FOOD SCIENCE, B.S.

Food science is the application of science and engineering to the production, processing, distribution, preparation, and evaluation of food.

The Department of Food Science at the University of Wisconsin–Madison has been a part of the College of Agricultural and Life Sciences for more than 100 years, instructing generations of food science and industry leaders. Housed in the recently remodeled Babcock Hall, the Department of Food Science offers students a truly unique undergraduate experience. Known for our distinguished and dedicated faculty and staff, students find the Department of Food Science a stimulating and encouraging environment to study and conduct research.

The Department of Food Science’s undergraduate program offers students valuable real-world experience and leadership skills by providing an innovative curriculum; varied club and extracurricular activities; research lab opportunities; access to a fully functional and award winning dairy plant; professional and industry contacts and experience; numerous internships and scholarships, and nearly 100% job placement.

Students find career opportunities in product development, quality assurance/control, processing and engineering, technical sales, management, research, sensory analysis, and food law and regulations.

HOW TO GET IN

To declare this major, students must be admitted to UW–Madison and the College of Agricultural and Life Sciences (CALS). For information about becoming a CALS first-year or transfer student, see Entering the College (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#enteringthecollegetext).

Students who attend Student Orientation, Advising, and Registration (SOAR) with the College of Agricultural and Life Sciences have the option to declare this major at SOAR. Students may otherwise declare after they have begun their undergraduate studies. For more information, contact the advisor listed under the Advising and Careers tab.

REQUIREMENTS

UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements (http://guide.wisc.edu/undergraduate/#requirementstext) section of the Guide.

General Education
- Breadth—Humanities/Literature/Arts: 6 credits
- Breadth—Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits
- Breadth—Social Studies: 3 credits
- Communication Part A & Part B *
- Ethnic Studies *
- Quantitative Reasoning Part A & Part B *

* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

COLLEGE OF AGRICULTURAL AND LIFE SCIENCES REQUIREMENTS

In addition to the University General Education Requirements, all undergraduate students in CALS must satisfy a set of college and major requirements. Specific requirements for all majors in the college and other information on academic matters can be obtained from the Office of Academic Affairs (http://www.cals.wisc.edu/academics), College of Agricultural and Life Sciences, 116 Agricultural Hall, 1450 Linden Drive, Madison, WI 53706; 608-262-3003. Academic departments and advisors also have information on requirements. Courses may not double count within university requirements (General Education and Breadth) or within college requirements (First-Year Seminar, International Studies and Science), but courses counted toward university requirements may also be used to satisfy a college and/or a major requirement; similarly, courses counted toward college requirements may also be used to satisfy a university and/or a major requirement.

COLLEGE REQUIREMENTS FOR ALL CALS B.S. DEGREE PROGRAMS

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of Work:</td>
<td>Students must maintain a minimum cumulative grade point average of 2.000 to remain in good standing and be eligible for graduation.</td>
<td></td>
</tr>
<tr>
<td>Residency:</td>
<td>Students must complete 30 degree credits in residence at UW–Madison after earning 86 credits toward their undergraduate degree.</td>
<td></td>
</tr>
<tr>
<td>First Year Seminar</td>
<td>(<a href="http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext">http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext</a>)</td>
<td>1</td>
</tr>
<tr>
<td>International Studies</td>
<td>(<a href="http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext">http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext</a>)</td>
<td>3</td>
</tr>
<tr>
<td>Physical Science Fundamentals</td>
<td>4-5</td>
<td></td>
</tr>
<tr>
<td>CHEM 103 or CHEM 108</td>
<td>General Chemistry I or Chemistry in Our World</td>
<td></td>
</tr>
<tr>
<td>CHEM 109</td>
<td>Advanced General Chemistry</td>
<td></td>
</tr>
<tr>
<td>Biological Science</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Additional Science</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Science Breadth</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CALS Capstone Learning Experience: included in the requirements for each CALS major (see &quot;Major Requirements&quot;) (<a href="http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext">http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext</a>)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
MAJOR REQUIREMENTS

NUTR SCI/A E AGRONOMY/INTER-AG 350 World Hunger and Malnutrition is recommended to fulfill the CALS International Studies requirement.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 217</td>
<td>Calculus with Algebra and Trigonometry II ¹</td>
<td>5</td>
</tr>
<tr>
<td>MATH 221</td>
<td>Calculus and Analytic Geometry 1</td>
<td>3</td>
</tr>
<tr>
<td>STAT 301</td>
<td>Introduction to Statistical Methods</td>
<td>3</td>
</tr>
<tr>
<td>STAT 371</td>
<td>Introductory Applied Statistics for the Life Sciences</td>
<td></td>
</tr>
</tbody>
</table>

