

# 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.

## You Might Like this Program If...

- You are interested in science and looking for something practical to do with 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 and real contact with faculty members

MORE INFORMATION ABOUT WHY STUDENTS CHOOSE TO STUDY FOOD SCIENCE (<https://foodscience.psu.edu/undergraduate/resources/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 at least third-semester classification (<https://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 (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44>).

Code	Title	Credits
<b>Prescribed Courses</b>		
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 112	Chemical Principles II	3
CHEM 113	Experimental Chemistry II	1
CHEM 202	Fundamentals of Organic Chemistry I	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
MICRB 202	Introductory Microbiology Laboratory	2
PHYS 250	Introductory Physics I	4
<i>Prescribed Courses: Require a grade of C or better</i>		
CAS 100	Effective Speech	3
ENGL 15	Rhetoric and Composition	3
FDSC 200	Introductory Food Science	3
FDSC 201	Introductory Food Science Practicum	1
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
STAT 250	Introduction to Biostatistics	3

### Additional Courses

FDSC 403	Sensory Data Collection & Analysis	3
or FDSC 404	Sensory Evaluation of Foods	

*Additional Courses: Require a grade of C or better*

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

## 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 and Inter-Domain courses do not meet this requirement.)**

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

### **Breadth in the Knowledge Domains (Inter-Domain courses do not meet this requirement.)**

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

### **Integrative Studies**

- **Inter-Domain Courses (Inter-Domain):** 6 credits

### **Exploration**

- **GN**, may be completed with Inter-Domain courses: 3 credits
- **GA, GH, GN, GS, Inter-Domain courses.** This may include 3 credits of World Language course work beyond the 12th credit level or the requirements for the student's degree program, whichever is higher: 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 (<https://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**

#### **Christopher M. Sigler**

Assistant Teaching Professor / Academic Adviser  
203 Rodney A. Erickson Food Science Building  
University Park, PA 16802  
814-863-6358  
[cms578@psu.edu](mailto:cms578@psu.edu)

## SUGGESTED ACADEMIC PLAN

The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2023-24 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
BIOL 110 <sup>†</sup>	4 CHEM 112 <sup>†</sup>	3
CHEM 110 <sup>†</sup>	3 CHEM 113 <sup>†</sup>	1
CHEM 111 <sup>†</sup>	1 MATH 140 (GQ) <sup>††</sup>	4
ENGL 15 <sup>††</sup>	3 Supporting Course <sup>2</sup>	3
FDSC 150S (First-Year Seminar)	2 General Education Course <sup>1</sup>	3
General Education Course <sup>1</sup>	3 General Education Course <sup>1</sup>	3
	<b>16</b>	<b>17</b>

#### Second Year

Fall	Credits Spring	Credits
CHEM 202	3 BMB 211	3
FDSC 200 <sup>*</sup>	3 BMB 212	1
FDSC 201 <sup>*</sup>	1 ENGL 202C or 202D <sup>††</sup>	3
MICRB 201	3 PHYS 250	4
MICRB 202	2 STAT 250 (GQ) <sup>††</sup>	3
General Education Course <sup>1</sup>	3 General Education Course <sup>1</sup>	3
	<b>15</b>	<b>17</b>

#### Third Year

Fall	Credits Spring	Credits
FDSC 400 <sup>*</sup>	3 CAS 100A or 100B <sup>††</sup>	3
FDSC 408 <sup>*</sup>	3 FDSC 405 <sup>*</sup>	3
FDSC 409	2 FDSC 406W <sup>*</sup>	3
General Education Course <sup>1</sup>	3 FDSC 410	3
General Education Course <sup>1</sup>	3 Supporting Course <sup>2</sup>	3
	<b>14</b>	<b>15</b>

#### Fourth Year

Fall	Credits Spring	Credits
FDSC 404	3 FDSC 414	3
FDSC 411	3 FDSC 415	3
FDSC 413	3 FDSC 417	3
FDSC 450	3 Supporting Course <sup>2</sup>	3
Supporting Course <sup>2</sup>	3	
	<b>15</b>	<b>12</b>

**Total Credits 121**

- \* 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

<sup>1</sup> (6) credit minimum of GH, GS, and GA General Education courses, and (3) credits minimum for the GHW requirement are needed and may be taken in any sequence.

<sup>2</sup> Supporting courses can be selected from a wide range of courses which serve to advance your professional development as a food scientist. Please consult with an Academic Adviser before scheduling.

#### University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity 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.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

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 satisfy a portion of that General Education requirement. If the student's program prescribes GWS these courses will replace both ENGL 15/ENGL 30H and CAS 100A/CAS 100B/CAS 100C. Each course is 3 credits.

