

FOOD SCIENCE, B.S.

Begin Campus: Any Penn State Campus

End Campus: University Park

Program Description

The food science major builds on a strong foundation in the sciences, especially chemistry and biology, and applies that knowledge to solving practical problems in food processing. It is a very hands-on program where students work in labs and small-scale processing facilities to put their learning into practice. Graduates enjoy excellent career prospects in the food industry where they can immediately put their knowledge into action developing, manufacturing and regulating the foods we eat every day.

What is Food Science?

Food science is the application of science and technology to the manufacture of safe, nutritious, and tasty food products. Food scientists are especially concerned with food safety, nutritional value, managing food quality, food plant management, as well as the development of new products and processes. They are employed by the big food brands whose products you use every day, as well as by less well-known companies who make the ingredients that go into them. Other food scientists also work for colleges and universities in teaching and research and as well as for government agencies concerned with food regulations.

You Might Like this Program If...

- You are interested in science and looking for somewhere to apply it
- You want a major that involves doing as well thinking
- You're looking for a major with real career prospects
- You value a "small college" atmosphere with real contact with the faculty

MORE INFORMATION ABOUT WHY STUDENTS CHOOSE TO STUDY FOOD SCIENCE (<http://foodscience.psu.edu/majors/why/>)

Entrance to Major

In order to be eligible for entrance to this major, a student must:

1. attain at least a C (2.00) cumulative grade-point average for all courses taken at the University; and
2. have third-semester classification (<http://www.registrar.psu.edu/enrollment/semester-classification.cfm>).

READ SENATE POLICY 37-30: ENTRANCE TO AND CHANGES IN MAJOR PROGRAMS OF STUDY (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/37-00-entrance-to-a-college-or-major/>)

Degree Requirements

For the Bachelor of Science degree in Food Science, a minimum of 121 credits is required:

Requirement	Credits
General Education	45
Electives	2
Requirements for the Major	98

24 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 9 credits of GN courses; 6 credits of GQ courses; 9 credits of GWS courses.

Requirements for the Major

To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44>).

Code	Title	Credits
Prescribed Courses		
BIOL 110	Biology: Basic Concepts and Biodiversity	4
BMB 211	Elementary Biochemistry	3
BMB 212	Elementary Biochemistry Laboratory	1
CHEM 110	Chemical Principles I	3
CHEM 111	Experimental Chemistry I	1
CHEM 113	Experimental Chemistry II	1
CHEM 202	Fundamentals of Organic Chemistry I	3
FDSC 400	Food Chemistry and Analysis (I)	3
FDSC 405	Food Engineering Principles	3
FDSC 406W	Physiology of Nutrition	3
FDSC 408	Food Microbiology	3
FDSC 409	Laboratory in Food Microbiology	2
FDSC 410	Food Chemistry and Analysis (II)	3
FDSC 411	Managing Food Quality	3
FDSC 413	Science and Technology of Plant Foods	3
FDSC 414	Science and Technology of Dairy Foods	3
FDSC 415	Science and Technology of Muscle Foods	3
FDSC 417	Food Laws and Regulations	3
FDSC 450	Food Innovation and Product Design	3
MICRB 201	Introductory Microbiology	3
<i>Prescribed Courses: Require a grade of C or better</i>		
CAS 100	Effective Speech	3
CHEM 112	Chemical Principles II	3
ENGL 15	Rhetoric and Composition	3
FDSC 200	Introductory Food Science	3
FDSC 201	Introductory Food Science Practicum	1
MICRB 202	Introductory Microbiology Laboratory	2
PHYS 250	Introductory Physics I	4
STAT 250	Introduction to Biostatistics	3
Additional Courses		
FDSC 403	Sensory Data Collection & Analysis	3
or FDSC 404	Sensory Evaluation of Foods	
<i>Additional Courses: Require a grade of C or better</i>		
ENGL 202C	Effective Writing: Technical Writing	3
or ENGL 202D	Effective Writing: Business Writing	
MATH 110	Techniques of Calculus I	4
or MATH 140	Calculus With Analytic Geometry I	
or MATH 140B	Calculus and Biology I	
Supporting Courses and Related Areas		
To reflect the student's career interests, select 12 credits from department list or in consultation with adviser		12

General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (<https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/>) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required.)

- **Quantification (GQ):** 6 credits
- **Writing and Speaking (GWS):** 9 credits

Knowledge Domains

- **Arts (GA):** 6 credits
- **Health and Wellness (GHW):** 3 credits
- **Humanities (GH):** 6 credits
- **Social and Behavioral Sciences (GS):** 6 credits
- **Natural Sciences (GN):** 9 credits

Integrative Studies (may also complete a Knowledge Domain requirement)

- **Inter-Domain or Approved Linked Courses:** 6 credits

University Degree Requirements

First Year Engagement

All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement

6 credits are required and may satisfy other requirements

- United States Cultures: 3 credits
- International Cultures: 3 credits

Writing Across the Curriculum

3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits

A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work

Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition

The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80>)). For more information, check the Suggested Academic Plan for your intended program.

Program Learning Objectives

- Students will apply the fundamental principles of engineering and unit operations related to preservation, packaging, and cleaning and sanitation in order to manufacture safe and nutritious foods.
- Students will be able to apply the fundamental concepts central to Food Science (e.g. engineering, microbiology, chemistry, etc) with consideration for the legal, economic, and ethical constraints surrounding food production and consumption.
- Students will evaluate how people interact with food with respect to biology, behavior, and culture.
- Students will be able to identify and characterize beneficial, pathogenic, and spoilage microorganisms in foods, and to use their knowledge of microbial growth, injury, and cell death to control the growth of microorganisms in foods and to solve applied food microbiology problems.
- Students will be able to describe the chemical composition of foods, the properties and reactions of food components, and analyze the major and minor components of foods.

