BIOENGINEERING (BS)

CIP: 14.0501

Program Description

The field of Bioengineering utilizes engineering principles into applications in biological and medical fields, and includes solving problems at multiple scales; ranging from the molecular and cellular levels to large-scale problems such as prosthetics and medical devices. Bioengineering is very broad by nature, which may include components from mechanical, chemical, computer, and electrical engineering, and elements from physics, chemistry, biology, and material sciences. Bioengineering slightly differentiates from Biomedical engineering in the sense that it includes not just biomedical devices, but biological devices that apply to basic science research and methods as well. The scope of Bioengineering is broader.

NYU Abu Dhabi offers six engineering degree programs: General Engineering, Bioengineering, Civil Engineering, Computer Engineering, Electrical Engineering, and Mechanical Engineering.

Each program is designed to create technological leaders with a global perspective, a broad education, and the capacity to think creatively. The uniqueness of the program lies in the integration of invention, innovation, and entrepreneurship into all phases of study. Students enjoy a learning environment conducive to creativity, which is at the heart of tomorrow's technological innovations and enterprises.

Accreditation

The Bioengineering program at NYU Abu Dhabi is accredited by the Engineering Accreditation Commission of ABET (https://www.abet.org/), and the Commission for Academic Accreditation (CAA). Graduates receive a Bachelor of Science degree.

Study Away

The study away pathway can be found on the NYUAD Student Portal at students.nyuad.nyu.edu/pathways (https://bulletins.nyu.edu/undergraduate/abu-dhabi/programs/bioengineering-bs/students.nyuad.nyu.edu/pathways/). Students with questions should contact the Office of Global Education.

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

Course	Title	Credits
General Education Requirements		
Physical Education (2 courses)		
Quantitative Reasoning (1 course)		
Experimental Inquiry (1 course)		
Islamic Studies (1 course)		
First-Year Writing Seminar		4
Colloquia		4
Field Colloquia (2 J-Term courses)		6
Core Competencies		
Arts, Design, and Technology		4
Cultural Exploration Analysis		4
Data and Discovery		4
Structures of Thought and Society		4
Major Requirements		
Science Courses (20 credits)		
SCIEN-UH 1121EQ	Foundations of Science 1-2: Physics	1.5
SCIEN-UH 1122EQ	Foundations of Science 1-2: Chemistry	3
SCIEN-UH 1123EQ	Foundations of Science 1-2: Biology	1.5
SCIEN-UH 1124C	Foundations of Science 2 Lab: Chemistry	1
SCIEN-UH 1124P	Foundations of Science 1 Lab: Physics	1
SCIEN-UH 1341Q	Foundations of Science 3-4: Physics	3
SCIEN-UH 1342Q	Foundations of Science 3-4: Chemistry	3
SCIEN-UH 1343	Foundations of Science 3-4: Biology	2
SCIEN-UH 1344BE	Foundations of Science 4 Lab: Biology	1
SCIEN-UH 1344CE	Foundations of Science 3 Lab: Chemistry	1
CHEM-UH 3101	Physical Chemistry for the Life Sciences	2
Mathematics Courses (18 credits)		
MATH-UH 1012Q	Calculus with Applications to Science and Engineering (or equivalent)	4
MATH-UH 1020Q	Multivariable Calculus with Applications to Science and Engineering	4
MATH-UH 1022Q	Linear Algebra	4
ENGR-UH 2010Q	Probability and Statistics for Engineers	2
ENGR-UH 2710	Differential Equations for Engineers	4
Engineering Common Courses (17 credits)		
ENGR-UH 1000	Computer Programming for Engineers	4
ENGR-UH 1010	Engineering Ethics	1
ENGR-UH 1021	Design and Innovation	2
ENGR-UH 2011	Engineering Statics	2
ENGR-UH 2012	Conservation Laws in Engineering	2
ENGR-UH 2013	Digital Logic	2
ENGR-UH 2017	Numerical Methods	2
ENGR-UH 2019	Circuits Fundamentals	2
Bioengineering Required Courses (12 credits)		
ENGR-UH 1801	Bioengineering Principles	2
ENGR-UH 2810	Biomechanics	2
ENGR-UH 2811	Biotransport Phenomena	2
ENGR-UH 2812	Bioimaging	2
ENGR-UH 4810	Biomaterials	2
ENGR-UH 2813	Bioinstrumentation	2
Bioengineering Electives (22 credits)		
Complete at least 22 credits of Bioengineering Electives, of which at least 12 credits must be Engineering electives (see lists below)		22
Capstone		
ENGR-UH 4011	Senior Design Capstone Project I	2