**Chemistry**

Select one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 103 &amp; CHEM 104</td>
<td>General Chemistry I and General Chemistry II</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 109</td>
<td>Advanced General Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 343</td>
<td>Introductory Organic Chemistry</td>
<td>2</td>
</tr>
<tr>
<td>CHEM 345</td>
<td>Intermediate Organic Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>PHYSICS 207</td>
<td>General Physics</td>
<td></td>
</tr>
<tr>
<td>PHYSICS 201</td>
<td>General Physics</td>
<td></td>
</tr>
</tbody>
</table>

**Biology**

Select one of the following (see below):

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOLOGY/BOTANY/ZOOLOGY 151</td>
<td>Introductory Biology</td>
<td>3</td>
</tr>
<tr>
<td>A A E 215</td>
<td>Introduction to Agricultural and Applied Economics</td>
<td>3</td>
</tr>
<tr>
<td>A A E 323</td>
<td>Cooperatives</td>
<td></td>
</tr>
<tr>
<td>ECON 101</td>
<td>Principles of Microeconomics</td>
<td></td>
</tr>
<tr>
<td>ECON 111</td>
<td>Principles of Economics-Accelerated Treatment</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 501</td>
<td>Introduction to Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO 101</td>
<td>General Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO 303</td>
<td>Biology of Microorganisms</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 501</td>
<td>Introduction to Biochemistry</td>
<td>2</td>
</tr>
</tbody>
</table>

**Nutritional Science**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>NUTR SCI/</td>
<td>Biochemical Principles of Human and Animal Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>BIOCHEM 510</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or NUTR SCI 332</td>
<td>Human Nutritional Needs</td>
<td></td>
</tr>
</tbody>
</table>

**Food Science**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOOD SCI 301</td>
<td>Introduction to the Science and Technology of Food</td>
<td>3</td>
</tr>
<tr>
<td>AN SCI/Food SCI 321</td>
<td>Food Laws and Regulations</td>
<td>1</td>
</tr>
<tr>
<td>FOOD SCI/MICROBIO 324</td>
<td>Food Microbiology Laboratory</td>
<td>2</td>
</tr>
</tbody>
</table>

**Integrated Food Product Elective**

Select one of the following (2 credits minimum):

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOOD SCI 511</td>
<td>Chemistry and Technology of Dairy Products</td>
<td>2</td>
</tr>
<tr>
<td>FOOD SCI/AN SCI 515</td>
<td>Commercial Meat Processing</td>
<td></td>
</tr>
<tr>
<td>FOOD SCI 535</td>
<td>Confectionery Science and Technology</td>
<td></td>
</tr>
<tr>
<td>FOOD SCI 550 &amp; FOOD SCI 551</td>
<td>Fermented Foods and Beverages</td>
<td></td>
</tr>
<tr>
<td>&amp; FOOD SCI 552</td>
<td>Fermented Foods and Beverages Laboratory: The Science of Wine</td>
<td></td>
</tr>
</tbody>
</table>

**Science Elective**

Any 400-level or above course with Physical Science designation

**Capstone**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOOD SCI 602</td>
<td>Senior Project</td>
<td>2</td>
</tr>
<tr>
<td>FOOD SCI 603</td>
<td>Senior Seminar</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Credits 85-92

¹ MATH 217 Calculus with Algebra and Trigonometry II requires MATH 171 Calculus with Algebra and Trigonometry I as a prerequisite.

**BIOLOGY PATHS**

**BIOCHEM/BOTANY/MICROBIO/ZOOLOGY (PATH 1)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOLOGY/BOTANY/ ZOOLOGY 151</td>
<td>Introductory Biology</td>
<td>5</td>
</tr>
</tbody>
</table>

Select one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOLOGY/</td>
<td>Introductory Biology</td>
<td>3</td>
</tr>
<tr>
<td>BOTANY/ZOOLOGY 152</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MICROBIO 101</td>
<td>General Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>or MICROBIO 303</td>
<td>Biology of Microorganisms</td>
<td></td>
</tr>
<tr>
<td>MICROBIO 102</td>
<td>General Microbiology Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>or MICROBIO 304</td>
<td>Biology of Microorganisms Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 501</td>
<td>Introduction to Biochemistry</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits 16-18