Academic Advising

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information needed to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy/>)

University Park

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Suggested Academic Plan

The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2022-23 academic year. To access previous years' suggested academic plans, please visit the archive (<https://bulletins.psu.edu/undergraduate/archive/>) to view the appropriate Undergraduate Bulletin edition (*Note: the archive only contains suggested academic plans beginning with the 2018-19 edition of the Undergraduate Bulletin*).

Food Science, B.S. at University Park Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
CHEM 110 [†]	3 CHEM 112 ^{**†}	3
CHEM 111 [†]	1 CHEM 113 [†]	1
ENGL 15, 30H, or ESL 15 ^{††}	3 MATH 110 or 140 ^{††}	4
First Year Seminar	2 General Education Course	3
BIOL 110 [†]	4 General Education Course	3
General Education Course	3	
	16	14

Second Year

Fall	Credits Spring	Credits
CHEM 202 or 210 [*]	3 CHEM 203 or 212 <i>and</i> 213	3-5
FDSC 200 [*]	3 BMB 211	3
FDSC 201 [*]	1 PHYS 250 [*]	4
MICRB 201	3 STAT 250 ^{††}	3
MICRB 202 [*]	2 General Education Course	3
General Education Course	3	
	15	16-18

Third Year

Fall	Credits Spring	Credits
FDSC 400	4 FDSC 405	3
FDSC 408	3 FDSC 410	3
FDSC 409	2 FDSC 406W	3
BMB 212	1 Career Interest Course	0-2
CAS 100A ^{††}	3 General Education Course	3
General Education Course	3	
	16	12-14

Fourth Year

Fall	Credits Spring	Credits
FDSC 413	3 FDSC 414	3
FDSC 411	3 FDSC 415	3
ENGL 202C or 202D ^{††}	3 Career Interest Course	3
Career Interest Course	3 Career Interest Course	3
Career Interest Course	3 Elective Course(s)	4
	15	16

Total Credits 120-124

- * Course requires a grade of C or better for the major
- ‡ Course requires a grade of C or better for General Education
- # Course is an Entrance to Major requirement
- † Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

All incoming Schreyer Honors College first-year students at University Park will take ENGL 137H/CAS 137H in the fall semester and ENGL 138T/CAS 138T in the spring semester. These courses carry the GWS designation and replace both ENGL 30H and CAS 100. Each course is 3 credits.

Advising Notes:

- Students should work with an academic adviser in the development of their plan as some courses are not taught every semester.
- If completing CHEM 212, CHEM 213 must also be completed.
- Students should consult with an academic adviser to select appropriate career interest courses.

Food Science, B.S. at Commonwealth Campuses

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
CHEM 110 [†]	3 CHEM 112 ^{*†}	3
CHEM 111 [†]	1 CHEM 113	1
ENGL 15, 30H, or ESL 15 ^{††}	3 MATH 110 or 140 ^{††}	4
First Year Seminar	1-3 General Education Course or FDSC 200 [*]	3
BIOL 110 [†]	4 General Education Course	3
General Education Course	3	
15-17		14

Second Year

Fall	Credits Spring	Credits
CHEM 202 or 210 [*]	3 CHEM 203 or 212 <i>and</i> 213	3-5
FDSC 200 (or General Education Course) [*]	3 PHYS 250 [*]	4
MICRB 201	3 BMB 211	3
MICRB 202 [*]	2 STAT 250	3
General Education Course	3 General Education Course	3
14		16-18

Third Year

Fall	Credits Spring	Credits
FDSC 400	4 FDSC 405	3
FDSC 408	3 FDSC 410	3
FDSC 409	2 FDSC 406W	3
CAS 100A	3 Career Interest Course	0-2
BMB 212	1 General Education Course	3
FDSC 201 [*]	1	
General Education Course	3	
17		12-14

Fourth Year

Fall	Credits Spring	Credits
FDSC 413	3 FDSC 414	3
FDSC 411	3 FDSC 415	3
ENGL 202C or 202D ^{††}	3 Career Interest Course	3
Career Interest Course	3 Career Interest Course	3
Career Interest Course	3 Elective Course(s)	4
15		16

Total Credits 119-125

- * Course requires a grade of C or better for the major
- ‡ Course requires a grade of C or better for General Education
- # Course is an Entrance to Major requirement
- † Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

Advising Notes:

- Students should work with an academic adviser in the development of their plan as some courses are not taught every semester.
- If completing CHEM 212, CHEM 213 must also be completed.
- Students should consult with an academic adviser to select appropriate career interest courses.

Career Paths

Because of the heavy demand for food scientists in industry, government agencies, and research institutions, many Penn State Food Science graduates have job offers before graduation with excellent starting salaries.

Careers

Most of our graduates go on to careers in the food industry where they develop new products, supervise manufacturing operations, and work to ensure food quality and safety. Other graduates work in government agencies to enforce the regulations that keep our food supply safe.

MORE INFORMATION ABOUT POTENTIAL CAREER OPTIONS FOR GRADUATES OF THE FOOD SCIENCE PROGRAM (<http://foodscience.psu.edu/majors/careers/>)

Opportunities for Graduate Studies

An M.S. or Ph.D. degree in food science can open doors to career in research and development in the food industry or academia.

Professional Resources

- Institute of Food Technologists (<http://www.ift.org>)

Accreditation

The undergraduate program in Food Science is approved by the Institute of Food Technologists, the professional body of food scientists.

MORE INFORMATION ABOUT THE INSTITUTE OF FOOD TECHNOLOGISTS (<http://www.ift.org/community/students/approved-undergrad-programs.aspx>)

Contact

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