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 the University of Nebraska–Lincoln, or within the first calendar year at Nebraska, 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 bachelors 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. Some degree programs have a higher cumulative grade point average required for graduation. Please check the degree program on its graduation cumulative grade point average.

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 (withdraw), 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. Some degree programs have a higher cumulative grade point average required for graduation. Please check the degree program on its graduation cumulative grade point average.

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 (60) is the maximum number of hours the University will accept on transfer from a two-year college. Ninety (90) is the
maximum number of hours the University 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 the University of Nebraska–Lincoln 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 the University of Nebraska–Lincoln.

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 the University of Nebraska–Lincoln 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 degree in the community college, transfer to the University of Nebraska–Lincoln, 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 the University of Nebraska–Lincoln 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. Students should discuss these degree programs with their academic advisor.

Cooperative Degree Programs
Academic credit from the University and a cooperating institution is applied towards a four-year degree from either the University of Nebraska–Lincoln (University degree-granting program) or the cooperating institution (non University degree-granting program). All have approved programs of study.

UNL Degree-Granting Programs
A University of Nebraska–Lincoln 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-semester 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).

Nebraska 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 University of Nebraska–Lincoln Degree-Granting Programs
The CASNR cooperates with other institutions to provide course work that is applied towards a degree at the cooperating institution. Pre-professional programs offered by CASNR allow students to complete the first two or three years of a degree program at the University 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 University of Nebraska–Lincoln credits. At least 18 of the 30 credit hours must be in courses offered through CASNR1 (>299) including the appropriate ACE 10 degree requirement or an approved ACE 10 substitution offered through another Nebraska 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. University of Nebraska–Lincoln open enrollment and summer independent study courses count toward residency.

1 Includes courses taught by CASNR faculty through interdisciplinary prefixes (e.g., LIFE, MBIO, ENVR, SCIL, EAEPM, 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 ace.unl.edu (https://ace.unl.edu).

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 the University of Nebraska–Lincoln 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 Nebraska 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

<table>
<thead>
<tr>
<th>College Integrative Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCIL 101 Science and Decision-Making for a Complex World</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 3

Natural Sciences

Select one of the following: 4-5

| BIOC 321 | Elements of Biochemistry |
| BIOC 321L | and Laboratory for Elements of Biochemistry |

| BIOC 431 / | Structure and Metabolism |
| BIOS 431 / | and Biochemistry Laboratory |
| CHEM 431 | |
| & BIOC 433 / | |
| BIOS 433 / | |
| CHEM 433 | |

<p>| LIFE 120 | Fundamentals of Biology I |
| LIFE 120L | and Fundamentals of Biology I laboratory |
| LIFE 121 | Fundamentals of Biology II |
| LIFE 121L | and Fundamentals of Biology II Laboratory |</p>
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS 312</td>
<td>Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 109</td>
<td>General Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 110</td>
<td>General Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 251</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>or CHEM 255</td>
<td>Biological Organic Chemistry</td>
<td></td>
</tr>
<tr>
<td>CHEM 253</td>
<td>Organic Chemistry I Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>or CHEM 257</td>
<td>Biological Organic Chemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td>MSYM 109</td>
<td>Physical Principles in Agriculture and Life Sciences</td>
<td>5</td>
</tr>
<tr>
<td>or MSYM 109</td>
<td>and Physical Principles in Agriculture and Life Sciences Laboratory</td>
<td></td>
</tr>
<tr>
<td>PHYS 151</td>
<td>Elements of Physics</td>
<td>3</td>
</tr>
<tr>
<td>or PHYS 153</td>
<td>and Elements of Physics Laboratory</td>
<td></td>
</tr>
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</table>

Credit Hours Subtotal: 33

**Mathematics and Statistics**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 218</td>
<td>Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>or ECON 215</td>
<td>Statistics</td>
<td></td>
</tr>
<tr>
<td>MATH 102</td>
<td>Trigonometry</td>
<td>2</td>
</tr>
<tr>
<td>MATH 104</td>
<td>Applied Calculus</td>
<td></td>
</tr>
<tr>
<td>MATH 106</td>
<td>Calculus I</td>
<td></td>
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</table>