**BIOCORE (PATH 2)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOCORE 381</td>
<td>Evolution, Ecology, and Genetics</td>
<td>3</td>
</tr>
</tbody>
</table>
BIOCORE 383  Cellular Biology 3
BIOCORE 485  Organismal Biology 3
BIOCORE 587  Biological Interactions 3

Select two of the following: 4
BIOCORE 382  Evolution, Ecology, and Genetics Laboratory
BIOCORE 384  Cellular Biology Laboratory
BIOCORE 486  Organismal Biology Laboratory

Total Credits 16

HONORS IN THE MAJOR
To earn Honors in the Major, students are required to take at least 20 honors credits. In addition, students must take FOOD SCI 681 Senior Honors Thesis and FOOD SCI 682 Senior Honors Thesis when completing their thesis project; please see the Honors in Major Checklist (http://www.cals.wisc.edu/academics/undergraduate-programs/get-involved/honors-program/honors-in-the-major) for more information.

UNIVERSITY DEGREE REQUIREMENTS

Total Degree  To receive a bachelor’s degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.

Quality of Work  Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.

LEARNING OUTCOMES

1. Clearly and effectively communicate, both verbally and written, to a diverse range of audiences including technical experts and a lay audience.
2. Apply quantitative problem solving and critical thinking skills in all aspects of food science.
3. Rigorously apply scientific principles and quantitative reasoning to solve food science problems (technical competence).
4. Demonstrate the ability to work both independently and in groups across a wide range of situations.

FOUR-YEAR PLAN

FOUR-YEAR PLAN
SAMPLE FOOD SCIENCE FOUR-YEAR PLAN

Freshman
Fall Credits Spring Credits
CHEM 103 or 109 4-5
MATH 221 2
5 BIOLOGY/BOTANY/ ZOOLOGY 151
General Education course 3
0-3 General Education Course 3
COMM A Course 3 FOOD SCI 201
(recommended) 1
First Year Seminar 1

Total Credits 13-17 11-14

Sophomore
Fall Credits Spring Credits
CHEM 343 3 CHEM 344 & CHEM 345
FOOD SCI 301 3 STAT 371 or 301
MICROBIO 101 & MICROBIO 102 5 PHYSICS 207
FOOD SCI 375 (The Practicing Professional: Pathway to Leadership (recommended)) 1 General Education Course 4
General Education Course 3 3

Total Credits 15 13-16

Junior
Fall Credits Spring Credits
BIOCHEM 501 3 NUTR SCI 332 or 510 3
FOOD SCI 440 3 FOOD SCI/AN SCI 321 1
FOOD SCI 410 3 FOOD SCI 432 3
MICROBIO/ FOOD SCI 324 & MICROBIO/ FOOD SCI 325 5 FOOD SCI 412 4
General Education Courses 3 0-6 Food Science course 4, 5
General Education Course 3 0-6

Total Credits 14-20 11-19

Senior
Fall Credits Spring Credits
FOOD SCI 532 4 FOOD SCI 514 4
FOOD SCI 602 2 FOOD SCI 603 6 1
Food Technologists Student Association for many years, placing highly.
The Food Science Club has garnered Gold status from the Institute of

FOOD SCIENCE CLUB
Food science students are strongly encouraged to develop leadership

Bolling, Huynh, Ikeda, vanPijkeren

ASSISTANT PROFESSORS

Science Elective Course 5 0-3 Science Elective Course 5 0-3

General Education Courses 3 3-6 General Education Courses 3 3-6

Total Credits 17-35

1 Students taking CHEM 109 do not take CHEM 104.
2 MATH 221 will satisfy the Quantitative Reasoning B requirement.
3 Electives can be found on the Requirements tab.
4 Students must select at least one course from FOOD SCI 511
Chemistry and Technology of Dairy Products (spring semester),
FOOD SCI/AN SCI 515 Commercial Meat Processing (fall semester),
FOOD SCI 535 Confectionery Science and Technology (fall semester),
or FOOD SCI 550 Fermented Foods and Beverages (spring semester)
and either FOOD SCI 551 Food Fermentation Laboratory (spring semester)
or FOOD SCI 552 Food Fermentation Laboratory: The Science of Wine (fall semester).
5 Students must complete two science elective courses:
(1) at least 3 credits of any 400-level or above biological science
course or BIOLOGY/BOTANY/ZOOLOGY 152 Introductory Biology (2)
at least 3 credits of any 400-level or above physical science course.
6 Combination of FOOD SCI 602 Senior Project and FOOD SCI 603
Senior Seminar satisfy Comm B requirement.

Note: Students must complete a minimum of 120 credits. This may
require taking 16 credits per semester for at least four semesters.

