Food Science (FDSC)

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N-201 Food Science Building
479-575-4605

Department of Food Science Website (http://food-science.uark.edu)

Food science is the application of science and technology to processing, packaging, safety, product innovation and distribution of food products. Food science deals with all aspects of food between production and consumption and involves many disciplines, including chemistry, microbiology, nutrition, engineering and sensory science.

Food science prepares students for many interesting, rewarding and challenging professional career opportunities in industry, business, governmental and educational organizations associated with food and food-related products. Due to the diversity and abundance of opportunities available, students graduating with a B.S.A. in food science readily obtain employment or continue studies for graduate school. Additionally, requirements for several pre-professional programs can be fulfilled while meeting requirements for the food science degree.

Students may choose one of three areas of concentration for their degree program: Food Science (FDSC), Food Technology (FDTN) or Food and Culinary Sciences (FDCU). The FDSC concentration at the University of Arkansas is one of only 40 programs in the United States and the only one in Arkansas that is approved by the Institute of Food Technologists. It provides students with a strong background in basic and applied sciences and food chemistry, microbiology, analysis, quality and engineering.

The FDTN concentration provides students interested in food industry careers with an integrated background in food science and business or nutrition. Students in the food technology concentration will complete a minor in agribusiness, general business, or nutrition while completing their core requirements, thus leaving elective hours available for further educational enhancement.

The FDCU concentration provides students interested in product development careers with an interdisciplinary background in food science and culinary arts. This concentration is a partnership program with Northwest Arkansas Community College (NWACC). Students complete their culinary arts coursework on the NWACC campus for transfer credit to the UA and are eligible to receive a Certificate of Proficiency in Culinary Arts from NWACC with no additional coursework. Culinary coursework can be taken prior to admission to the UA or taken while in residence at the UA. Food and Culinary Sciences concentration will provide students with the course work necessary to be eligible to become a Certified Culinary Scientist through the Research Chef’s Association.

Students in each concentration are offered opportunities for research, internships, international experiences and selection of a minor.

Requirements for a Major in Food Science (FDSC)

State minimum core and discipline specific general education requirements:
(Course work that meets state minimum core requirements is in bold.)

Communication (6-12 hours)

ENGL 1013 Composition I (ACTS Equivalency = ENGL 1013) (unless exempt) 3
ENGL 1023 Composition II (ACTS Equivalency = ENGL 1023) (unless exempt) 3
Select two courses from approved list of communication intensive courses (FDCU must choose 3000-4000 level courses) 6

U.S. History and Government (3 hours)

Select one U.S. History Core courses 3

Mathematics and Statistics (9-13 hours)

MATH 1203 College Algebra (ACTS Equivalency = MATH 1103) 3
FDSC Concentration: 10
MATH 1213 Plane Trigonometry (ACTS Equivalency = MATH 1203)
MATH 2054 Calculus I (ACTS Equivalency = MATH 2405)
Select one of the following:
STAT 2303 Principles of Statistics (ACTS Equivalency = MATH 2103)
STAT 2023 Biostatistics
AGST 4023 Principles of Experimentation
FDTU Concentration: 6-9
MATH 2043 Survey of Calculus (ACTS Equivalency = MATH 2203)
MATH 2053 Finite Mathematics (for students declaring Agricultural Business or General Business minors only)
Select one of the following:
AGEC 2403 Quantitative Tools for Agribusiness
WCOB 1033 Data Analysis and Interpretation
STAT 2303 Principles of Statistics (ACTS Equivalency = MATH 2103)
AGST 4023 Principles of Experimentation
FDTU Concentration: 6
MATH 2043 Survey of Calculus (ACTS Equivalency = MATH 2203)
STAT 2303 Principles of Statistics (ACTS Equivalency = MATH 2103)

Physical and Biological Sciences (20-31 hours)

BIOI 1543 Principles of Biology (ACTS Equivalency = BIOI 1014 Lecture) and Principles of Biology Laboratory (ACTS Equivalency = BIOI 1014 Lab) 4
BIOI 2013 General Microbiology (ACTS Equivalency = BIOI 2004 Lecture) and General Microbiology Laboratory (ACTS Equivalency = BIOI 2004 Lab) 4
CHEM 1103 University Chemistry I (ACTS Equivalency = CHEM 1414 Lecture) and University Chemistry I Laboratory (ACTS Equivalency = CHEM 1414 Lab) 4
CHEM 1123 University Chemistry II (ACTS Equivalency = CHEM 1424 Lecture) and University Chemistry II Laboratory (ACTS Equivalency = CHEM 1424 Lab) 4
Select one of the following concentrations:
FDSC Concentration: 11-15
Food Science B.S.A., Food Science Concentration
Nine-Semester Degree Program

Because the Food Science Concentration requires an internship one summer, students cannot enroll in an Eight-Semester Program. See the Eight-Semester Degree Policy (http://catalog.uark.edu/undergraduatecatalog/academicregulations/eightsemesterdegreecompletionpolicy) for requirements of the eight-semester programs.

