

# BIOTECHNOLOGY, B.S.

**Begin Campus:** Any Penn State Campus

**End Campus:** University Park

## Degree Requirements

For the Bachelor of Science degree in Biotechnology, a minimum of 125 credits is required:

Requirement	Credits
General Education	45
Requirements for the Major	95

15 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.

### 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 (<http://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.

### Requirements for the Major

To graduate with a B.S. degree in Biotechnology, a grade of C or better is required in 9 credits of any BIOTC, B M B, or MICRB 400-level course except BMB 442, BMB 443W, BMB 445W, BMB 448, BMB 488, BMB 496, MICRB 421W, MICRB 422, MICRB 447.

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>).

### Common Requirements for the Major (All Options)

Code	Title	Credits
<b>Prescribed Courses</b>		
BMB 211	Elementary Biochemistry	3
BMB 221	Applied Biochemistry	2
BMB 251	Molecular and Cell Biology I <sup>1</sup>	3
BMB 252	Molecular and Cell Biology II <sup>1</sup>	3
CHEM 113	Experimental Chemistry II	1
MATH 141	Calculus with Analytic Geometry II	4
MICRB 201	Introductory Microbiology <sup>1</sup>	3
MICRB 202	Introductory Microbiology Laboratory	2
MICRB 410	Principles of Immunology	3
MICRB 421W	Laboratory of General and Applied Microbiology	3
PHYS 250	Introductory Physics I	4
PHYS 251	Introductory Physics II	4

PSU 16	First-Year Seminar Science	1
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*Prescribed Courses: Require a grade of C or better*

CHEM 110	Chemical Principles I	3
CHEM 111	Experimental Chemistry I	1
CHEM 112	Chemical Principles II	3
MATH 140	Calculus With Analytic Geometry I	4

#### Requirements for the Option

Select an option		48
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<sup>1</sup> To graduate with a B.S. degree in Biotechnology, a grade of C or better is required in two of the following courses:

- MICRB 201
- BMB 251/MICRB 251
- BMB 252/MICRB 252

#### Requirements for the Option

##### General Biotechnology Option (48 credits)

Code	Title	Credits
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##### Prescribed Courses

BIOL 322	Genetic Analysis	3
BIOTC 416	Microbial Biotechnology	2
BIOTC 459	Plant Tissue Culture and Biotechnology	3
BIOTC 479	Methods in Biofermentations	3
BIOTC 489	Animal Cell Culture Methods	3
BMB 442	Laboratory in Proteins, Nucleic Acids, and Molecular Cloning	3
STAT 250	Introduction to Biostatistics	3

##### Additional Courses

Select one of the following sequences:		6-8
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CHEM 202 Fundamentals of Organic Chemistry I  
& CHEM 203 and Fundamentals of Organic Chemistry II

CHEM 210 Organic Chemistry I  
& CHEM 212 and Organic Chemistry II  
& CHEM 213 and Laboratory in Organic Chemistry

##### Supporting Courses and Related Areas

Select 14-16 credits from department list C	14-16
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Select 6 credits of the following:	6
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Any 400-level BMB/BIOTC/MICRB lecture course

FDSC 408 Food Microbiology

Additional courses from department list D

##### Clinical Laboratory Science Option (48 credits)

This option provides both the academic and clinical preparation for students interested in a career as a clinical laboratory scientist. Positions are found in hospital, physician-office, reference, industrial, and research laboratories. To complete baccalaureate degree requirements, students enter a ten-month clinical practicum (MICRB 405A, MICRB 405B, MICRB 405C, MICRB 405D, MICRB 405E, MICRB 405F) at an affiliate hospital for the senior year. (Current affiliations are with Mount Nittany Medical Center, State College and Pennsylvania Hospital, Philadelphia.) Students are recommended for a fixed number of hospital positions on a competitive basis. Cumulative grade-point average and hospital school admission requirements serve as criteria for recommendation. The B.S. degree is awarded at the first commencement following completion of the clinical practicum.

Code	Title	Credits
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##### Prescribed Courses

BMB 212	Elementary Biochemistry Laboratory	1
MICRB 405A	Seminar and Practicum in Medical Technology	8
MICRB 405B	Seminar and Practicum in Medical Technology	1
MICRB 405C	Seminar and Practicum in Medical Technology	6
MICRB 405D	Seminar and Practicum in Medical Technology	5
MICRB 405E	Seminar and Practicum in Medical Technology	7
MICRB 405F	Seminar and Practicum in Medical Technology	3
MICRB 412	Medical Microbiology	3
MICRB 422	Medical Microbiology Laboratory	2

##### Additional Courses

BIOL 322	Genetic Analysis	3
or BIOL 222	Genetics	

Select one of the following sequences:		6-8
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CHEM 202 Fundamentals of Organic Chemistry I  
& CHEM 203 and Fundamentals of Organic Chemistry II

CHEM 210 Organic Chemistry I  
& CHEM 212 and Organic Chemistry II  
& CHEM 213 and Laboratory in Organic Chemistry

##### Supporting Courses and Related Areas

Select 1-3 credits from department list	1-3
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