

MATHEMATICS: BIOLOGICAL MATHEMATICS, BA

At the core of modern theoretical science, mathematics has historically provided an expressive language and a theoretical framework for advances in the physical sciences. It has since become central in the life and social sciences and in computer science. Mathematics at Penn embraces traditional core areas of mathematics and developing areas (Penn is one of the world's leading centers in the application of logic to theoretical computer science). The goals of the major program are to assist students in acquiring both an understanding of mathematics and the ability to use it. The mathematics major provides a solid foundation for graduate study in mathematics and a background for study in economics, the biological sciences, the physical sciences, and engineering, as well as many non-traditional areas.

The minimum total course units (<https://www.college.upenn.edu/credits-needed-major/>) for graduation in this major is 36. Double majors may entail more course units.

Majors and prospective majors: Please email majoradvisor@math.upenn.edu. You will be assigned to one of the Math Major Advisors who will discuss your current and future plans with you. It is important that you see this advisor at least once per semester thereafter.

Below is a planning tool that is meant to help you but does not replace the web and advisor visit requirements.

For more information: <https://www.math.upenn.edu/undergraduate/math-majors-and-minors/biological-mathematics-concentration-mathematics-major> (<https://www.math.upenn.edu/undergraduate/math-majors-and-minors/biological-mathematics-concentration-mathematics-major/>)

For information about the General Education requirements, please visit the College of Arts & Sciences Curriculum (<https://www.college.upenn.edu/curriculum/>) page.

Code	Title	Course Units
College General Education Requirements and Free Electives		
Foundational Approaches + Sectors ¹ + Free Electives		17.5-18.5
Major Requirements		
<i>Mathematics Requirement</i>		
Calculus Requirement:		
MATH 104	Calculus, Part I	1
MATH 114	Calculus, Part II ²	1
or MATH 116	Honors Calculus	
MATH 240	Calculus, Part III	1
or MATH 260	Honors Calculus, Part II	
MATH 361	Advanced Calculus	1
or MATH 509	Advanced Analysis	
MATH 360	Advanced Calculus	1
or MATH 508	Advanced Analysis	
Algebra Requirement:		
MATH 370	Algebra	1
or MATH 502	Abstract Algebra	

MATH 371	Algebra	1
or MATH 503	Abstract Algebra	
Statistics Requirement:		
MATH 320	Computer Methods in Mathematical Science I	1
STAT 431	Statistical Inference	1
Upper Level Math Course:		
Select one of the following:		
MATH 241	Calculus, Part IV	
MATH 420	Ordinary Differential Equations	
MATH 425	Partial Differential Equations	
MATH 480	Topics in Modern Math (only if Life Science related)	
Other		
<i>Biology Requirement</i>		
Select one of the following Tracks:		
Track 1:		8.5
BIOL 121	Introduction to Biology - The Molecular Biology of Life	
BIOL 124	Introductory Organismal Biology Lab	
Select two of the following:		
BIOL 221	Molecular Biology and Genetics	
BIOL 230	Evolutionary Biology	
BIOL 240	Ecology: From individuals to ecosystems	
Select three of the following:		
BIOL 410	Advanced Evolution	
BIOL 417	Theoretical Population Biology	
BIOL 431	Genome Science and Genomic Medicine	
BIOL 437	Introduction to Computational Biology & Biological Modeling	
BIOL 536	Fundamentals of Computational Biology	
Select one of the following additional science courses:		
CHEM 101 & CHEM 053	General Chemistry I and General Chemistry Laboratory I	
CHEM 101 & CHEM 054	General Chemistry I and General Chemistry Laboratory II	
PHYS 151	Principles of Physics II: Electromagnetism and Radiation	
Track 2:		
BIOL 101	Introduction to Biology A	
BIOL 102	Introduction to Biology B	
Select two of the following:		
BIOL 221	Molecular Biology and Genetics	
BIOL 230	Evolutionary Biology	
BIOL 240	Ecology: From individuals to ecosystems	
Select two of the following:		
BIOL 410	Advanced Evolution	
BIOL 431	Genome Science and Genomic Medicine	
BIOL 485	The RNA World: A functional and computational analysis	
Select one of the following additional science courses:		
CHEM 101 & CHEM 053	General Chemistry I and General Chemistry Laboratory I	

CHEM 101 & CHEM 054	General Chemistry I and General Chemistry Laboratory II
PHYS 151	Principles of Physics II: Electromagnetism and Radiation

Total Course Units **36-37**

¹ You may count no more than one course toward both a Major and a Sector requirement. For Exceptions, check the Policy Statement (<http://www.college.upenn.edu/sectors-policy/>).

² MATH 116 Honors Calculus is a Honors Course.

The degree and major requirements displayed are intended as a guide for students entering in the Fall of 2021 and later. Students should consult with their academic program regarding final certifications and requirements for graduation.
