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/)

The degree and major requirements displayed are intended as a guide for students entering in the Fall of 2026 and later. Students should consult with their academic program regarding final certifications and requirements for graduation.

Required Courses

Code	Title	Course Units
Bioengineering Fundamentals		**4**
Select 4 courses with Attribute EPBF (https://catalog.upenn.edu/attributes/epbf/)**or** BE 5000/6000-level courses. [1, 4]		
Biomedical Science		**1**
Select 1 course with Attribute EPBS. (https://catalog.upenn.edu/attributes/epbs/) [2, 4]		
Statistics and Domain Math Courses		**1**
Select 1 course with Attribute EPBM. (https://catalog.upenn.edu/attributes/epbm/) [3, 4]		
Bioengineering Seminars		**1**
Select a minimum of two seminars each in:		
BE 6990	Bioengineering Graduate Seminar	
BE 5730	Soft Skills for Bioengineering PhDs	
Teaching Requirement		**2**
BE 8950	Teaching Practicum	
Responsible Conduct of Research Requirement		
EAS 9000	Responsible Conduct for Research (RCR), Engineering	0.5
Bioengineering Research		**10**
BE 9950	Dissertation [5]	
BE 9999	Independent Study Research	
Total Course Units		**19.5**

1. 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. A list of courses students have taken recently to fulfill this requirement (https://catalog.upenn.edu/attributes/epbf/) can be found in the catalog.
2. 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 (https://catalog.upenn.edu/attributes/epbs/) can be found in the catalog.
3. 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 (https://catalog.upenn.edu/attributes/epbm/) can be found in the catalog.
4. BE 9999 Independent Study Research may be taken as a **1:1 substitute** for up to two credits of didactic classes (BE Fundamentals, Biological Science, or Statistics and Domain Math).
5. Doctoral students are expected to maintain full-time status and to enroll in BE 9999 Independent Study Research while conducting research, in year one and two in consultation with their advisor. A student should enroll in BE 9950 in year three and beyond once they advance to candidacy. A student must be enrolled in BE 9950 in their final semester.

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 (https://catalog.upenn.edu/pennbook/academic-rules-phd/).

Sample Plan of Study

Code	Title	Course Units
First Year		
Fall		
BE 6990	Bioengineering Graduate Seminar	0
BE 5730	Soft Skills for Bioengineering PhDs	0.5
EAS 9000	Responsible Conduct for Research (RCR), Engineering	0.5
2 CU's BE Fundamental Course (Attribute EPBF) [1]		2
BE 9999	Independent Study Research	1
Spring		
BE 5730	Soft Skills for Bioengineering PhDs	0.5
BE 6990	Bioengineering Graduate Seminar	0
Biomedical Science Course (Attribute EBPS) [1]		1
Statistics and Domain Math Course (Attribute EBPM) [1]		1
BE 9999	Independent Study Research	1
Summer		
Qualification Evaluation [2]		

Second Year		
Fall		
2 CU's BE Fundamental Course (Attribute EPBF) [1]		2
BE 8950	Teaching Practicum	1
Spring		
BE 8950	Teaching Practicum	1
BE 9999	Independent Study Research	2
Third Year and Beyond		
Fall		
Dissertation Proposal [3]		
BE 9999	Independent Study Research	3
Spring		
BE 9950	Dissertation	3
Total Course Units		**19.5**

1 Selected in consultation with research advisor. Course Attribute lists for EPBS (https://catalog.upenn.edu/attributes/epbs/), EPBM (https://catalog.upenn.edu/attributes/epbm/), and EPBF (https://catalog.upenn.edu/attributes/epbf/) can also be found in the requirements outline.

2 Qualifications Evaluation will be completed during the first Summer or Early Fall of the second year.

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