Credit Hours Subtotal: 10

**Communications**

*ACE Outcome 1*

Select one of the following: 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 150</td>
<td>Writing and Inquiry</td>
<td></td>
</tr>
<tr>
<td>ENGL 151</td>
<td>Writing and Argument</td>
<td></td>
</tr>
<tr>
<td>ENGL 254</td>
<td>Writing and Communities</td>
<td></td>
</tr>
<tr>
<td>JGEN 120</td>
<td>Basic Business Communication</td>
<td></td>
</tr>
<tr>
<td>JGEN 200</td>
<td>Technical Communication I</td>
<td></td>
</tr>
<tr>
<td>JGEN 300</td>
<td>Technical Communication II</td>
<td></td>
</tr>
</tbody>
</table>

**ACE Outcome 2**

Select one of the following: 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALEC 102</td>
<td>Interpersonal Skills for Leadership</td>
<td></td>
</tr>
<tr>
<td>COMM 101</td>
<td>Communication in the 21st Century</td>
<td></td>
</tr>
<tr>
<td>COMM 209</td>
<td>Public Speaking</td>
<td></td>
</tr>
<tr>
<td>COMM 210</td>
<td>Communicating in Small Groups</td>
<td></td>
</tr>
<tr>
<td>COMM 286</td>
<td>Business and Professional Communication</td>
<td></td>
</tr>
<tr>
<td>NRES 301</td>
<td>Environmental Communication Skills</td>
<td></td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 6

**Economics, Humanities and Social Sciences**

Select one of the following: 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 211</td>
<td>Principles of Macroeconomics</td>
<td></td>
</tr>
<tr>
<td>ECON 212</td>
<td>Principles of Microeconomics</td>
<td></td>
</tr>
<tr>
<td>AECN 141</td>
<td>Introduction to the Economics of Agriculture (ACE 6)</td>
<td></td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDST 101</td>
<td>Introductory Food Science</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDST 132</td>
<td>Practical Applications in Food Science</td>
<td>1</td>
</tr>
<tr>
<td>FDST 280</td>
<td>Contemporary Issues in Food Science</td>
<td>2</td>
</tr>
<tr>
<td>FDST 403</td>
<td>Food Quality Assurance</td>
<td>3</td>
</tr>
<tr>
<td>FDST 451</td>
<td>Food Science and Technology Seminar</td>
<td>1</td>
</tr>
<tr>
<td>FDST 460</td>
<td>Food Product Development Concepts I</td>
<td>3</td>
</tr>
</tbody>
</table>

**Process Technology Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>FDST 363</td>
<td>Heat and Mass Transfer</td>
<td>3</td>
</tr>
<tr>
<td>or MSYM 363</td>
<td></td>
<td></td>
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</table>

Select two of the following: 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASCI 310</td>
<td>Fresh Meats</td>
<td></td>
</tr>
<tr>
<td>ASCI 410</td>
<td>Processed Meats</td>
<td></td>
</tr>
<tr>
<td>FDST 412</td>
<td>Cereal Technology</td>
<td></td>
</tr>
<tr>
<td>FDST 429</td>
<td>Dairy Products Technology</td>
<td></td>
</tr>
<tr>
<td>FDST 420</td>
<td>Fruit and Vegetable Technology</td>
<td></td>
</tr>
<tr>
<td>FDST 455</td>
<td>Microbiology of Fermented Foods</td>
<td></td>
</tr>
<tr>
<td>or FDST 455L</td>
<td>and Microbiology of Fermented Foods Laboratory</td>
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</table>

**Food Chemistry**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDST 205</td>
<td>Food Composition and Analysis</td>
<td>3</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>
<tr>
<td>FDST 458</td>
<td>Advanced Food Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>

**Food Microbiology**

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

**Nutrition**

Select one of the following: 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASCI 421</td>
<td>Advanced Animal Nutrition</td>
<td></td>
</tr>
<tr>
<td>NUTR 250</td>
<td>Human Nutrition and Metabolism</td>
<td></td>
</tr>
<tr>
<td>NUTR 455</td>
<td>Advanced Nutrition</td>
<td></td>
</tr>
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</table>

Credit Hours Subtotal: 39

**Technical Electives**

Select 10-11 hours of the following areas: 2 10-11

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>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, STAT, VBMS (except 101)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 10

**Free Electives**

Select 0-4 hours 0-4

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, CHEM 252, CHEM 253 and CHEM 254.
Students are encouraged to consider 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 hours 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>Credit Hours</th>
</tr>
</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:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<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>3</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 hours in food science and technology, including a minimum of 6 hours at the 300 level or above. No more than 3 hours of FDST 396 Independent Study in Food Science and Technology can be applied to the minor.

