

MICROBIOLOGY, B.S.

Begin Campus: Any Penn State Campus

End Campus: University Park

Degree Requirements

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

Requirement	Credits
General Education	45
Requirements for the Major	94-98

15-18 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; and 0-3 credits of GWS courses (3 credits if BMB 491 or BIOL 403 is taken as an elective).

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 ¹		
BMB 400	Molecular Biology of the Gene	2
BMB 401	General Biochemistry	3
BMB 402	General Biochemistry	3
BMB 442	Laboratory in Proteins, Nucleic Acids, and Molecular Cloning	3
CHEM 113	Experimental Chemistry II	1
CHEM 210	Organic Chemistry I	3
CHEM 212	Organic Chemistry II	3
CHEM 213	Laboratory in Organic Chemistry	2
MICRB 201	Introductory Microbiology ²	3
MICRB 401	Microbial Physiology and Structure	3
MICRB 421W	Laboratory of General and Applied Microbiology	3
MICRB 450	Microbial/Molecular Genetics	3
PPEM 456	Applied Microbial Ecology	3
<i>Prescribed Courses: Require a grade of C or better</i>		
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
Additional Courses		
MICRB 202	Introductory Microbiology Laboratory	2
or MICRB 203	Inquiry-based Microbiology Laboratory	
PHYS 250	Introductory Physics I	4
or PHYS 211	General Physics: Mechanics	
PHYS 251	Introductory Physics II	4
or PHYS 212	General Physics: Electricity and Magnetism	
<i>Additional Courses: Require a grade of C or better</i>		

Select 3-4 credits from the following: 3-4

MATH 141	Calculus with Analytic Geometry II
STAT 200	Elementary Statistics
STAT 240	Introduction to Biometry
STAT 250	Introduction to Biostatistics

Supporting Courses and Related Areas

Select 3 credits from MICRB Elective List A (Applied) ³	3
Select 3 credits from MICRB Elective List B ³	3
Select 11 credits from MICRB Elective List C (free electives)	11

Requirements for the Option

Select an option 18-21

¹ To graduate, a grade of C or better is required in 9 credits of prescribed 400-level courses, excluding BMB 442 and MICRB 421W.

² To graduate, a grade of C or better is required in two of the following courses:

- MICRB 201
- BMB 251/MICRB 251 or BIOL 230W
- BMB 252/MICRB 252 or BIOL 220W

³ In Elective List A (Applied) and Elective List B, students can apply a total maximum of 3 credits in BMB 408 and/or MICRB 408 and a maximum of 4 credits in BMB 488 and/or BMB 496

Requirements for the Option

General Microbiology Option (18-21 Credits)

Code	Title	Credits
Prescribed Courses		
MICRB 415	General Virology: Bacterial and Animal Viruses	3

Additional Courses

Select one of the following Sequences: 9-12

Sequence 1

BIOL 222	Genetics
or BIOL 322	Genetic Analysis
BMB 251	Molecular and Cell Biology I ¹
or BIOL 230W	Biology: Molecules and Cells
BMB 252	Molecular and Cell Biology II ¹

Sequence 2

BIOL 110	Biology: Basic Concepts and Biodiversity
BIOL 220W	Biology: Populations and Communities ¹
BIOL 230W	Biology: Molecules and Cells ¹

Supporting Courses and Related Areas

Select 6 credits from MICRB Elective List B 6

¹ To graduate, a grade of C or better is required in two of the following courses:

- MICRB 201
- BMB 251/MICRB 251 or BIOL 230W
- BMB 252/MICRB 252 or BIOL 220W

Medical Microbiology Option (18-19 Credits)

Code	Title	Credits
Prescribed Courses		
BMB 252	Molecular and Cell Biology II	3

MICRB 410	Principles of Immunology	3
MICRB 412	Medical Microbiology	3
Additional Courses		
BIOL 322 or BIOL 222	Genetic Analysis Genetics	3
BMB 251 or BIOL 230W	Molecular and Cell Biology I ¹ Biology: Molecules and Cells	3-4
MICRB 435 or MICRB 415	Viral Pathogenesis General Virology: Bacterial and Animal Viruses	3

¹ To graduate, a grade of C or better is required in two of the following courses:

- MICRB 201
- BMB 251/MICRB 251 or BIOL 230W
- BMB 252/MICRB 252

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.