BIOMEDICAL ENGINEERING (PHD)

Biomedical Engineering Department (https://engineering.nyu.edu/academics/departments/biomedical-engineering/)

NYSED: 41174 **HEGIS:** 0905.00 **CIP.** 14.0501

Program Description

The Department of Biomedical Engineering has assembled a core of renowned faculty from multiple disciplines in the NYU Tandon School of Engineering and the NYU School of Medicine, augmented by associated faculty from across NYU's schools and colleges and the NYU Global Network. Students within the PhD degree programs engage in research leading to new engineering approaches and technologies to promote and enhance human health. In the laboratories of faculty members who are among the most accomplished authorities in the field, these students will acquire all of the necessary skills and expertise to become leaders in biomedical engineering in their own right.

Students engage, for example, in projects that look to develop new medical imaging devices and state-of-the-art medical data analysis. This includes the use of artificial intelligence (AI) and deep learning to improve diagnostic capabilities in oncology, ophthalmology, neurology, and orthopedics. Students are also involved in designing devices to separate, analyze, and modulate the behavior of single cells for disease models and diagnostic tests, and creating synthetic chromosomes. Collaboration with faculty in Electrical and Mechanical Engineering includes innovative research on wearable electronics that can be used to monitor disease onset and progression at home on a daily basis.

The state-of-the-art research taking place in the department is supported by engineering strengths in medical imaging, signal processing and analysis, modeling and control of complex living/non-living systems, big data management and visualization, design of microfluidic devices, biomaterials, control and modulation of cellular behavior, biomechanics, and systems biology.

Urban Science Doctoral Track

The optional Urban Science Doctoral Track (https://engineering.nyu.edu/urban-science-sensing-complexity-informatics-doctoral-track/) is specifically designed for students who want to focus on urban science through a cohesive array of in-class and experiential learning activities, while pursuing their PhD at NYU Tandon. Doctoral track students will engage with CUSP's urban science faculty, experts in methodological aspects pertaining to complexity (dynamical systems, multi-agent systems, network science, and risk engineering), informatics (AI, machine learning, and robotics), and sensing (Internet of Things, smart infrastructure, wireless).

Admissions

To apply for admission to any Tandon graduate program, please contact the Office of Graduate Admissions (https://engineering.nyu.edu/admissions/graduate/).

Desired Background

A BS degree in biomedical engineering or a related field of science or engineering is generally required for admission to the BME PhD program. Applicants with degrees in other fields may be admitted with undergraduate or graduate deficiencies as evaluated by the Graduate Admissions Committee. Students entering the program with an MS degree are expected to have an MS degree in biomedical engineering or a related field of science, medicine, or engineering. In addition to the degree requirement, acceptance to the program will depend on (1) academic excellence, (2) research interests congruent with those of program faculty, and (3) positive recommendations (e.g., from former research advisers). GRE scores are optional. Admissions committee members or faculty members whose research interests match those of the candidate, either in person or by a conference call, will interview viable candidates. Enrollment in the NYU Global Fellows program is available to those who choose a research adviser at the NYU Abu Dhabi campus.

Program Requirements

The program requires the completion of 75 credits, comprised of the following:[1]

Course	Title	Credits
Core Courses		
Advanced Mathematics and Statistics for Biomedical Engineering		
Select one of the following:		3
BE-GY 6453	Probability and Stochastic Processes	
BE-GY 6473	Applied Mathematics and Statistics for Biomedical Engineering	
CBE-GY 6153	Applied Mathematics in Engineering	
Biomedical or Biophysical Science		
Select one of the following:		3
BE-GY 6103	Anatomy, Physiology, & Biophysics I	
BE-GY 6113	Anatomy, Physiology, & Biophysics II	
Biomechanics or Bioinstrumentation		
Select one of the following:		3
BE-GY 6503	Biomedical Instrumentation	
BE-GY 6513	Biomedical Device Design and Development	
BE-GY 6783	Biomechanics for Biomedical Engineers	
Responsible Conduct of Research		
BE-GY 9753	Bioethics Seminar	3
Electives		
Course Electives		
Course Electives can be courses from the Course Electives list below or additional Core Courses from the list above. The PhD requires 15 credits of Course Electives.		15
Free Electives		
Free Electives can be chosen from the Course Electives list below, or additional Core Courses from the list above, or additonal dissertation research credits. The PhD requires 21 credits of Free Electives.		21
Qualifying Exam		
The qualifying exam (QE) is the prerequisite to dissertation. Students must pass the QE within 2 years of entering the PhD program.		0
RE-GY 9990	PHD QUALIFYING EXAM	
Dissertation		
After passing the qualifying exam, students will enroll in dissertation. Once students begin dissertation research, they must enroll in at least 3 credits of the dissertation course each fall and spring semester until graduation. This PhD program requires 27 credits of dissertation.		27
BE-GY 999X	PhD Dissertation in Biomedical Engineering	

Colloquium and Seminar

Students must enroll in and attend the colloquium lecture series with distinguished invited speakers each semester.	0
BE-GY 9730 Colloquium in Biomedical Engineering	
Students must participate and enroll in the seminar for professional development at least four semesters.	0
BE-GY 9740 Seminar in Biomedical Engineering	
Total Credits	**75**

[1] For the core and elective courses, other courses not listed here may be selected with the approval of the Graduate Studies Committee.