**First Year**

<table>
<thead>
<tr>
<th>Units</th>
<th>Fall</th>
<th>Spring</th>
<th>Summer</th>
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<tbody>
<tr>
<td>UNIV 1001 University Perspectives</td>
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<tr>
<td>BIOL 1543 Principles of Biology (ACTS Equivalency = BIOL 1014 Lecture) &amp; BIOL 1541L Principles of Biology Laboratory (ACTS Equivalency = BIOL 1014 Lab)</td>
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<td>FDSC 1011 Exploring Topics in Food Science</td>
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<td>MATH 1203 College Algebra (ACTS Equivalency = MATH 1103)</td>
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<tr>
<td>ENGL 1013 Composition I (ACTS Equivalency = ENGL 1013)</td>
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<td>ENGL 1023 Composition II (ACTS Equivalency = ENGL 1023)</td>
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<td>MATH 1213 Plane Trigonometry (ACTS Equivalency = MATH 1203)</td>
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<td>CHEM 1103 University Chemistry I (ACTS Equivalency = CHEM 1414 Lecture) &amp; CHEM 1101L University Chemistry I Laboratory (ACTS Equivalency = CHEM 1414 Lab)</td>
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<td>FDSC 1103 Introduction to Food Science</td>
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<td>Year Total:</td>
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**Second Year**

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<tr>
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<th>Spring</th>
<th>Summer</th>
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<tbody>
<tr>
<td>CHEM 1123 University Chemistry II (ACTS Equivalency = CHEM 1424 Lecture) &amp; CHEM 1121L University Chemistry II Laboratory (ACTS Equivalency = CHEM 1424 Lab)</td>
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<td>MATH 2554 Calculus I (ACTS Equivalency = MATH 2405)</td>
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<tr>
<td>Select one of the following:</td>
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<tr>
<td>FDSC 2603 Science in the Kitchen (recommended elective)</td>
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<tr>
<td>General Elective</td>
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<tr>
<td>NUTR 1213 Fundamentals of Nutrition</td>
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<td>3</td>
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</table>
### Requirements for a Major in Food Science (FDSC)

State minimum core and discipline specific general education requirements:
(Course work that meets state minimum core requirements is in bold.)

#### Communication (6-12 hours)

- **ENGL 1013** Composition I (ACTS Equivalency = ENGL 1013) (unless exempt) 3
- **ENGL 1023** Composition II (ACTS Equivalency = ENGL 1023) (unless exempt) 3

Select two courses from approved list of communication intensive courses (FDCU must choose 3000-4000 level courses) 6

#### U.S. History and Government (3 hours)

Select one U.S. History Core courses 3

#### Mathematics and Statistics (9-13 hours)

- **MATH 1203** College Algebra (ACTS Equivalency = MATH 1103) 3
- **FDSC Concentration:** 10
  - **MATH 1213** Plane Trigonometry (ACTS Equivalency = MATH 1203) 3
  - **MATH 2554** Calculus I (ACTS Equivalency = MATH 2405) 3

Select one of the following:  
- **STAT 2303** Principles of Statistics (ACTS Equivalency = MATH 2103) 3
- **AGST 4023** Principles of Experimentation 3

- **FDTN Concentration:** 6-9
  - **MATH 2043** Survey of Calculus (ACTS Equivalency = MATH 2203) 3
  - **MATH 2053** Finite Mathematics (for students declaring Agricultural Business or General Business minors only) 3

Select one of the following:  
- **AGEC 2403** Quantitative Tools for Agribusiness 3
- **WCOB 1033** Data Analysis and Interpretation 3
- **STAT 2303** Principles of Statistics (ACTS Equivalency = MATH 2103) 3

#### Fourth Year

- **AGST 4023** Principles of Experimentation 3

**FDSC Concentration:** 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall</th>
<th>Spring</th>
<th>Summer</th>
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<tbody>
<tr>
<td>FDSC 3103 Principles of Food Processing</td>
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<tr>
<td>FDSC 4413 Sensory Evaluation of Food</td>
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<tr>
<td>University Core in Fine Arts/Humanities or Social Science or History</td>
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Year Total: 14 16 3
### Physical and Biological Sciences (20-31 hours)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>BIOL 1543 &amp; BIOL 1541L</td>
<td>Principles of Biology (ACTS Equivalency = BIOL 1014 Lecture) and Principles of Biology Laboratory (ACTS Equivalency = BIOL 1014 Lab)</td>
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<tr>
<td>BIOL 2013 &amp; BIOL 2011L</td>
<td>General Microbiology (ACTS Equivalency = BIOL 2004 Lecture) and General Microbiology Laboratory (ACTS Equivalency = BIOL 2004 Lab)</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 1103 &amp; CHEM 1101L</td>
<td>University Chemistry I (ACTS Equivalency = CHEM 1414 Lecture) and University Chemistry I Laboratory (ACTS Equivalency = CHEM 1414 Lab)</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 1123 &amp; CHEM 1121L</td>
<td>University Chemistry II Laboratory (ACTS Equivalency = CHEM 1424 Lab) and University Chemistry II Laboratory (ACTS Equivalency = CHEM 1424 Lab)</td>
<td>4</td>
</tr>
</tbody>
</table>

