

# BIOCHEMISTRY AND MOLECULAR BIOLOGY, B.S. (SCIENCE)

**Begin Campus:** Any Penn State Campus

**End Campus:** University Park

## Degree Requirements

For the Bachelor of Science degree in Biochemistry and Molecular Biology, 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: 9 credits of GN courses; 6 credits of GQ courses.

### Requirements for the Major

To graduate, a grade of C or better is required in 9 credits of any BMB or MICRB 400-level course except: BMB 408, BMB 442, BMB 443W, BMB 445W, BMB 448, BMB 488, BMB 496 MICRB 408, 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 (<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
<b>Prescribed Courses</b>		
BIOL 322	Genetic Analysis	3
BMB 251	Molecular and Cell Biology I <sup>1</sup>	3
BMB 252	Molecular and Cell Biology II <sup>1</sup>	3
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
BMB 443W	Laboratory in Protein Purification and Enzymology	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
MATH 141	Calculus with Analytic Geometry II	4
MICRB 201	Introductory Microbiology <sup>1</sup>	3
MICRB 202	Introductory Microbiology Laboratory	2
PSU 16	First-Year Seminar Science	1
<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

BMB 445W	Laboratory in Molecular Genetics I	2
or BMB 448	Model Systems and Approaches in Cell Biology Inquiry	

#### Requirements for the Option

Select an option	40
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<sup>1</sup> To graduate, a grade of C or better is required in two of the following courses: MICRB 201, BMB 251/MICRB 251, and/or BMB 252/MICRB 252.

### Requirements for the Option Biochemistry Option (40 credits)

*Available at the following campuses: Berks, University Park*

Code	Title	Credits
<b>Prescribed Courses</b>		
BMB 474	Analytical Biochemistry	3
CHEM 450	Physical Chemistry - Thermodynamics	3
CHEM 452	Physical Chemistry - Quantum Chemistry	3
PHYS 211	General Physics: Mechanics	4
PHYS 212	General Physics: Electricity and Magnetism	4
PHYS 213	General Physics: Fluids and Thermal Physics	2
PHYS 214	General Physics: Wave Motion and Quantum Physics	2

#### Supporting Courses and Related Areas

Select 7-9 credits from any 400-level BMB/CHEM/MICRB course or from department list D (additional 400-level courses) <sup>1</sup>

Select 2-3 credits in the mathematical sciences from department list B

Select 7-10 credits from department list C

<sup>1</sup> With a maximum of 3 credits in BMB 408 and/or MICRB 408 and a maximum of 4 credits in BMB 488 and/or BMB 496.

### Molecular and Cell Biology Option (40 credits)

*Available at the following campuses: Berks, University Park*

Code	Title	Credits
<b>Prescribed Courses</b>		
BMB 430	Developmental Biology	3
BMB 460	Cell Growth and Differentiation	3
MICRB 410	Principles of Immunology	3
<b>Additional Courses</b>		
Select 8 credits of the following:		8
PHYS 211 & PHYS 212	General Physics: Mechanics and General Physics: Electricity and Magnetism	
PHYS 250 & PHYS 251	Introductory Physics I and Introductory Physics II	
Select 3-6 credits of the following:		3-6
BMB 428	Physical Chemistry with Biological Applications	
CHEM 450 & CHEM 452	Physical Chemistry - Thermodynamics and Physical Chemistry - Quantum Chemistry	
<b>Supporting Courses and Related Areas</b>		

Select 5-6 credits from any 400-level BMB/MICRB course or from department list D (additional 400-level courses) <sup>1</sup> 5-6

Select 2-3 credits in the mathematical sciences from department list B 2-3

Select 8-13 credits from department list C 8-13

<sup>1</sup> With 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.

## 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.