

BIOLOGICAL ENGINEERING, B.S.

Begin Campus: Any Penn State Campus

End Campus: University Park

Degree Requirements

For the Bachelor of Science degree in Biological Engineering, a minimum of 128 credits is required:

Requirement	Credits
General Education	45
Requirements for the Major	107-108

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>).

Common Requirements for the Major (All Options)

Code	Title	Credits
Prescribed Courses		
BE 404	Engineering Properties of Food and Biological Materials	3
BE 460W	Biological Engineering Design I	2
BE 466W	Biological Engineering Design II	2
CHEM 111	Experimental Chemistry I	1
MATH 231	Calculus of Several Variables	2
PHYS 212	General Physics: Electricity and Magnetism	4
<i>Prescribed Courses: Require a grade of C or better</i>		
BE 301	Mathematical Modeling of Biological and Physical Systems	3
BE 302	Heat and Mass Transfer in Biological Systems	4
BE 305	Agricultural Measurements and Control Systems	3
BE 308	Engineering Elements of Biochemistry and Microbiology	3
BE 391	Communication Skills for BE and ABSM Students	2
BE 392	Leadership and Ethics for BE and ABSM Students	2
CHEM 110	Chemical Principles I	3
EDSGN 100	Cornerstone Engineering Design	3
EMCH 211	Statics	3
EMCH 212	Dynamics	3
EMCH 213	Strength of Materials	3
MATH 140	Calculus With Analytic Geometry I	4
MATH 141	Calculus with Analytic Geometry II	4
ME 300	Engineering Thermodynamics I	3
PHYS 211	General Physics: Mechanics	4

Additional Courses

Select one of the following: 3

IE 424	Process Quality Engineering
STAT 240	Introduction to Biometry
STAT 250	Introduction to Biostatistics
STAT/MATH 318	Elementary Probability
STAT 401	Experimental Methods
STAT/MATH 418	Introduction to Probability and Stochastic Processes for Engineering

Additional Courses: Require a grade of C or better

Select one of the following: 3

CAS 100A	Effective Speech
CAS 100B	Effective Speech
CAS 100C	Effective Speech
CAS/ENGL 138T	Rhetoric and Civic Life II

Select one of the following: 3

ENGL 15	Rhetoric and Composition
ENGL 30H	Honors Rhetoric and Composition
ENGL/CAS 137H	Rhetoric and Civic Life I

Select one of the following: 4

MATH 251	Ordinary and Partial Differential Equations
MATH 250 & MATH 252	Ordinary Differential Equations and Partial Differential Equations

Requirements for the Option

Select an option 33-34

Requirements for the Option Agricultural Engineering Option (33 credits)

Code	Title	Credits
Additional Courses		
<i>Additional Courses: Require a grade of C or better</i>		
CE 360	Fluid Mechanics	3
or ME 320	Fluid Flow	

Supporting Courses and Related Areas

Select 3 credits in math/basic science ¹	3
Select 6 credits in engineering science/design ¹	6
Select 3 credits in agricultural/biological science ¹	3
Select 6 credits in biological engineering ¹	6
Select 6 credits in technical elective ^{1,2}	6

Supporting Courses and Related Area: Require a grade of C or better

Select 6 credits from the following: 6

BE 303	Structural Systems in Agriculture
BE 306	Machines for Agricultural and Biological Processing
BE 307	Principles of Soil and Water Engineering

¹ Courses to be selected from a list approved by the Agricultural and Biological Engineering faculty. These courses must be chosen so that the engineering design and engineering science requirements for the major are met.

² Students may apply 3 credits of ROTC to the technical selection category and 3 credits to the GHW category upon completion of the ROTC program.

Food and Biological Processing Engineering Option (33-34 credits)

Code	Title	Credits
Prescribed Courses		
BE 465	Food and Biological Process Engineering	3
BE 468	Microbiological Engineering	3
Additional Courses		
CHEM 202 or CHEM 210	Fundamentals of Organic Chemistry I Organic Chemistry I	3
Select one of the following:		3-4
BIOL 230W	Biology: Molecules and Cells	
BMB 211	Elementary Biochemistry	
BMB/MICRB 251	Molecular and Cell Biology I	
BME 201	Fundamentals of Cells and Molecules	
<i>Additional Courses: Require a grade of C or better</i>		
CE 360 or ME 320	Fluid Mechanics Fluid Flow	3
Supporting Courses and Related Areas		
Select 6 credits in biological/food science ¹		6
Select 6 credits in engineering science/design ¹		6
Select 6 credits in technical elective ^{1,2}		6

¹ Courses to be selected from a list approved by the Agricultural and Biological Engineering faculty. These courses must be chosen so that the engineering design and engineering science requirements for the major are met.

² Students may apply 3 credits of ROTC to the technical selection category and 3 credits to the GHW category upon completion of the ROTC program.

Natural Resources Engineering Option (33 credits)

Code	Title	Credits
Prescribed Courses		
BE 467	Design of Stormwater and Erosion Control Facilities	3
BE 477	Land-Based Waste Disposal	3
BE 487	Simulation Modeling for Water Resources Management	3
SOILS 101	Introductory Soil Science	3
<i>Prescribed Courses: Require a grade of C or better</i>		
ABSM 309	Measurement & Monitoring of Hydrologic Systems	3
BE 307	Principles of Soil and Water Engineering	3
CE 360	Fluid Mechanics	3
Supporting Courses and Related Areas		
Select 6 credits in engineering science/design ¹		6
Select 3 credits in biological/environmental science ¹		3
Select 3 credits in technical elective ^{1,2}		3

¹ Courses to be selected from a list approved by the Agricultural and Biological Engineering faculty. These courses must be chosen so that

the engineering design and engineering science requirements for the major are met.

² Students may apply 3 credits of ROTC to the technical selection category and 3 credits to the GHW category upon completion of the ROTC program.

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.