#### Advising Notes:

- FDSC 406W, a required course within the Food Science Degree, satisfies the University's Writing Across the Curriculum requirement.
- General Education Foundations (GWS and GQ) – both require a grade of a "C" or better. Typically, the GQ General Education Requirements are met by MATH 140 and STAT 250, which are also required for the major. If these courses are used to meet GQ requirements, then they require a "C" or better.
- General Education Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Typically, GN requirements are met by other requirements of the food science major (i.e., BIOL 110, CHEM 110, CHEM 111, CHEM 112, CHEM 113).

## 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
BIOL 110 <sup>†</sup>	4 CHEM 112 <sup>†</sup>	3
CHEM 110 <sup>†</sup>	3 CHEM 113 <sup>†</sup>	1
CHEM 111 <sup>†</sup>	1 MATH 140 (GQ) <sup>‡†</sup>	4
ENGL 15 <sup>‡†</sup>	3 FDSC 200 <sup>*</sup>	3
First-Year Seminar	2 General Education Course <sup>1</sup>	3
General Education Course <sup>1</sup>	3 General Education Course <sup>1</sup>	3
	<b>16</b>	<b>17</b>

### Second Year

Fall	Credits Spring	Credits
CHEM 202	3 BMB 211	3
MICRB 201	3 BMB 212	1
MICRB 202	2 ENGL 202C or 202D <sup>‡†</sup>	3
Supporting Course <sup>2</sup>	3 PHYS 250	4
General Education Course <sup>1</sup>	3 STAT 250 (GQ) <sup>‡†</sup>	3
General Education Course <sup>1</sup>	3 General Education Course <sup>1</sup>	3
	<b>17</b>	<b>17</b>

### Third Year

Fall	Credits Spring	Credits
FDSC 201 <sup>*</sup>	1 CAS 100A or 100B <sup>‡†</sup>	3
FDSC 400 <sup>*</sup>	3 FDSC 405 <sup>*</sup>	3
FDSC 408 <sup>*</sup>	3 FDSC 406W <sup>*</sup>	3
FDSC 409	2 FDSC 410	3
General Education Course <sup>1</sup>	3 Supporting Course <sup>2</sup>	3
	<b>12</b>	<b>15</b>

### Fourth Year

Fall	Credits Spring	Credits
FDSC 404	3 FDSC 414	3
FDSC 411	3 FDSC 415	3
FDSC 413	3 FDSC 417	3
FDSC 450	3 Supporting Course <sup>2</sup>	3
Supporting Course <sup>2</sup>	3	
	<b>15</b>	<b>12</b>

**Total Credits 121**

\* 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

<sup>1</sup> (6) credit minimum of GH, GS, and GA General Education courses, and (3) credits minimum for the GHW requirement are needed and may be taken in any sequence.

<sup>2</sup> Supporting courses can be selected from a wide range of courses which serve to advance your professional development as a food scientist. Please consult with an Academic Adviser before scheduling.

### University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity 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.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

### Advising Notes:

- FDSC 406W, a required course within the Food Science Degree, satisfies the University's Writing Across the Curriculum requirement.
- General Education Foundations (GWS and GQ) – both require a grade of a "C" or better. Typically, the GQ General Education Requirements are met by MATH 140 and STAT 250, which are also required for the major. If these courses are used to meet GQ requirements, then they require a "C" or better.
- General Education Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Typically, GN requirements are met by other requirements of the food science major (i.e., BIOL 110, CHEM 110, CHEM 111, CHEM 112, CHEM 113).
- Not all classes listed within the commonwealth plan are available to students. Please consult your assigned Academic Adviser and consider clarifying with University Park's Academic Adviser for approved substitute courses.

## Career Paths

Because of the high 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. Others go on to graduate school in food science with a view to more research-focused careers in academia, government, and industry.

## 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 (<https://foodscience.psu.edu/undergraduate/resources/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.

MORE INFORMATION ABOUT OPPORTUNITIES FOR GRADUATE STUDIES  
(<https://foodscience.psu.edu/graduate/>)

## Professional Resources

- Institute of Food Technologists (<https://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  
(<https://www.ift.org/community/students/undergraduate-programs/>)

## Contact

### University Park

DEPARTMENT OF FOOD SCIENCE  
202 Rodney A. Erickson Food Science Building  
University Park, PA 16802  
814-865-5444  
[foodsci@psu.edu](mailto:foodsci@psu.edu)

<https://foodscience.psu.edu/about/contact> (<https://foodscience.psu.edu/about/contact/>)