Biophysics, PhD (Boston)

The Biophysics PhD program at Northeastern University is a combined and cross-disciplinary program that draws expertise from the physics, biology, and chemistry departments. Designed to meet the growing need for interdisciplinary research, this program focuses on the application of physical and chemical principles to understand complex biological systems. Through this unique partnership, students explore biological phenomena at all scales, from molecules to entire organisms, using quantitative and experimental methods.

This program offers a comprehensive curriculum that includes core courses in statistical mechanics, chemistry, and cell and molecular biology, along with a recurring graduate biophysics seminar. Emphasizing both theoretical knowledge and practical experience, the program covers techniques such as spectroscopy, computational modeling, and advanced microscopy, while also promoting the development of essential skills in data science and machine learning. This approach is designed to enable students to address significant scientific challenges in fields such as biotechnology and health sciences.

Structured under the College of Science's cross-disciplinary science PhD umbrella, the program allows for flexibility based on each student's background and career goals. Students engage in research rotations and are encouraged to seek external internships to broaden their professional experience and network. The program's structure supports students as they build a solid foundation in biophysics, preparing them for candidacy exams and offering pathways into diverse scientific careers.

Successful graduates of the Biophysics PhD program are equipped to excel in academia, industry, and beyond. By fostering a collaborative research environment that draws on the strengths of multiple disciplines, this program aims to produce scientists capable of groundbreaking research with a lasting impact on both science and society.

Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Cross-Disciplinary Science *(*https://catalog.northeastern.edu/graduate/science/interdisciplinary/cross-disciplinary-science-ms-bos/*) degree. Note that no students will be admitted directly into the Cross-Disciplinary Science program to pursue a master's degree.*

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Lab rotations
Identify PhD advisor
Dissertation committee
Dissertation proposal and presentation
Candidacy
Dissertation/dissertation defense

Core Requirements

Code	Title	Hours
Thermodynamics and Statistical Mechanics		
CHEM 5636	Statistical Thermodynamics	3
or PHYS 7305	Statistical Physics	
Chemistry		
CHEM 5621	Principles of Chemical Biology	3
or CHEM 5638	Molecular Modeling	
or CHEM 5641	Computational Chemistry	
Cell and Molecular Biology		
BIOL 6301	Molecular Cell Biology	4
Biological Physics		
PHYS 7731	Physics of Biological Processes and Living Systems 1	4
Graduate Biophysics Seminar		
Complete this repeatable course each semester of the program:		0
INSC 7100	Biophysics Seminar	
Laboratory Rotation		

Complete the following variable credit course twice (register at 3 semester hours for the first lab rotation and at 2 semester hours for the second lab rotation):		5
PHYS 9984	Advanced Research	

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
Physics Breadth Courses		
PHYS 5116	Network Science 1	
PHYS 5318	Principles of Experimental Physics	
PHYS 7301	Classical Mechanics/Math Methods	
PHYS 7302	Electromagnetic Theory	
PHYS 7315	Quantum Theory 1	
PHYS 7321	Computational Physics	
PHYS 7322	Nonequilibrium Physics	
PHYS 7335	Dynamical Processes in Complex Networks	
PHYS 7741	Physics of Biological Processes and Living Systems 2	
Biology Breadth Courses		
BIOL 5103 to BIOL 6961		
Chemistry Breadth Courses		
CHEM 5610 to CHEM 5688		

Dissertation

Code	Title	Hours
After achieving candidacy, students complete Dissertation Term 1 in the department of their PhD advisor. In the following semester, they complete Dissertation Term 2.		
PHYS 9990	Dissertation Term 1	
or CHEM 9990	Dissertation Term 1	
or BIOL 9990	Dissertation Term 1	
PHYS 9991	Dissertation Term 2	
or CHEM 9991	Dissertation Term 2	
or BIOL 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
PHYS 9996	Dissertation Continuation	
or CHEM 9996	Dissertation Continuation	
or BIOL 9996	Dissertation Continuation	

Program Credit/GPA Requirements

31 total semester hours required
Minimum 3.000 GPA required