### Select one of the following concentrations:

- **FDSC Concentration:** 11-15
  - CHEM 2613 Organic Physiological Chemistry (ACTS Equivalency = CHEM 1224 Lecture) and Organic Physiological Chemistry Laboratory (ACTS Equivalency = CHEM 1224 Lab)
  - or CHEM 36 Organic Chemistry I & CHEM 36 Organic Chemistry II & CHEM 36 Organic Chemistry II Laboratory
  - CHEM 3813 Elements of Biochemistry

- **PHYS 2013 College Physics I (ACTS Equivalency = PHYS 1424 Lecture) and College Physics I Laboratory (ACTS Equivalency = PHYS 1424 Lab)**

### FDTN Concentration:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CHEM 2613 &amp; CHEM 2611L</td>
<td>Organic Physiological Chemistry (ACTS Equivalency = CHEM 1224 Lecture) and Organic Physiological Chemistry Laboratory (ACTS Equivalency = CHEM 1224 Lab)</td>
<td>4</td>
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<tr>
<td>CHEM 3813</td>
<td>Elements of Biochemistry (for students declaring General Foods and Nutrition minor only)</td>
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### FDCU Concentration:

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<thead>
<tr>
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</table>

### Fine Arts and Humanities (6 hours)

Select two Fine Arts, Humanities Core courses

### Social Sciences (9 hours)

Select three Social Science Core courses

- Students declaring Agricultural Business minor must take
  - AGEC 1103 Agricultural Microeconomics and students declaring General Business minor must take ECON 2143 Basic Economics
    - Theory & Practice, or both ECON 2013 Macroeconomics and ECON 2023 Microeconomics

### FDSC Degree Requirements (26 hours)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
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<tbody>
<tr>
<td>FDSC 1001</td>
<td>University Perspectives</td>
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<td>FDSC 1011</td>
<td>Exploring Topics in Food Science</td>
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<tr>
<td>FDSC 1103</td>
<td>Introduction to Food Science</td>
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### Additional Requirements for Food Technology Concentration (18-21 hours)

Select one of the following:

- FSC 3103 Principles of Food Processing 3
- FSC 3202 Introduction to Food Law 2
- FSC 4304 Food Chemistry 4
- FSC 4113 Food Analysis 4
- FSC 4111L and Food Analysis Lab
- FSC 431V Internship in Food Science 3
- FSC 4413 Sensory Evaluation of Food 3
- FSC 4713 Product Innovation for the Food Scientist 3
- General Electives (9-19 hours) 9-19

### Food Science B.S.A., Food Technology Concentration

**Nine-Semester Degree Program**

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Semester Program. See the Eight-Semester Degree Policy (http://catalog.uark.edu/undergraduatecatalog/academicregulations/eightsemesterdegreecompletionpolicy) for requirements of the eight-semester programs. Students in the Food Technology Concentration must also minor in agribusiness, general business or nutrition.