Course Electives

List of Course Electives

Course	Title	Credits
BE-GY 6103	Anatomy, Physiology, & Biophysics I	3
BE-GY 6113	Anatomy, Physiology, & Biophysics II	3
BE-GY 6203	Biomedical Imaging I	3
BE-GY 6303	Bio-optics	3
BE-GY 6353	Special Topics in Biomedical Engineering	3
BE-GY 6403	Digital Signal Processing I	3
BE-GY 6453	Probability and Stochastic Processes	3
BE-GY 6473	Applied Mathematics and Statistics for Biomedical Engineering	3
BE-GY 6503	Biomedical Instrumentation	3
BE-GY 6513	Biomedical Device Design and Development	3
BE-GY 6523	Biomems and Microfluidics	3
BE-GY 6723	Natural Polymers and Materials	3
BE-GY 6763	Rehabilitation Engineering	3
BE-GY 6783	Biomechanics for Biomedical Engineers	3
BE-GY 6803	Biomaterials: Engineering Principles and Design Consideration	3
BE-GY 9443	Tissue Engineering	3
BE-GY 9453	Engineering Tissue Regeneration	3
BE-GY 9763	Regulatory Issues Surrounding Medical Devices	3
ECE-GY 6813	Medical Imaging I	3

Qualifying Exam and Dissertation

Passing a doctoral qualifying examination is required in order to begin taking dissertation research credits. The qualifying exam will be based on assigned thematically focused publications. This exam may be taken as early as the end of the first year, and not later than the middle of the second year. In the case of failure, the right to a second examination within six months is at the discretion of the examination committee in consultation with the Biomedical Engineering program committee. The qualifying examination must be passed by the end of the second year.

Once students have passed the qualifying exam, they may then enroll in dissertation research. A minimum of 27 credits of dissertation are required for this PhD degree. Once dissertation research begins, students must enroll in at least 3 credits of dissertation each fall and spring term (the summer term is optional) until graduation.

Sample Plan of Study

Course	Title	Credits
1st Semester/Term		
BE-GY 6453	Probability and Stochastic Processes	3
BE-GY 6103	Anatomy, Physiology, & Biophysics I	3
BE-GY 9730	Colloquium in Biomedical Engineering	0
BE-GY 9740	Seminar in Biomedical Engineering	0
Course Elective		3
	Credits	**9**
2nd Semester/Term		
BE-GY 6503	Biomedical Instrumentation	3
BE-GY 9753	Bioethics Seminar	3
BE-GY 9730	Colloquium in Biomedical Engineering	0
BE-GY 9740	Seminar in Biomedical Engineering	0
Course Elective		3
	Credits	**9**
3rd Semester/Term		
BE-GY 9730	Colloquium in Biomedical Engineering	0
BE-GY 9740	Seminar in Biomedical Engineering	0
RE-GY 9990	PHD QUALIFYING EXAM	0
Course Elective		3
Course Elective		3
Course Elective		3
	Credits	**9**
4th Semester/Term		
BE-GY 9730	Colloquium in Biomedical Engineering	0
BE-GY 9740	Seminar in Biomedical Engineering	0
Free Elective		3
Free Elective		3
Free Elective		3
	Credits	**9**
5th Semester/Term		
BE-GY 999X	PhD Dissertation in Biomedical Engineering	3
BE-GY 9730	Colloquium in Biomedical Engineering	0
	Credits	**3**
6th Semester/Term		
BE-GY 999X	PhD Dissertation in Biomedical Engineering	3
BE-GY 9730	Colloquium in Biomedical Engineering	0
	Credits	**3**
7th Semester/Term		
BE-GY 999X	PhD Dissertation in Biomedical Engineering	3
BE-GY 9730	Colloquium in Biomedical Engineering	0
	Credits	**3**
8th Semester/Term		
BE-GY 999X	PhD Dissertation in Biomedical Engineering	3
GA-GY 9993	Writing and Communication for Engineers and Scientists	3
BE-GY 9730	Colloquium in Biomedical Engineering	0
	Credits	**6**
9th Semester/Term		
BE-GY 999X	PhD Dissertation in Biomedical Engineering	6
BE-GY 9730	Colloquium in Biomedical Engineering	0
	Credits	**6**
10th Semester/Term		
BE-GY 999X	PhD Dissertation in Biomedical Engineering	6
BE-GY 9730	Colloquium in Biomedical Engineering	0
	Credits	**6**
11th Semester/Term		
BE-GY 999X	PhD Dissertation in Biomedical Engineering	6
BE-GY 9730	Colloquium in Biomedical Engineering	0
	Credits	**6**

12th Semester/Term

BE-GY 999X	PhD Dissertation in Biomedical Engineering	6
BE-GY 9730	Colloquium in Biomedical Engineering	0
	Credits	**6**
	Total Credits	**75**

Learning Outcomes

Upon successful completion of the program, graduates will:

1. Provide students with an indepth, advanced education that will give them the tools needed to perform fundamental and applied independent research in biomedical engineering.
2. Provide requisite technical knowledge that students may wish to apply to management, marketing, and sales activities related to biomedical engineering.
3. Provide knowledge for entrepreneurial activities related to biomedical engineering.

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/graduate/engineering/academic-policies/).