Core Courses

Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDST 101</td>
<td>Introductory Food Science</td>
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<tr>
<td>FDST 131 / CHEM 131 / NUTR 131</td>
<td>The Science of Food</td>
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<tr>
<td>FDST 205</td>
<td>Food Composition and Analysis</td>
<td>3</td>
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<td>FDST 280</td>
<td>Contemporary Issues in Food Science</td>
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Credit Hours Subtotal: 7-8

Additional FDST courses

Select 10-11 hours

Credit Hours Subtotal: 10-11

Total Credit Hours: 17-19

FDST 101 Introductory Food Science

Description: Food composition, safety, processing, packaging, labeling, product development, food marketing and related topics.

Credit Hours: 2

Max credits per semester: 2

Max credits per degree: 2

Format: LEC

Prerequisite for: FDST 205; FDST 280; FDST 301

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 131L; FDST 205; FDST 280; 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.

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

Prerequisites: CHEM 109 and 110; FDST 101 or 131.

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: 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
Notes: Will not count toward a FDST major or minor.
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

FDST 406 Food Microbiology Laboratory
Crosslisted with: BIOS 446, BIOS 846, FDST 806
Prerequisites: BIOS 445, BIOS 845, FDST 405, FDST 805; FDST 415, FDST 815; FDST 425, FDST 825; FDST 455, FDST 855; FDST 455L, FDST 855L; FDST 460, FDST 860; FDST 875; FDST 877; FDST 908B
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
Prerequisite for: FDST 415, FDST 815

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
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, BIOS 321, or equivalent.
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.
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
Prerequisite for: NUTR 449

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 microbiome 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
Prerequisite for: NUTR 449

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
Prerequisite for: ASCI 917; FDST 449, FDST 849; FDST 452, FDST 852; FDST 458, FDST 858; FDST 460, FDST 860; NUTR 449
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
Prerequisite for: FDST 458, FDST 858

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 452 Physical Chemistry of Foods
Crosslisted with: FDST 852
Prerequisites: FDST 448/848 or instructor approval.
Description: The basic theory of physical chemistry that is relevant in food science and technology. Understand and predict changes occurring in a food during processing, storage, and handling using physical chemistry theory. Design and improvement of processes to make foods having specific qualities in an efficient way.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
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
Prerequisites: FDST 205, 448/848, and FDST 449/849.
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 FDST 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
ACE: ACE 10 Integrated Product

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.

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
• Associate Food Scientist, ConAgra Foods - Omaha NE
• Leadership Development Program - Quality Emphasis, Ardent Mills - Wichita KS
• Quality Assurance/Food Safety Specialist, Smithfield Farmland - Wichita KS
• Food Safety, Quality and Regulatory Associate, Cargill - Columbus NE
• Lab Technician, SensoryEffects - Lincoln NE
• Quality Development Associate, ConAgra Brands - Russellville AR
• Graduate Student, University of Nebraska - Lincoln NE
• Associate Food Scientist, International Spices - Fremont NE
• Leadership Development Program - Operations, Ardent Mills - Denver CO
• Quality Assurance, Hormel Foods - Rochelle IL

Internships
• Quality Assurance Intern, Ardent Mills - Kenosha WI
• Product Development Intern, ConAgra Brands - Omaha NE
• Dairy Foods R&D - Product Development Intern, Land O'Lakes - Arden Hills MN
• Quality Chemist Intern, Cargill - Wahpeton ND
• Food Safety Intern, Land O’Frost - Lansing IL
• Quality Intern, ConAgra Foods - Marshall MO
• 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

Graduate & Professional 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 KS
• 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
• Complex Biosystems, University of Nebraska - Lincoln NE
• Food Science, University of Illinois Urbana-Champaign - Champaign IL
• Dentistry, University of Iowa - Iowa City IA