<table>
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<tr>
<th>First Year</th>
<th>Fall</th>
<th>Spring</th>
<th>Summer</th>
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<tr>
<td>UNIV 1001 University Perspectives</td>
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<td>BIOL 1543 Principles of Biology (ACTS Equivalency = BIOL 1014 Lecture) &amp; BIOL 1541L Principles of Biology Laboratory (ACTS Equivalency = BIOL 1014 Lab)</td>
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<tr>
<td>University Core in Fine Arts/Humanities or Social Science or History</td>
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<td>ENGL 1013 Composition I (ACTS Equivalency = ENGL 1013)</td>
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<td>FDSC 1011 Exploring Topics in Food Science</td>
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<td>MATH 1203 College Algebra (ACTS Equivalency = MATH 1103)</td>
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<td>CHEM 1103 University Chemistry I (ACTS Equivalency = CHEM 1414 Lecture) &amp; CHEM 1101L University Chemistry I Laboratory (ACTS Equivalency = CHEM 1414 Lab)</td>
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<td>ENGL 1023 Composition II (ACTS Equivalency = ENGL 1023)</td>
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<td>Select one of the following:</td>
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<tr>
<td>Business minors only: AGEC 1103 Principles of Agricultural Microeconomics or ECON 2143 Basic Economics: Theory and Practice</td>
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<td>Nutrition minors only: University Core in Social Science</td>
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<td>Business minors only: ISYS 1120 Computer Competency Requirement &amp; MATH 2053 Finite Mathematics</td>
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<td>Nutrition minors only: NUTR 1213 Fundamentals of Nutrition</td>
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<td>FDSC 1103 Introduction to Food Science</td>
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<td>Year Total:</td>
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<th>Second Year</th>
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<th>Spring</th>
<th>Units</th>
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<td>CHEM 1123 University Chemistry II (ACTS Equivalency = CHEM 1424 Lecture) &amp; CHEM 1121L University Chemistry II Laboratory (ACTS Equivalency = CHEM 1424 Lab)</td>
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<td>FDSC 2503 Food Safety and Sanitation</td>
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<td>MATH 2043 Survey of Calculus (ACTS Equivalency = MATH 2203)</td>
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<td>Select one of the following:</td>
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<td>Business minors only: AGEC 2142 Agribusiness Financial Records &amp; AGEC 2141L Agribusiness Financial Records Lab or ACCT 2013 Accounting Principles</td>
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<tr>
<td>Nutrition minors only: NUTR 2113 Principles of Foods &amp; NUTR 2111L Principles of Foods Laboratory</td>
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<tr>
<td>FDSC 2603 Science in the Kitchen General Elective</td>
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<td>Communication Intensive Elective (from approved list of courses)</td>
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<td>CHEM 2613 Organic Physiological Chemistry (ACTS Equivalency = CHEM 1224 Lecture) &amp; CHEM 2611L Organic Physiological Chemistry Laboratory (ACTS Equivalency = CHEM 1224 Lab)</td>
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<td>AGEC 2403 Quantitative Tools for Agribusiness WCOB 1033 Data Analysis and Interpretation STAT 2303 Principles of Statistics (ACTS Equivalency = MATH 2103) AGST 4023 Principles of Experimentation</td>
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<td>FDSC 2701 Food for Health General Elective</td>
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<th>Third Year</th>
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<tr>
<td>BIOL 2013 General Microbiology (ACTS Equivalency = BIOL 2004 Lecture) &amp; BIOL 2011L General Microbiology Laboratory (ACTS Equivalency = BIOL 2004 Lab)</td>
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University Core in Fine Arts/Humanities or Social Science or History 3
FDSC 4304 Food Chemistry 4
Select one of the following: 3
Business minors only:
- MKTG 3433 Introduction to Marketing or 3 hours of 3000-4000 level business elective
Nutrition minors only:
- NUTR 4223 Life Cycle Nutrition
Communication Intensive Elective (from approved list of courses) 3
FDSC 3202 Introduction to Food Law 2
FDSC 4113 Food Analysis & FDSC 4111L Food Analysis Lab 4
Select one of the following: 6
Business minors only:
- AGEC 2303 Introduction to Agribusiness & AGEC 3303 Food and Agricultural Marketing or MGMT 3563 Management Concepts and Organizational Behavior
OR
- MGMT 3563 Management Concepts and Organizational Behavior & 3000-4000 level business elective
Nutrition minors only:
- CHEM 3813 Elements of Biochemistry & NUTR 3203 Human Nutrition
FDSC 431V Internship in Food Science 3
Year Total: 14 15 3

Fourth Year

<table>
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<th>Units</th>
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<td>FDSC 4413 Sensory Evaluation of Food</td>
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<td>Select one of the following:</td>
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<tr>
<td>Business minors only:</td>
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</tbody>
</table>
- AGEC 4313 Agricultural Business Management or 3000-4000 level Business Elective |
Nutrition minors only: | | | |
- NUTR 4213 Advanced Nutrition |
FDSC 3103 Principles of Food Processing | 3 | | |
General Elective | 3 | | |
FDSC 4713 Product Innovation for the Food Scientist | | | 3 |
Select one of the following: | | | 6 |

Business minors only:
- General Electives
Nutrition minors only:
- NUTR 2203 Sports Nutrition or NUTR 4243 Community Nutrition & General Elective
University Core in Fine Arts/Humanities or Social Science or History 3
Year Total: 15 12

Total Units in Sequence: 120

Requirements for a Major in Food Science (FDSC)
State minimum core and discipline specific general education requirements:
(Course work that meets state minimum core requirements is in bold.)

Communication (6-12 hours)
- ENGL 1013 Composition I (ACTS Equivalency = ENGL 1013) (unless exempt) 3
- ENGL 1023 Composition II (ACTS Equivalency = ENGL 1023) (unless exempt) 3
Select two courses from approved list of communication intensive courses (FDCU must choose 3000-4000 level courses) 6

U.S. History and Government (3 hours)
Select one U.S. History Core courses 3

Mathematics and Statistics (9-13 hours)
- MATH 1203 College Algebra (ACTS Equivalency = MATH 1103) 3
- MATH 2554 Calculus I (ACTS Equivalency = MATH 2405)
Select one of the following:
- STAT 2303 Principles of Statistics (ACTS Equivalency = MATH 2103)
- STAT 2023 Biostatistics
- AGST 4023 Principles of Experimentation

FDSC Concentration:
- MATH 1213 Plane Trigonometry (ACTS Equivalency = MATH 1203)
- MATH 2554 Calculus I (ACTS Equivalency = MATH 2405)
Select one of the following:
- AGEC 2403 Quantitative Tools for Agribusiness
- WCOB 1033 Data Analysis and Interpretation
- STAT 2303 Principles of Statistics (ACTS Equivalency = MATH 2103)
- AGST 4023 Principles of Experimentation

FDSC Concentration: 6-9
- MATH 2043 Survey of Calculus (ACTS Equivalency = MATH 2203)
- MATH 2053 Finite Mathematics (for students declaring Agricultural Business or General Business minors only)
Select one of the following:
- AGEC 2403 Quantitative Tools for Agribusiness
- WCOB 1033 Data Analysis and Interpretation
- STAT 2303 Principles of Statistics (ACTS Equivalency = MATH 2103)
- AGST 4023 Principles of Experimentation

