

FOOD SCIENCE, B.S.

Overview

The study of Food Science incorporates real-life aspects of chemistry, physics, microbiology, and engineering to solve today's global and local food problems. The curriculum emphasizes high-level technical competence while instilling communication, critical thinking, and problem-solving skills.

Housed in Babcock Hall, the Food Science major offers close contact with faculty and instructors, opportunities to conduct research, skill-building extracurricular activities, networking with industry professionals, and access to the modern Food Application Lab and a commercial dairy processing plant that manufactures the campus' famous Babcock ice cream.

With a nearly 100% job placement rate, graduates are equipped to compete and succeed in a modern global economy. Students find career opportunities with corporations, government agencies, and nonprofits in product development, quality assurance/control, processing and engineering, technical sales, management, research, sensory analysis, and food law and regulations.

Learn through hands-on, real-world experience

Hands-on, practical learning is essential to the program, and laboratory courses are included at every level. A capstone course integrates earlier coursework, and students conduct a lab-based research project and analyze and present their findings. Students are encouraged to pursue internships to gain additional experience; many complete more than one before graduation. Some gain practical experience by working in the Babcock Dairy Plant, making consumer dairy products sold on campus. Others participate in undergraduate research projects on food quality, microbiology, chemistry, and food and health.

Build community and networks

Faculty teach courses at every level and are on a first-name basis with students. The Food Science Club student organization is active and provides students with leadership opportunities and connections to alums and industry professionals. Additionally, more than 40 companies recruit students annually, providing many links to professionals and job opportunities.

Customize a path of study

Students can select from lab-based elective courses focused on dairy, candy, meat, or fermented foods. The program also offers students the option to participate in Honors in Food Science.

Make a strong start

A course for first-year students focuses on discovering food science and includes study skills, on-campus networking, resume writing, job interview skills, and learning from alums about career options.

Gain global perspective

Study abroad is encouraged and students can use the program's road map to take advantage of summer and winter break study abroad opportunities or even a semester abroad with careful planning. Students can explore studying abroad as a Food Science major by utilizing the Food Science

Major Advising Page. Students work with their advisor and the CALS study abroad office to identify appropriate programs.

HOW TO GET IN

To declare this major, students must be admitted to UW-Madison and the College of Agricultural and Life Sciences (CALC). 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 in the Contact Box for the major.

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/#requirementsforundergraduatestudytext>) 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/#CALSThirdYearSeminarCourses)	1
	International Studies (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSThirdYearSeminarCourses)	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/#CALSCapstoneRequirement)		

MAJOR REQUIREMENTS

NUTR SCI/A A E/AGRONOMY 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.		
Complete one of the following:		5
	MATH 217 Calculus with Algebra and Trigonometry II ¹	
	MATH 221 Calculus and Analytic Geometry I	
Complete one of the following:		3
	STAT 301 Introduction to Statistical Methods	
	STAT 371 Introductory Applied Statistics for the Life Sciences	
Chemistry		
<i>General Chemistry</i>		
Complete one of the following:		5-9
	CHEM 103 General Chemistry I & CHEM 104 and General Chemistry II	
	CHEM 109 Advanced General Chemistry	
<i>Organic Chemistry</i>		
	CHEM 343 Organic Chemistry I	3
	CHEM 344 Introductory Organic Chemistry Laboratory	2

CHEM 345	Organic Chemistry II	3
Physics		
Complete one of the following:		4-5
	PHYSICS 103 General Physics	
	PHYSICS 201 General Physics	
	PHYSICS 207 General Physics	
Biology		
<i>Introductory Biology</i>		
	BIOLOGY/BOTANY/ ZOOLOGY 151 Introductory Biology	5
Complete one of the following:		3-5
	Any course numbered 400 or above with Biological Science designation	
	BIOLOGY/ BOTANY/ ZOOLOGY 152 Introductory Biology	
<i>Fundamental Biological Sciences</i>		
	MICROBIO 101 General Microbiology or MICROBIO 303 Biology of Microorganisms	3
	MICROBIO 102 General Microbiology Laboratory or MICROBIO 304 Biology of Microorganisms Laboratory	2
	BIOCHEM 501 Introduction to Biochemistry	3
Foundation		
<i>Economics and Applied Economics</i>		
Complete 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	
<i>Nutritional Science</i>		
	NUTR SCI/ BIOCHEM 510 Nutritional Biochemistry and Metabolism or NUTR SCI 332 Human Nutritional Needs	3
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
<i>Integrated Food Product Elective</i>		
Complete 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	
<i>Science Elective</i>		
Any course numbered 400 or above 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.

