

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/#enteringthecollegertext>).

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/#requirementsforundergraduatetext>) section of the *Guide*.

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| General Education | <ul style="list-style-type: none"> • 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 * |
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* 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. Courses may not double count within university requirements (General Education and Breadth) or within college requirements (First-Year Seminar, International Studies, Science, and Capstone), 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

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

MAJOR REQUIREMENTS

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

Code	Title	Credits
Mathematics and Statistics		
This major requires calculus. Prerequisites may need to be taken before enrollment in calculus.		
Select one of the following:		5
MATH 217	Calculus with Algebra and Trigonometry II ¹	
MATH 221	Calculus and Analytic Geometry I	
Select one of the following:		3
STAT 301	Introduction to Statistical Methods	
STAT 371	Introductory Applied Statistics for the Life Sciences	
Chemistry		
Select one of the following:		5-9
CHEM 103 & CHEM 104	General Chemistry I and General Chemistry II	
CHEM 109	Advanced General Chemistry	
CHEM 343	Introductory Organic Chemistry	3
CHEM 344	Introductory Organic Chemistry Laboratory	2
CHEM 345	Intermediate Organic Chemistry	3
Physics		
Select one of the following:		4-5
PHYSICS 201	General Physics	
PHYSICS 207	General Physics	
Biology		
Select one of the following (see below):		16-18
Biochem/Botany/Microbio/Zoology (Path 1)		
Biocore (Path 2)		
Foundation		
<i>Econ or Ag & Applied Econ</i>		
Select one of the following:		3
A A E 215	Introduction to Agricultural and Applied Economics	
A A E 323	Cooperatives and Alternative Forms of Enterprise Ownership	
ECON 101	Principles of Microeconomics	
ECON 111	Principles of Economics-Accelerated Treatment	
Nutritional Science		
NUTR SCI/ BIOCHEM 510	Nutritional Biochemistry and Metabolism	3
or NUTR SCI 332	Human Nutritional Needs	
Core		
FOOD SCI 301	Introduction to the Science and Technology of Food	3
AN SCI/FOOD SCI 321	Food Laws and Regulations	1
FOOD SCI/MICROBIO 324	Food Microbiology Laboratory	2
FOOD SCI/MICROBIO 325	Food Microbiology	3
FOOD SCI 410	Food Chemistry	3
FOOD SCI 412	Food Analysis	4

FOOD SCI 432	Principles of Food Preservation	3
FOOD SCI 440	Principles of Food Engineering	3
FOOD SCI 514	Integrated Food Functionality	4
FOOD SCI 532	Integrated Food Manufacturing	4
Integrated Food Product Elective		
Select one of the following (2 credits minimum):		2
FOOD SCI 511	Chemistry and Technology of Dairy Products	
FOOD SCI/ AN SCI 515	Commercial Meat Processing	
FOOD SCI 535	Confectionery Science and Technology	
FOOD SCI 550 & FOOD SCI 551	Fermented Foods and Beverages and Food Fermentation Laboratory	
FOOD SCI 550 & FOOD SCI 552	Fermented Foods and Beverages and Food Fermentation Laboratory: The Science of Wine	
Science Elective		
Any 400-level or above course with Physical Science designation		3
Capstone		
FOOD SCI 602	Senior Project	2
FOOD SCI 603	Senior Seminar	1
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)

Code	Title	Credits
BIOLOGY/BOTANY/ ZOOLOGY 151	Introductory Biology	5
Select one of the following:		3-5
Any 400-level or above course with Biological Science designation		
BIOLOGY/ BOTANY/ ZOOLOGY 152	Introductory Biology	
MICROBIO 101	General Microbiology	3
or MICROBIO 303	Biology of Microorganisms	
MICROBIO 102	General Microbiology Laboratory	2
or MICROBIO 304	Biology of Microorganisms Laboratory	
BIOCHEM 501	Introduction to Biochemistry	3
Total Credits		16-18

BIOCORE (PATH 2)

Code	Title	Credits
BIOCORE 381	Evolution, Ecology, and Genetics	3
BIOCORE 383	Cellular Biology	3
BIOCORE 485	Principles of Physiology	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	Principles of Physiology Laboratory
Total Credits	16

HONORS IN THE MAJOR

Students admitted to the university and to the College of Agricultural and Life Sciences are invited to apply to be considered for admission to the CALS Honors Program.