FDCU Concentration: 6
- MATH 2043 Survey of Calculus (ACTS Equivalency = MATH 2203)
Food Science (FDSC) 7

Physical and Biological Sciences (20-31 hours)

BIOL 1543 Principles of Biology (ACTS Equivalency = BIOL 1014 Lecture) and Principles of Biology Laboratory (ACTS Equivalency = BIOL 1014 Lab) 4

BIOL 2013 General Microbiology (ACTS Equivalency = BIOL 2004 Lecture) and General Microbiology Laboratory (ACTS Equivalency = BIOL 2004 Lab) 4

CHEM 1103 University Chemistry I (ACTS Equivalency = CHEM 1414 Lecture) and University Chemistry I Laboratory (ACTS Equivalency = CHEM 1414 Lab) 4

CHEM 1123 University Chemistry II (ACTS Equivalency = CHEM 1424 Lecture) and University Chemistry II Laboratory (ACTS Equivalency = CHEM 1424 Lab) 4

Select one of the following concentrations:

FDSC Concentration: 11-15

CHEM 2613 Organic Physiological Chemistry (ACTS Equivalency = CHEM 1224 Lecture) and Organic Physiological Chemistry Laboratory (ACTS Equivalency = CHEM 1224 Lab)

or CHEM 36 Organic Chemistry I

& CHEM 36I and Organic Chemistry I Laboratory

& CHEM 36 II and Organic Chemistry II

& CHEM 36 III and Organic Chemistry III Laboratory

CHEM 3813 Elements of Biochemistry

PHYS 2013 College Physics I (ACTS Equivalency = PHYS 1403 Lecture) and College Physics I Laboratory (ACTS Equivalency = PHYS 1403 Lab)

FDTN Concentration: 4-7

CHEM 2613 Organic Physiological Chemistry (ACTS Equivalency = CHEM 1224 Lecture) and Organic Physiological Chemistry Laboratory (ACTS Equivalency = CHEM 1224 Lab)

CHEM 3813 Elements of Biochemistry (for students declaring General Foods and Nutrition minor only)

FDSC Degree Requirements (26 hours)

UNIV 1001 University Perspectives 1

FDSC 1011 Exploring Topics in Food Science 1

FDSC 1103 Introduction to Food Science 3

FDSC 3103 Principles of Food Processing 3

FDSC 3202 Introduction to Food Law 2

FDSC 4304 Food Chemistry 4

FDSC 4113 Food Analysis 4

& FDSC 4111L Food Analysis Lab

FDSC 431V Internship in Food Science 3

FDSC 4413 Sensory Evaluation of Food 3

FDSC 4713 Product Innovation for the Food Scientist 3

General Electives (9-19 hours) 9-19

Additional Requirements for Food and Culinary Sciences Concentration (24 hours)

NUTR 1213 Fundamentals of Nutrition 3

Select one of the following: 3

FDSC 2503 Food Safety and Sanitation

FDST 1013 Food Safety 1

FDST 1023 Foundations 1

FDST 1033 Sauces 1

FDST 1043 Methods 1

FDST 1203 Baking 1

FDST 1403 Butchery & Charcuterie 1

FDST 2003 World Cuisine 1

Total Hours 120

1 Indicates NorthWest Arkansas Community College course codes.

Food Science B.S.A., Food and Culinary Sciences Concentration

Nine-Semester Degree Program

Because the Food and Culinary Sciences Concentration requires an internship one summer, students cannot enroll in an Eight-Semester Program. See the Eight-Semester Degree Policy (http://catalog.uark.edu/undergraduatecatalog/academicregulations/eightsemesterdegreecompletionpolicy) for requirements of the eight-semester programs.

First Year

UNIV 1001 University Perspectives 1

BIOL 1543 Principles of Biology (ACTS Equivalency = BIOL 1014 Lecture) & BIOL 1541L Principles of Biology Laboratory (ACTS Equivalency = BIOL 1014 Lab) 4

Biological Microeconomics and students declaring General Business minor must take ECON 2143 Basic Economics - Theory & Practice, or both ECON 2013 Microeconomics and ECON 2023 Macroeconomics

University Core in Fine Arts/Humanities or Social Science or History 3

ENGL 1013 Composition I (ACTS Equivalency = ENGL 1013) 3

FDSC 1011 Exploring Topics in Food Science 1

MATH 1203 College Algebra (ACTS Equivalency = MATH 1103) 3

University core in Fine Arts/Humanities or Social Science or History 3
ENGL 1023 Composition II (ACTS Equivalency = ENGL 1023) 3
FDSC 1103 Introduction to Food Science 3
Select one of the following:
  FDST 1013 Food Safety
  FDSC 2503 Food Safety and Sanitation
CHEM 1103 University Chemistry I (ACTS Equivalency = CHEM 1414 Lecture) 4
& CHEM 1101L University Chemistry I Laboratory (ACTS Equivalency = CHEM 1414 Lab)
Year Total: 15 16

