MATHEMATICS AND PHYSICS (BS)

Department Website (https://engineering.nyu.edu/academics/departments/applied-physics/)

NYSED: 08862 **HEGIS:** 1701.00 **CIP:** 27.0301

Program Description

Mathematics deals with abstraction, logic, and quantitative reasoning. Because it has applications to nearly every branch of science and engineering, it's essential for mathematicians to think about how their work infiltrates other branches of learning. Advances in physics — for example, those in electromagnetism and thermodynamics — often resonate deeply with mathematics.

At the School of Engineering, the BS in Applied Physics and Mathematics program serves as a means to bridge these 2 disciplines. The dual major allows students to gain a foothold in separate but substantial fields. In addition to learning the fundamentals of physics and math, students pursue a specialized course of study that a minor in either field just can't match.

But it's important that these skills transfer over to the real world. That's why this program provides internship opportunities at major financial, insurance, and technology firms in the New York area.

Students with experience in both mathematics and physics enjoy diverse and interesting careers. Graduates have the freedom to explore such stimulating fields as chemistry, biology, medicine, and engineering. They're also qualified for positions in software design, economics, aerospace engineering, law, and business.

Admissions

New York University's Office of Undergraduate Admissions supports the application process for all undergraduate programs at NYU. For additional information about undergraduate admissions, including application requirements, see How to Apply (https://www.nyu.edu/admissions/undergraduate-admissions/how-to-apply.html).

Program Requirements

The program requires the completion of 128 credits, comprised of the following:

Course	Title	Credits
Major Requirements		
Physics		
PH-UY 1013	MECHANICS	3
PH-UY 2121	General Physics Laboratory I	1
PH-UY 2023	ELECTRICITY, MAGNETISM, & FLUIDS	3
PH-UY 2131	General Physics Laboratory II	1
PH-UY 2033	WAVES, OPTICS, & THERMODYNAMICS	3
PH-UY 2104	Analytical Mechanics	4
PH-UY 2344	INTRODUCTION TO MODERN AND SOLID STATE PHYSICS	4
PH-UY 3002	JUNIOR PHYSICS LABORATORY	2
PH-UY 3234	Electricity and Magnetism	4
PH-UY 4124	Thermodynamics and Statistical Physics	4
PH-GY 6673	QUANTUM MECHANICS I	3
PH-UY 3801	Guided Studies in Physics	1
Mathematics		
MA-UY 1024	Calculus I for Engineers	4
MA-UY 1124	Calculus II for Engineers	4
MA-UY 2114	Calculus III: Multi-Dimensional Calculus	4
or MA-UY 2514	HONORS CALCULUS III	
MA-UY 2224	Data Analysis	4
MA-UY 2034	Linear Algebra and Differential Equations	4
MA-UY 3113	Advanced Linear Algebra and Complex Variables	3
MA-UY 4414	APPLIED PARTIAL DIFFERENTIAL EQUATIONS	4
MA-UY 4424	NUMERICAL ANALYSIS	4
Other Major Requirements		
PH-UY 1002	Physics: The Genesis of Technology	2
EG-UY 1001	Engineering and Technology Forum	1
EXPOS-UA 1	Writing as Inquiry	4
EXPOS-UA 22	Advanced Writing for Engineers	4
CS-UY 1114	INTRO TO PROGRAMMING & PROBLEM SOLVING	4
Select one of the following:		4
CM-UY 1003 & CM-UY 1001	General Chemistry for Engineers and General Chemistry for Engineers Laboratory	
CM-UY 1013 & CM-UY 1011	GENERAL CHEMISTRY I and General Chemistry Laboratory I	
Electives		
Humanities or Social Sciences		
Select four humanities or social science courses [1]		16
Mathematics and Physics		
Select at least four credits from the undergraduate math electives and at least three credits from the undergraduate physics electives [2]		7
PH-UY 2813	Astronomy and Astrophysics	
PH-UY 2823	GEOLOGY AND GEOPHYSICS	
PH-UY 3054	Introduction to Polymer Physics	
PH-UY 3103	Fundamentals of Applied Nuclear Physics	
PH-UY 3474	Introduction to Modern Optics and Photonics	
PH-UY 3503	Introduction to Radiation Physics and Dosimetry	
PH-UY 3513	NUCLEAR AND RADIATION INSTRUMENTATION AND METHODS	
PH-UY 3603		
PH-UY 3614	COMPUTATIONAL PHYSICS	
PH-UY 3703	MATHEMATICAL PHYSICS II	
PH-UY 4554	SOLID STATE PHYSICS	
PH-UY 4603	Special Topics in Physics	
STEM and Free Electives, Independent Study and Projects		
Select 22 credits of STEM & free electives and independent study courses [3]		22
Total Credits		**128**

[1] These 4 courses can be within a single cluster or across multiple clusters. For optimal breadth of experience, students are encouraged to take electives across clusters and/or across disciplines within a cluster. These 4 humanities and social science electives must satisfy the following:

- 1 must be a 3000/4000 level humanities or social science elective; and
- 1 must be an Advanced Seminar, identifiable by course number 4504

Please see the General Education Requirements (https://engineering.nyu.edu/academics/departments/technology-culture-and-society/general-education-requirements/) for further details.