ADVISING AND CAREERS

Students are assigned a faculty or staff advisor once they declare
the major. Advisors are prepared to help with curricular planning and
course access; major and degree questions; discussion of independent
study and lab research experience; and navigating internship and
scholarship opportunities.Declared food science majors must meet
with their assigned advisor prior to registration. Additional information
can be found on the department’s website (https://foodsci.wisc.edu/
advising.php).

Prospective food science majors should contact the Department of Food
Science at foodsci@wisc.edu or 608-262-3046 for more information.

PEOPLE

PROFESSORS
Damodaran, Etzel, Hartel, Ingham, Lucey, Parkin, Rankin (chair)

ASSISTANT PROFESSORS
Bolling, Huynh, Ikeda, vanPijkeren

WISCONSIN EXPERIENCE

Food science students are strongly encouraged to develop leadership
skills through a variety of extracurricular experiences.

FOOD SCIENCE CLUB
The Food Science Club has garnered Gold status from the Institute of
Food Technologists Student Association for many years, placing highly
every year in the Chapter of the Year competition. This acclaim comes
from the wide array of activities offered by the club each year.

• Product Development teams. Join teams of students who develop new
products, from idea conception to manufacture, for submission to
national competitions. Our student teams place highly every year, in
part because of the extremely supportive culture within the program.
• Outreach. Each semester, club members participate in outreach
activities (WI Science Festival, Science Expeditions, local school
activities, etc.) that promote food science to grade school and high
school students. Activities such as Peeps Jousting, gummy bear
production, chocolate rheology, flavor and sensory science, and many
others, help demonstrate various science principles and generate
interest in science among younger students.
• Fundraising activities. A Bucky Puck, an ice cream sandwich with
Cookies and Cream ice cream, is the main fundraising product of
the club. You can help make them and then help sell them to various
events. Other fundraising activities include selling Babcock ice
cream at Taste of Madison, silent auctions at professional meetings,
and merchandise sales. Funds raised through these activities help
support other club activities.
• Food and Health Initiative. Are you interested in developing healthy
food alternatives? This program is for you then. Hear from a variety
of experts on various topics of interest, including gluten-free pasta,
sugar and health, GMO foods, and many others.
• Food Systems Initiative. Food science focuses on converting raw
materials into edible food products. But there is so much more to the
broader food landscape. This initiative focuses on the wider scope
of food, investigating how food scientists can interact with food
production and social issues related to food.
• Social activities. Each month, a fun social activity allows students to
mingle in a friendly environment. For example, you can make (and
eat) Thanksgiving dinner in November and enjoy chocolate-covered
anything at the February social.
• College Bowl. Which state has the largest production of ginseng?
Questions like this serve as the focal point of College Bowl, a food
science trivia competition for both undergraduate and graduate
students. The team competes first in the regional competition,
and if successful then moves on to the national competition. Yes,
Wisconsin is the largest producer of ginseng in the United States.
• Company info sessions. Each club meeting is sponsored by a food
company that also gives a brief presentation about itself. Additional
info sessions are sponsored on an individual basis.

SUMMER INTERNSHIPS

Spending a summer working and gaining experience at a food company
is a great way to apply classroom learning to the real world. With over
40 companies visiting the program each year, numerous opportunities
are available for any student interested in a summer internship. Students
spend their summers at companies that include General Mills, PepsiCo,
Kraft-Heinz, Foremost Farms, Agropur, Schreiber Cheese, and many more.
These internships are generally paid (sometimes quite well) and many
have lodging subsidies.

RESEARCH/WORK EXPERIENCE

Another way to gain practical experience is to work in the building or on

• Research labs. Food Science faculty welcome undergraduates to gain
experience conducting meaningful research in their labs.
• **Babcock Dairy Plant.** Want practical experience in a fully operational dairy plant? Consider signing up for part-time work in the Babcock Dairy Plant gaining experience in a wide range of practical jobs, from quality control to production.

• **Center for Dairy Research (CDR).** Also within Babcock Hall is the internationally renowned Center for Dairy Research. Students can conduct research, work in the analytical labs or participate on the CDR Sensory Panel to gain invaluable practical experience.

• **Food Research Institute (FRI).** Housed in the Microbial Sciences Building, FRI conducts industry oriented research on a wide range of food safety topics.

• **Meat Lab/Bucky's Butchery.** Interested in meat science? The meat processing facilities within the Animal Science department actually apply many food science principles and provide a unique opportunity for students to get hands-on experience with all aspects of meat production.