**Second Year**

<table>
<thead>
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<th>Units</th>
<th>Fall</th>
<th>Spring</th>
<th>Summer</th>
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<td>University Core in Fine Arts/Humanities or Social Science or History</td>
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<tr>
<td>FDST 1023 Foundations</td>
<td>3</td>
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<tr>
<td>CHEM 1123 University Chemistry II (ACTS Equivalency = CHEM 1424 Lecture)</td>
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</table>
& CHEM 1121L University Chemistry II Laboratory (ACTS Equivalency = CHEM 1424 Lab)
| NUTR 1213 Fundamentals of Nutrition | 3 | | |
| MATH 2043 Survey of Calculus (ACTS Equivalency = MATH 2203) | 3 | | |
| BIOL 2013 General Microbiology (ACTS Equivalency = BIOL 2004 Lecture) & BIOL 2011L General Microbiology Laboratory (ACTS Equivalency = BIOL 2004 Lab) | 4 | | |
| CHEM 2613 Organic Physiological Chemistry (ACTS Equivalency = CHEM 1224 Lecture) & CHEM 2611L Organic Physiological Chemistry Laboratory (ACTS Equivalency = CHEM 1224 Lab) | 4 | | |
| Communication Intensive Elective (from approved list of courses; must be 3000-4000 level course) | 3 | | |
| Select one of the following: | | | |
| FDSC 2701 Food for Health | | | |
| General Elective | | | |
| FDST 1033 Sauces | 3 | | |
Year Total: 16 15

**Fourth Year**

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<th>Units</th>
<th>Fall</th>
<th>Spring</th>
<th>Summer</th>
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<tbody>
<tr>
<td>FDSC 3103 Principles of Food Processing</td>
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<td>FDSC 4413 Sensory Evaluation of Food</td>
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<tr>
<td>University Core in Fine Arts/Humanities or Social Science or History</td>
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<tr>
<td>General Elective (must be 3000-4000 level course)</td>
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<tr>
<td>FDSC 4713 Product Innovation for the Food Scientist</td>
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<td>FDST 2003 World Cuisine</td>
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<tr>
<td>FDST 1203 Baking</td>
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</table>
Year Total: 16 15

Total Units in Sequence: 120

1 Indicates NorthWest Arkansas Community College course codes.

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**Minor in Food Science (FDSC-M)**

The Food Science Minor consists of 18 semester hours to include:

- FDSC 3103 Principles of Food Processing 3
- FDSC 4122 Food Microbiology 3
- FDSC 4121L Food Microbiology Lab
- FDSC 4304 Food Chemistry 4
- and a minimum of 8 hours selected from the following courses (at least 5 hours must be 3000-4000 level coursework):
  - FDSC 1103 Introduction to Food Science
  - FDSC 2401 Uncorked: Vines to Wines
  - FDSC 2401H Honors Uncorked: Vines to Wines
  - FDSC 2603 Science in the Kitchen
  - FDSC 2701 Food for Health
  - FDSC 3202 Introduction to Food Law
  - FDSC 4113 Food Analysis & FDSC 4111L Food Analysis Lab

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**Test**

**Food Science (FDSC)**
FDSC 4413  Sensory Evaluation of Food
FDSC 4754  Engineering Principles of Food Processing
NUTR 4213  Advanced Nutrition

Total Hours 18

A student planning to minor in food science must consult a Department of Food Science adviser.

Faculty
Atungulu, Griffiths Odhiambo, Ph.D., M.S. (Iwate University, Japan), B.S. (Jomo Kenyatta University of Agriculture and Technology, Kenya), Assistant Professor, 2013.
Baum, Jamie L., Ph.D., B.S. (University of Illinois-Urbana-Champaign), Associate Professor, 2011.
Carbonero, Franck, Ph.D. (University of Warwick, U.K.), M.S. (Université Blaise Pascal, France), B.S. (Université Joseph Fourier, France), Assistant Professor, 2013.
Crandall, Philip G., Ph.D., M.S. (Purdue University), B.S. (Kansas State University), Professor, 1999.
Gibson, Kristen Elizabeth, Ph.D. (Johns Hopkins University), B.S. (University of Central Florida), Associate Professor, 2012.
Hettiarachchy, Navam S., Ph.D. (University of Hull, England), M.S. (Edinburgh University, Scotland), B.S. (University of Madras, India), University Professor, 1992.
Howard, Luke R., Ph.D., M.S. (University of Arkansas), B.S. (Purdue University), Professor, 2002.
Lee, Sun-Ok, Ph.D., M.S., B.S. (Dongduk Women’s University), Associate Professor, 2008.
Meullenet, Jean-François, Ph.D. (University of Georgia), M.S. (National Superior School of Agronomy and Food Science, Nancy, France), Professor, 1996.
Morawicki, Ruben O., Ph.D. (Pennsylvania State University), M.Eng. (State University of New York-Buffalo), B.S. (Universidad Nacional de Misiones, Argentina), Associate Professor, 2006.
Proctor, Andy, Ph.D., M.S. (University of Arkansas), B.S. (Queen Mary College, University of London), University Professor, 1999.
Ricke, Steven C., Ph.D. (University of Wisconsin-Madison), M.S., B.S. (University of Illinois), Professor, 2005.
Seo, Han-Seok, Dr rer. Medic. (Technische Universität Dresden, Germany), Ph.D., M.Sc. (Seoul National University), B.S. (Korea University, Seoul), Associate Professor, 2012.
Siebenmorgen, Terrence J., Ph.D. (University of Nebraska-Lincoln), M.S.Ag.E. (Purdue University), B.S.Ag.E. (University of Arkansas), Distinguished Professor, 1984.
Wang, Ya-Jane, Ph.D. (Iowa State University), M.S. (University of Minnesota-Twin Cities), B.S. (National Taiwan University), Professor, 1999.