[2] Graduate courses may be substituted with adviser's approval.

[3] 8 credits are reserved for a 6 credit physics project plus a 2 credit senior physics seminar course or a 4 credit math project/thesis and an extra 4 credit math elective. The remaining 14 credits are reserved for two 4 credit STEM electives and two 3 credit free electives. The program adviser must approve electives selected from other disciplines.

Sample Plan of Study

Course	Title	Credits
1st Semester/Term		
Select one of the following:		4
CM-UY 1003 & CM-UY 1001	General Chemistry for Engineers and General Chemistry for Engineers Laboratory	
CM-UY 1013 & CM-UY 1011	GENERAL CHEMISTRY I and General Chemistry Laboratory I	
PH-UY 1002	Physics: The Genesis of Technology	2
MA-UY 1024	Calculus I for Engineers	4
EXPOS-UA 1	Writing as Inquiry	4
EG-UY 1001	Engineering and Technology Forum	1
	Credits	**15**
2nd Semester/Term		
PH-UY 1013	MECHANICS	3
MA-UY 1124	Calculus II for Engineers	4
CS-UY 1114	INTRO TO PROGRAMMING & PROBLEM SOLVING	4
EXPOS-UA 22	Advanced Writing for Engineers	4
	Credits	**15**
3rd Semester/Term		
PH-UY 2023	ELECTRICITY, MAGNETISM, & FLUIDS	3
PH-UY 2121	General Physics Laboratory I	1
MA-UY 2114	Calculus III: Multi-Dimensional Calculus	4
MA-UY 2224	Data Analysis	4
Humanities and Social Science Elective		4
	Credits	**16**
4th Semester/Term		
PH-UY 2033	WAVES, OPTICS, & THERMODYNAMICS	3
PH-UY 2131	General Physics Laboratory II	1
PH-UY 2344	INTRODUCTION TO MODERN AND SOLID STATE PHYSICS	4
MA-UY 2034	Linear Algebra and Differential Equations	4
Humanities and Social Science Elective		4
	Credits	**16**
5th Semester/Term		
PH-UY 2104	Analytical Mechanics	4
MA-UY 4414	APPLIED PARTIAL DIFFERENTIAL EQUATIONS	4
STEM Elective		4
Humanities and Social Science Elective		4
	Credits	**16**
6th Semester/Term		
PH-UY 3234	Electricity and Magnetism	4
PH-UY 3002	JUNIOR PHYSICS LABORATORY	2
MA-UY 4424	NUMERICAL ANALYSIS	4
STEM Elective		4
Free Elective		3
	Credits	**17**
7th Semester/Term		
PH-GY 6673	QUANTUM MECHANICS I	3
Select one of the following:		2
PH-UY 4902	Introduction to Senior Project in Physics	
Math Elective		
Select one of the following:		2
PH-UY 4912	Senior Seminar in Physics	
Math Elective		
MA-UY 3113	Advanced Linear Algebra and Complex Variables	3
Humanities and Social Science Elective		4
Free Elective		3
	Credits	**17**
8th Semester/Term		
PH-UY 4904 or MA-UY 492X	Senior Project in Physics or INDEPENDENT STUDY	4
PH-UY 4124	Thermodynamics and Statistical Physics	4
Math Elective		4
Physics Elective		3
PH-UY 3801	Guided Studies in Physics	1
	Credits	**16**
	Total Credits	**128**

Learning Outcomes

Upon successful completion of the program, graduates will:

1. Gain a foothold in separate but substantial fields, bridging these two disciplines, learning about their applications to other branches of science and engineering.
2. Pursue a specialized course of study that explores both disciplines in greater depth.
3. Be ready for a variety of career options following graduation, including, but not limited to graduate study in chemistry, biology, medicine, and engineering, as well as professional careers in software design, economics, aerospace engineering, law, and business.

Policies

NYU Policies

University-wide policies can be found on the New York University Policy pages (https://bulletins.nyu.edu/nyu/policies/).

Tandon Policies

Additional academic policies can be found on the Tandon academic policy page (https://bulletins.nyu.edu/undergraduate/engineering/academic-policies/).