

# BIOENGINEERING, PHD

The first doctorate degree in bioengineering in the nation was awarded at Penn in 1953, and since that time, Penn Bioengineering has been an integral academic program linking faculty from the engineering, medical, and arts and sciences schools on a single centrally-located campus. Penn Bioengineering provides students with a flexible curriculum and a world-class research environment. Students are given the opportunity to work in a collaborative culture that includes multiple generations of leaders in academia, government, and industry.

**For more information:** <http://www.be.seas.upenn.edu/prospective-students/doctoral/index.php> (<http://www.be.seas.upenn.edu/prospective-students/doctoral/>)

## Required Courses

Code	Title	Course Units
<b>Responsible Conduct of Research Requirement</b>		
EAS 9000	Responsible Conduct for Research (RCR), Engineering	0
<b>Biomedical Science</b>		<b>2</b>
Select 2 courses with Attribute EPBS ( <a href="http://catalog.upenn.edu/attributes/epbs/">http://catalog.upenn.edu/attributes/epbs/</a> ) <sup>1</sup>		
<b>Bioengineering Fundamentals</b>		<b>4</b>
Select four courses with Attribute EPBF ( <a href="http://catalog.upenn.edu/attributes/epbf/">http://catalog.upenn.edu/attributes/epbf/</a> )		
<b>Statistics and Domain Math Courses</b>		<b>2</b>
Select two courses with Attribute EPBM ( <a href="http://catalog.upenn.edu/attributes/epbm/">http://catalog.upenn.edu/attributes/epbm/</a> ) <sup>3</sup>		
<b>Bioengineering Seminars</b>		<b>1</b>
Select a minimum of two seminars each in:		
BE 6990	Bioengineering Graduate Seminar	
BE 5730	Soft Skills for Bioengineering PhDs	
<b>Bioengineering Research</b>		
BE 9999	Independent Study Research	
BE 9950	Doctoral Dissertation Status	
<b>Total Course Units</b>		<b>9</b>

## University PhD Benchmarks

In addition to Program requirements, the following milestones must be completed:

Code	Title	Course Units
Qualifying Evaluation		
Candidacy Examination		
Dissertation Defense/Oral Exam		
Dissertation Deposit		

For more information view the University's Academic Rules for PhD Programs (<http://catalog.upenn.edu/pennbook/academic-rules-phd/>).

<sup>1</sup> Select 2 courses in biomedical sciences such as cell biology and/or systems physiology. Courses are chosen in consultation with advisor. A list of courses that students have taken recently to fulfill

this requirement (<http://www.be.seas.upenn.edu/current-students/masters/documents/16BiologicalScienceCourses.pdf>) can be found on the Bioengineering website.

<sup>2</sup> Select four BE or Engineering courses devoted to analytical methods, modeling, experimental methods and data analysis which focus on the student concentration. Courses will be chosen in consultation with the advisor.

<sup>3</sup> Suggested courses include:

- ENM 5020 Numerical Methods and Modeling
- ENM 5100 Foundations of Engineering Mathematics - I
- ENM 5110 Foundations of Engineering Mathematics - II
- BE 5100 Biomechanics and Biotransport
- Additional math course recommendations (<http://www.be.seas.upenn.edu/current-students/masters/documents/16MathCourses.pdf>) can be found on the Bioengineering website.

The degree and major requirements displayed are intended as a guide for students entering in the Fall of 2025 and later. Students should consult with their academic program regarding final certifications and requirements for graduation.

## Sample Plan of Study

Code	Title	Course Units
<b>First Year</b>		
<i>Fall</i>		
Biomedical Science Course		
Statistics and Domain Math Courses <sup>1</sup>		
BE 6990	Bioengineering Graduate Seminar	0
BE 5730	Soft Skills for Bioengineering PhDs	0.5
EAS 9000	Responsible Conduct for Research (RCR), Engineering	0
<i>Spring</i>		
BE 6990	Bioengineering Graduate Seminar	0
BE 5730	Soft Skills for Bioengineering PhDs	0.5
BE 9999	Independent Study Research	1
Biomedical Science course <sup>1</sup>		
BE Fundamental <sup>1</sup>		
<i>Summer</i>		
Qualification Evaluation <sup>2</sup>		
<b>Second Year</b>		
<i>Fall</i>		
Statistics and Domain Math Courses		
BE Fundamental <sup>1</sup>		
BE 9999	Independent Study Research	
<i>Spring</i>		
2 Bioengineering Fundamental <sup>1</sup>		
BE 9999	Independent Study Research	
<b>Third Year and Beyond</b>		
Dissertation Proposal <sup>3</sup>		

Final Exam and Dissertation Defense

BE 9999 Independent Study Research  
or BE 9950 Doctoral Dissertation Status

<sup>1</sup> Selected in consultation with the research advisor.

<sup>2</sup> Qualifications Evaluation will be completed during the Summer or Early Fall.

<sup>3</sup> The Dissertation Proposal is required by the end of the Fall semester in the Third Year.