Courses
FDSC 1011. Exploring Topics in Food Science. 1 Hour.
Introduces the depth and scope of Food Science as a profession. This course emphasizes the importance of science in processing and preservation of food and discusses current topics and issues. Practical information on food processing, composition, additives, labeling, environmental issues, regulations, safety, sensory analysis, and health benefits will be provided. Curriculum offerings in Food Science will be related to job responsibilities as a Food Scientist. Lecture/discussions, 2 hours per week for 8 weeks.

FDSC 1103. Introduction to Food Science. 3 Hours.
This course is designed to provide students with a general application and understanding of current issues associated with food products and food ingredients. Discussions will focus on controversial subjects involving food products, food additives, food safety and preservation techniques based on scientific principles and popular belief. Lecture/discussions/demonstrations, 3 hours per week.

FDSC 2111. Math Elements for Food Science and Technology. 1 Hour.
Basic data interpretation and analysis, problem interpretation and equation formulation, manipulation of algebraic functions representing applications in food science and technology, predictive models and curve fittings to determine model constants applied in food science and processing. Pre- or Corequisite: MATH 2043 or MATH 2554.

FDSC 2401. Uncorked: Vines to Wines. 1 Hour.
This introductory course is designed to provide students with an understanding of the basic concepts of growing grapes and winemaking, including history, grape growing, cultivars, chemistry, wine microorganisms, fermentation, winery operations, wine marketing, and the sensory and appreciation of wine. Coursework is expected to integrate lecture and guest presenters with supplemental reading assignments. This course will not include wine tasting, therefore there are no age restrictions for enrollment.

FDSC 2401H. Honors Uncorked: Vines to Wines. 1 Hour.
This introductory course is designed to provide students with an understanding of the basic concepts of growing grapes and winemaking, including history, grape growing, cultivars, chemistry, wine microorganisms, fermentation, winery operations, wine marketing, and the sensory and appreciation of wine. Coursework is expected to integrate lecture and guest presenters with supplemental reading assignments. This course will not include wine tasting, therefore there are no age restrictions for enrollment. Prerequisite: Honors standing. This course is equivalent to FDSC 2401.

FDSC 2503. Food Safety and Sanitation. 3 Hours.
Principles of sanitation, cleaners and sanitizers, sanitary equipment, plant design, and microbial growth and control in food processing operations. Lecture/discussion/demonstrations, 3 hours per week. Students may not receive credit for both FDSC 2503 and FDSC 2523.

FDSC 2523. Sanitation and Safety in Food Processing Operations. 3 Hours.
Topics to be covered include understanding and control of microbial, chemical, and physical food hazards as well as emerging food safety issues. Course will include a study of cleaners and sanitizers, sanitary equipment, and plant design. Bioterrorism and food safety will also be discussed. Students may not receive credit for both FDSC 2523 and FDSC 2503. Web-based course.

FDSC 2603. Science in the Kitchen. 3 Hours.
In recent years science has found its way into the kitchen and cooking into laboratories and food processing plants. This course is designed to integrate science and cooking to help students appreciate the chemical and physical properties of foods and understand how the processes used when handling, preparing, and storing foods affect these properties.

FDSC 2701. Food for Health. 1 Hour.
The course is designed for students interested in how foods affect one’s health. This course provides students with a background of functional food that will enable them to understand, discuss, and evaluate functionality of food in relation to health. This class is designed to appeal to students studying food science, nutrition, biology, chemistry, nursing, and health and human performance.
FDSC 3103. Principles of Food Processing. 3 Hours.
The course is designed as an overview of the unit; food processing operations common to all types of food processing plants. Examples will be drawn from international food processing operations processing fruits and vegetables, poultry and meats, and oil seeds and cereal grains. Emphasis on oral communication and critical thinking skills. Corequisite: Lab component. Prerequisite: CHEM 1123 and CHEM 1121L and (MATH 2043 or MATH 2554).

FDSC 3202. Introduction to Food Law. 2 Hours.
Discussion of government laws and regulations affecting the manufacture of food. Emphasis is on federal regulations relating to food safety, labeling, and the FDA. Discussion relates to practical use of food law. Lecture 2 hours per week.

FDSC 3923H. Honors Molecular Gastronomy. 3 Hours.
Lecture, demonstration, and hands-on exercises will be used to explain and demonstrate selected principles of chemistry by utilizing a modern culinary approach. Hands-on exercises will provide students with experience in applying the knowledge learned from the class to explicate fundamental principles in chemistry. Demonstrations and hands-on exercises will take place during scheduled lecture time. High school physics and chemistry will be useful in this course.

