected problems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

FDST 448 Food Chemistry
Crosslisted with: FDST 848
Prerequisites: FDST 205; CHEM 251; BIOC 321.
Description: Molecular components of various foods and the reactions of these components during the processing of foods.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

FDST 449 Food Chemistry Laboratory
Crosslisted with: FDST 849
Prerequisites: FDST 205; FDST 448/848 or parallel; BIOC 321.
Description: Experiments involving the isolation, purification, and characterization of the molecular components of foods.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LAB
FDST 451 Food Science and Technology Seminar
Prerequisites: Permission.
Description: Student presentations of food science literature and research.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

FDST 455 Microbiology of Fermented Foods
Crosslisted with: FDST 855
Prerequisites: FDST 405/805
Notes: On-campus students must also register for FDST 455L/855L
Description: Physiology, biochemistry, and genetics of microorganisms important in food fermentation. How microorganisms are used in fermentation and the effects of processing and manufacturing conditions on production of fermented foods.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LEC

FDST 455L Microbiology of Fermented Foods Laboratory
Crosslisted with: FDST 855L
Prerequisites: FDST 405/805 and parallel FDST 455/855
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LAB

FDST 458 Advanced Food Analysis
Crosslisted with: FDST 858
Description: Theory and application of molecular and atomic spectroscopy, immunochemistry and thermal methods to the analysis of foods. Chemical separation techniques for the isolation of food constituents.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

FDST 460 Food Product Development Concepts I
Crosslisted with: FDST 860
Prerequisites: FDST 405/805 and 448/848.
Notes: Capstone course.
Description: Develop a commercially viable food product using chemical, microbiological and sensory analysis principles, and marketing and packaging sciences.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

FDST 465 Food Engineering Unit Operations
Crosslisted with: FDST 865, MSYM 465, MSYM 865
Prerequisites: FDST/MSYM 363.
Description: Unit operations and their applications to food processing.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

FDST 470 Nutraceuticals and Functional Foods
Crosslisted with: FDST 870
Prerequisites: BIOC 321 or BIOC/BIOS/Chem 431/831.
Description: Evaluation of natural compounds impact on human health. Inflammation, cancer, heart disease, and the impact of gut micro-flora on health.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

FDST 490 Food Industry Experience
Prerequisites: Junior or senior standing and permission.
Notes: Required seminars/discussions to be completed prior to the internship. At the completion of the internship, a written report of the experience and a seminar presentation of the same material is required.
Description: Obtain a working knowledge of the food industry and begin developing professional credentials.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

FDST 499H Honors Thesis
Prerequisites: Admission to the University Honors Program and permission, AGRI 299H recommended.
Description: Conduct a scholarly research project and write a University Honors Program or undergraduate thesis.
Credit Hours: 3-6
Min credits per semester: 3
Max credits per semester: 6
Max credits per degree: 6
Format: IND

PLEASE NOTE
This document represents a sample 4-year plan for degree completion with this major. Actual course selection and sequence may vary and should be discussed individually with your college or department academic advisor. Advisors also can help you plan other experiences to enrich your undergraduate education such as internships, education abroad, undergraduate research, learning communities, and service learning and community-based learning.

Icon Legend: Critical

14 HR TERM 1
Core Courses
complete FDST 101  
2hr

College Algebra Reqt
complete MATH 102  
2hr

College Course
complete SCIL 101
<table>
<thead>
<tr>
<th>Term</th>
<th>Subject</th>
<th>Courses</th>
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<tbody>
<tr>
<td><strong>TERM 1</strong></td>
<td><strong>ACE 4 Chemistry</strong></td>
<td>complete CHEM 109</td>
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<td></td>
<td><strong>ACE 1 Written Comm</strong></td>
<td>complete 1 from ENGL 150, ENGL 151, ENGL 254, JGEN 120, JGEN 200, JGEN 300</td>
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<td><strong>16 HR</strong></td>
<td><strong>ACE 4 Chemistry</strong></td>
<td>complete CHEM 110</td>
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<td><strong>TERM 2</strong></td>
<td><strong>Practical Appl Course</strong></td>
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<td>complete CHEM 110</td>
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<td></td>
<td><strong>College Algebra Reqt</strong></td>
<td>complete either MATH 104 or MATH 106</td>
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<tr>
<td></td>
<td><strong>ACE 2 Oral Comm</strong></td>
<td>complete 1 from ALEC 102, COMM 101, COMM 209, COMM 210H, COMM 286, NRES 301</td>
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<td><strong>ACE 6 Economics</strong></td>
<td>complete 1 from AECN 141, ECON 211, ECON 212, ECON 200</td>
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<td><strong>16 HR</strong></td>
<td><strong>ACE 4 Organic Chemistry</strong></td>
<td>complete 2 from CHEM 251, CHEM 255, CHEM 253, CHEM 257</td>
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<td><strong>TERM 3</strong></td>
<td><strong>ACE4 Life Science</strong></td>
<td>complete LIFE 120, LIFE 120L</td>
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<td><strong>ACE 3 Math/Statistics</strong></td>
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<td><strong>ACE 5 Humanities</strong></td>
<td>complete 1 from ACE5</td>
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<td><strong>16 HR</strong></td>
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<tr>
<td><strong>TERM 4</strong></td>
<td><strong>Comp And Analysis Course</strong></td>
<td>complete FDST 205</td>
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<td><strong>ACE4 Life Science</strong></td>
<td>complete either LIFE 121 or LIFE 121L</td>
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<tr>
<td></td>
<td><strong>ACE 4 Physics</strong></td>
<td>complete 2 from MSYM 109, MSYM 109L, PHYS 151, PHYS 153</td>
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<td><strong>ACE 7 Arts</strong></td>
<td>complete 1 from ACE7</td>
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<td><strong>14 HR</strong></td>
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<tr>
<td><strong>TERM 5</strong></td>
<td><strong>Process Technology</strong></td>
<td>complete 1 from FDST 363, ASCI 310, ASCI 410, FDST 412, FDST 420, FDST 429, FDST 455L, FDST 455</td>
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<tr>
<td></td>
<td><strong>Biochemistry</strong></td>
<td>complete 2 from BIOC 321, BIOC 321L, BIOC 431, BIOC 433</td>
</tr>
</tbody>
</table>