Admission Criteria for New First-Year Students:

- Complete program application including essay questions

Admission Criteria for Transfer and Continuing UW-Madison Students:

- UW-Madison cumulative GPA of at least 3.25
- Complete program application including essay questions

HOW TO APPLY

The application is available on the CALS Honors Program website (<https://cals.wisc.edu/academics/undergraduate-students/outside-the-classroom/honors-program/>). Applications are accepted at any time.

New first-year students with accepted applications will automatically be enrolled in Honors in Research. It is possible to switch to Honors in the Major in the student's first semester on campus after receiving approval from the advisor for that major. Transfer and continuing students may apply directly to Honors in Research or Honors in the Major (after approval from the major advisor).

REQUIREMENTS

All CALS Honors programs have the following requirements:

- Earn at least a cumulative 3.25 GPA at UW-Madison (some programs have higher requirements)
- Complete the program-specific requirements listed below
- Submit completed thesis documentation to CALS Academic Affairs

REQUIREMENTS

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.

Residency Degree candidates are required to earn a minimum of 30 credits in residence at UW-Madison. "In residence" means on the UW-Madison campus with an undergraduate degree classification. "In residence" credit also includes UW-Madison courses offered in distance or online formats and credits earned in UW-Madison Study Abroad/Study Away programs.

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 ¹		4-5 CHEM 104 ¹	5
MATH 221 ²		5 BIOLOGY/BOTANY/ ZOOLOGY 151	5
General Education course ³		0-3 General Education Course ³	0-3
COMM A Course		3 FOOD SCI 201 (recommended)	1
First Year Seminar		1	
	13-17		11-14

Total Credits 24-31

Sophomore

Fall	Credits	Spring	Credits
CHEM 343		3 CHEM 344 & CHEM 345	5
FOOD SCI 301		3 STAT 371 or 301	3
MICROBIO 101 & MICROBIO 102		5 PHYSICS 207	5
General Education Course ³		3 General Education Course ⁴	0-3
	14		13-16

Total Credits 27-30

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}	0-2
		General Education Course ³	0-6
		14-20	11-19

Total Credits 25-39

Senior			
Fall	Credits	Spring	Credits
FOOD SCI 532		4 FOOD SCI 514	4
FOOD SCI 602		2 FOOD SCI 603 ⁶	1
Food Science Course ⁴		0-3 Food Science Course ⁴	0-3
Science Elective Course ⁵		0-3 Science Elective Course ⁵	0-3
General Education Courses ³		3-6 General Education Courses ³	3-6
		9-18	8-17

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

Hartel, Ingham, Lucey, Rankin (chair)

ASSOCIATE PROFESSORS

Bolling, vanPijkeren

ASSISTANT PROFESSORS

Girard, Huynh, Ujor

WISCONSIN EXPERIENCE

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

FOOD SCIENCE CLUB

The highly-acclaimed Food Science Club provides a wide array of activities to its members each year. These activities provide opportunities to develop leadership skills and network with industry professionals and other students.

- *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. Outreach activities, such as cheese making, 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.* In order to sponsor club activities, fundraising activities (i.e., selling Babcock ice cream at Taste of Madison, silent auctions at professional meetings, and merchandise sales) are a great way to get involved and develop leadership skills.
- *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 systems, 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. These info sessions provide an opportunity to learn about the range of companies that hire our graduates and are a great opportunity for networking.

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, Organic Valley, Danone, Agropur, Schreiber Cheese, Lindt Chocolate, and many more. These internships are generally paid and many have lodging subsidies.

RESEARCH/WORK EXPERIENCE

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

- 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 Sciences 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.