FDSC 400V. Special Problems. 1-4 Hour.
Investigation of assigned problems in food science. Prerequisite: Junior standing.

FDSC 4111L. Food Analysis Lab. 1 Hour.
Laboratory exercises providing students with experience of analytical techniques and instrumentation used in food analysis. Laboratory 3 hours per week. Corequisite: FDSC 4113. Prerequisite: FDSC 4304 and CHEM 1123 and CHEM 1121L and CHEM 2613 and CHEM 2611L or (CHEM 3603 and CHEM 3601L).

FDSC 4113. Food Analysis. 3 Hours.
Methods of analysis, instrumentation, and laboratory techniques for measuring the chemical composition of raw and value-added products. Lecture 3 hours. Corequisite: FDSC 4111L. Prerequisite: FDSC 4304 and CHEM 1123 and CHEM 1121L and CHEM 2613 and CHEM 2611L or (CHEM 3603 and CHEM 3601L).

FDSC 4121L. Food Microbiology Lab. 1 Hour.
A hands-on laboratory course designed to teach students microbiological techniques and certain enumeration and plating techniques of specific food spoilage and pathogenic bacteria. Pre- or Corequisite: FDSC 4122.

FDSC 4122. Food Microbiology. 2 Hours.
The study of food microbiology including classification/taxonomy, contamination, preservation and spoilage of different kinds of foods, pathogenic microorganisms, food poisoning, sanitation, control and inspection and beneficial uses of microorganisms. Prerequisite: BIOL 2013 and BIOL 2011L or BIOL 2533. This course is cross-listed with BIOL 4122.

FDSC 4304. Food Chemistry. 4 Hours.
Water, carbohydrates, lipids, proteins, vitamins, and minerals in foods; biochemical and functional properties, enzymes, food additives (emulsifiers, pigments, colors, flavors, preservatives, and sweeteners) and texture as related to properties in food systems and during processing. Lecture 3 hours, laboratory 3 hours per week. Corequisite: Lab component. Prerequisite: CHEM 1123 and CHEM 1121L and CHEM 2613 and CHEM 2611L or (CHEM 3603 and CHEM 3601L).

FDSC 4311V. Internship in Food Science. 1-4 Hour.
The Food Science Internship is a supervised practical work experience with a food industry, research program or governmental agency to gain professional experience and insight into career opportunities. Prerequisite: Junior standing and consent. May be repeated for up to 6 hours of degree credit.

FDSC 4313. Sensory Evaluation of Food. 3 Hours.
Principles and procedures for sensory evaluation of food. Appropriate uses of specific tests are discussed, along with physiological, psychological, and environmental factors affecting sensory verdicts. Lecture 2 hours, laboratory 2 hours per week. Corequisite: Lab component. Prerequisite: STAT 2303 or WCOB 1033 or AGST 4023 or STAT 2023 or PSYC 2013.

FDSC 4333. Molecular Biology Techniques Applied to Nutrition and Food Science. 3 Hours.
This course will provide advanced knowledge on current molecular biology techniques and how they can be used in nutrition and food science. A specific emphasis will be given on learning how to understand and interpret results generated through these methods. Therefore, the course is of interest to a wider audience, as such analytic skills are valuable for a diverse array of disciplines. Methods covered will include DNA and RNA-based techniques (PCR, microarrays, sequencing, genomics and metagenomics), protein-based techniques (blots, proteomics) and other molecules-based techniques (metabolomics, immunoblots). Prerequisite: Junior or senior standing.

FDSC 4356. Experiencing the Food Industry. 3 Hours.
This course will expose students to the food industry by providing insight into the food processing, packaging, distribution and retailing components of the food industry. The course will include local and regional food industry related tours. May be repeated for up to 6 hours of degree credit.

FDSC 4713. Product Innovation for the Food Scientist. 3 Hours.
This is a capstone course integrating knowledge developed in Food Science to the development of new food products. This course will take an integrated multidisciplinary approach to developing innovative food products and will provide learning experiences in new product development and Research & Development. Topics include product formulation, ingredient interactions, sensory analysis, packaging, labeling, food safety and food law. Corequisite: Lab component. Pre- or Corequisite: FDSC 4113 and FDSC 4111L. Prerequisite: Senior standing, FDSC 4304, FDSC 3103, and FDSC 4413.

FDSC 472V. Special Topics in Food Science. 1-4 Hour.
Discussion focused on selected topics of particular fields of raw product physiology, food processing, chemistry, physiology, microbiology, evaluation, sensory analysis, and preservation. May be repeated for up to 4 hours of degree credit.

FDSC 4754. Engineering Principles of Food Processing. 4 Hours.
Basic mechanics of refrigeration, temperature controls, materials handling and mechanical problems as applied to foods and food processing. Lecture 3 hours, laboratory 3 hours per week. Corequisite: Lab component. Prerequisite: MATH 1213, PHYS 2013, and PHYS 2011L.

FDSC 4823. Principles of Food Microbiology. 3 Hours.
This web-based course is a study of the fundamentals of food microbiology to include its history, classifications, spores and their importance, and the most common and serious pathogenic food microorganisms. Fermentation, spoilage microorganisms and control methodology are also discussed.