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/current-students/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 Program page (<https://>

cals.wisc.edu/academics/undergraduate/current-students/honors-program/) 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

First Year

Fall	Credits	Spring	Credits
CHEM 103 or 109 ¹		4 CHEM 104 ¹	5
MATH 221		5 BIOLOGY/BOTANY/ ZOOLOGY 151	5
Communications A requirement (COMM-A) ²		3 FOOD SCI 201 (recommended)	1
CALS First-Year Seminar		1 Ethnic Studies	3
		13	14

Second Year

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 103, 201, or 207	4
CALS International Studies	3 General Education Course	3
14		15

Third Year

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 Course ³		3 General Education Course	3
		Integrated Food Product Elective ⁴	1-3
17		15-17	

Fourth Year

Fall	Credits	Spring	Credits
FOOD SCI 532		4 FOOD SCI 514	4
FOOD SCI 602		2 FOOD SCI 603 ²	1
General Education Course		3 Science Elective ⁵	3-5
Integrated Food Product Elective ⁴		1-3 General Education Course	3
Science Elective ⁵		3-5 Integrated Food Product Elective ⁴	1-3
13-17		12-16	

Total Credits 113-123

1

Students taking CHEM 109 do not take CHEM 104.

2

Note that the Communications B requirement (Comm-B) is met through FOOD SCI 602 Senior Project & FOOD SCI 603 Senior Seminar

3

Students may choose to complete a General Education Course requirement this semester. Note: Enrolling in 17 credits this semester is not recommended.

4

Students are required to take at least one Integrated Food Product Elective course; students may choose to meet the Integrated Food Product Elective requirement during this semester.

Note: FOOD SCI 550 Fermented Foods and Beverages must be taken with FOOD SCI 551 Food Fermentation Laboratory to meet the Food Product Elective Requirement.

5

Both Biological and Physical Science elective classes are required
Biological: 3 credits of any B designated course numbered 400 or above; or BIOLOGY/BOTANY/ZOOLOGY 152 Introductory Biology (5 credits)
Physical: 3 credits of any P designated course numbered 400 or above.

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

Advising

All 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 before semester enrollment. Additional information can be found on the department's website.

Prospective food science majors should contact the Department of Food Science at foodsci@wisc.edu or 608-265-2729 for more information.

Career Opportunities

More than 40 organizations recruit students each year, and nearly all Food Science majors receive a job offer before graduation. Careers include working in product development, quality assurance/control, processing and engineering, technical sales, management, research, sensory analysis, and food law and regulations for corporations, nonprofits, and government agencies. Faculty advisors and course assignments help prepare students to write resumes, interview for jobs, and network with professionals in the field.

PEOPLE

Professors

Bradley Bolling, Audrey Girard, Richard Hartel, Tu-Anh Huynh, Barbara Ingham, John Lucey, Gulustan Ozturk, Scott Rankin (chair), Victor Ujor, Jan Peter van Pijkeren

Instructors

Beth Button, Arnolodo Lopez-Hernandez, Yaa Klu, Nick Smith

Advisors

Professor Brad Bolling, Professor Rich Hartel

Full faculty and staff list (<https://foodsci.wisc.edu/faculty.html>)

WISCONSIN EXPERIENCE

Student organizations

The Food Science Club organizes many programs, including mentoring first-year students, organizing company visits and tours, monthly socials, K-12 educational outreach, a food and health initiative, and a food systems initiative. Faculty advise the club, and activities are coordinated with coursework.

Competitive teams

The Food Science Club coordinates many competitions. Each year, there are several different product development competitions, which are very popular with students. There is also a College Bowl, a food science trivia

competition, and a dairy judging team that competes regionally and nationally.

Internships

Advisors encourage students to pursue internships with one of the dozens of companies connected to the program. Most students complete at least one internship before graduation, but some complete as many as three. 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.

Students can also gain experience in several campus centers and programs focused on food, including the Babcock Dairy Plant, Center for Dairy Research, Food Research Institute, or Bucky's Varsity Meats.

Research experience

First-year students are encouraged to pursue research experiences in faculty labs to get involved. Undergraduates can participate for credit through independent study or work for pay. Students working in faculty labs have been co-authors of scientific publications in food science and nutrition journals.

Global engagement

With advance planning, students can study abroad and complete the degree in four years. Opportunities include: France, the Netherlands, and Australia. Read more about study abroad as a Food Science major. (<https://studyabroad.wisc.edu/academics/major-advising-pages-maps/food-science/>)

Community engagement and volunteering

The Food Science Club organizes various volunteer activities. These have included dinners at the Ronald McDonald House, working with food pantries, and reducing food waste.

RESOURCES AND SCHOLARSHIPS

Scholarships

Students in the College of Agricultural and Life Sciences receive more than \$1.25 million in scholarships annually. Learn more about college scholarships.

Food Science students are additionally eligible for \$25,000 in annual scholarships. Well-qualified students receive awards ranging from \$1,000-\$3,000.

Resources

Babcock Dairy Plant. Want practical experience in a fully operational dairy plant? Consider signing up for part-time work in the Babcock Dairy Plant to gain experience in a wide range of practical jobs, from quality control to production.

Babcock Hall Food Application Lab. This lab has 11 culinary workstations, food service equipment, and other amenities needed to prepare food at both small and food service scales.

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 in 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 various food safety topics.

Bucky's Varsity Meats. Interested in meat science? The meat processing facilities within the Department of Animal and Dairy Sciences apply many food science principles and provide a unique opportunity for students to get hands-on experience with all aspects of meat production.