Complete an ACE 5, 7, 8, or 9 requirement this term.
Food Science & Technology

Technical Electives


3hr

ACE 8 Ethical Principles

- complete 1 from ACE8

3hr

Complete an ACE 5, 7, 8, or 9 requirement this term.

15 HR TERM 6

Process Technology

- complete 2 from FDST 455, FDST 465, ASCI 310, ASCI 410, FDST 412, FDST 420, FDST 429, FDST 455L

6hr

Complete FDST 365 and one other course this term.

Core Courses

- complete FDST 403

3hr

Microbiology

- complete BIOS 312

3hr

Nutrition

- complete NUTR 455

15 HR TERM 7

Food Microbiology

- complete FDST 405, FDST 406

5hr

Food Chemistry

- complete FDST 448, FDST 449

4hr

Technical Electives


3hr

ACE 9 Global/Human Divers

- complete 1 from ACE9

3hr

Complete an ACE 5, 7, 8, or 9 requirement this term.

15 HR TERM 8

Core Courses

- complete FDST 451

1hr

Food Chemistry

- complete FDST 458

3hr

ACE 10 Capstone Course

- complete FDST 460

3hr

Technical Electives


3hr
Electives

complete Any Course

Graduation Requirements
1. Performance Measure: 2.00 GPA required for graduation.
2. ***Total Credits Applying Toward 120 Total Hours***

Career Information
The following represents a sample of the internships, jobs and graduate school programs that current students and recent graduates have reported.

Jobs of Recent Graduates
- RD Scientist, Rembrandt Foods - Spirit Lake IA
- Operations Management, Milk Specialties Global - Fond du Lac WI
- Associate Manager; Sensory, Wells Enterprises - LeMars IA
- Food Safety Scientist, Kraft Foods - Glenview IL
- Quality Management Chemist, Cargill - Cedar Rapids IA
- Organic Certification Specialist, OneCert - Lincoln NE
- Technical Sales Associate, LI-COR Biosciences - Lincoln NE
- Lab Technician, SensoryEffects - Lincoln NE
- Food Safety Officer, United States Army - Natick MA
- Food Technologist, Nestle - Solon OH

Internships
- Quality Assurance Intern, Ardent Mills - Kenosha WI
- Product Development Intern, ConAgra Brands - Omaha NE
- Dairy Foods RD - Product Development Intern, Land O'Lakes - Arden Hills MN
- Quality Chemist Intern, Cargill - Wahpeton ND
- Food Safety Intern, Land O’Frost - Lansing IL
- Research Innovation, Product Development Intern, ConAgra Foods - Omaha NE
- Quality Assurance Intern, Tyson Fresh Meats - Sioux City IA
- Quality Assurance Intern, Land O’Frost Deli Meats - Madisonville KY
- Lab Intern, Pro-Pet LLC - St. Marys OH
- Research and Development Intern, Cargill - Wayzata MN

Grad Schools
- Graduate Student in Food Science Technology, University of Nebraska-Lincoln - Lincoln NE
- Graduate Student in Food Science, Kansas State University - Manhattan KS
- Doctor of Pharmacy, University of Nebraska Medical Center - Omaha NE
- Graduate Student in Food Science, Cornell University - Ithaca NY
- Graduate Student in Food Science, Purdue University - West Lafayette IN
- Doctorate of Medicine, University of Nebraska Medical Center - Omaha NE