ENGR-UH 4020	Senior Design Capstone Project II	4
Other Electives		
Complete enough courses to reach the minimum overall required 128 credits		3
Total Credits		**128**

Bioengineering Electives

Students who wish to pursue post-graduate medical studies (pre-med track) should complete CHEM-UH 2010 Organic Chemistry 1 and CHEM-UH 3010 Organic Chemistry 2 as part of their Bioengineering Science Electives. Foundations of Science 5-6 are prerequisite for enrollment to CHEM-UH 2010 and CHEM-UH 3010, but do not count toward Bioengineering major requirements.

Engineering Electives

Code	Title	Credits
BIOL-UH 2010	Human Physiology	4
CHEM-UH 3201	Interdisciplinary Magnetic Resonance	4
ENGR-UH 2028	Tissue Engineering	2
ENGR-UH 2210	Engineering Dynamics	3
ENGR-UH 2211	Solid Mechanics	2
ENGR-UH 2212	Fluid Mechanics	3
ENGR-UH 2311	Advanced Circuits	2
ENGR-UH 3111	Analysis of Chemical and Biological Processes	4
ENGR-UH 3120	Engineering Materials	2
ENGR-UH 3230	Finite Element Modeling and Analysis	4
ENGR-UH 3332	Applied Machine Learning	4
ENGR-UH 3411	Environmental Engineering	4
ENGR-UH 3530	Embedded Systems	4
ENGR-UH 3610	Signals and Systems	4
ENGR-UH 3611	Electronics	4
ENGR-UH 3720	Computer-Aided Design	2
ENGR-UH 3810	Quantitative Physiology	2
ENGR-UH 3811	Neuroengineering	4
ENGR-UH 3812	Laser and Optics in Medicine	4
ENGR-UH 3813	Nanobiotechnology	2
ENGR-UH 4112	Engineering Honors Research	2
ENGR-UH 4140	Mechatronics	3
ENGR-UH 4141	Fundamentals and Applications of MEMS	4
ENGR-UH 4142	Bio-sensors and Biochips	4
ENGR-UH 4145	Mechatronics Lab	1
ENGR-UH 4160	Selected Topics in Biomedical and Health Systems	2-4
ENGR-UH 4231	Membrane Science and Engineering	2
ENGR-UH 4330	Robotics	4

Science Electives

Code	Title	Credits
BIOL-UH 3116	Immunology	4
BIOL-UH 3121	RNA Biology	4
BIOL-UH 3122	Stem Cell Biology	4
BIOL-UH 3123	Introduction to Bioinformatics	4
BIOL-UH 3124	Developmental Biology	4
BIOL-UH 3130	Biophysics	4
BIOL-UH 3215	Microbiology	4
BIOL-UH 3220	Experimental Systems Biology & Complex Human Disorders	4
CHEM-UH 2010	Organic Chemistry 1	5
CHEM-UH 2201	Advanced Materials	4
CHEM-UH 3010	Organic Chemistry 2	3
CHEM-UH 3011	Physical Chemistry: Thermodynamics and Kinetics	4
CHEM-UH 3012	Physical Chemistry Laboratory: Thermodynamics and Kinetics	2
CHEM-UH 3020	Biochemistry: Macromolecular Structure and Function	4
CHEM-UH 3050	Organic Chemistry 2 Lab	2
ENGR-UH 3130	Quantitative Synthetic Biology	2
PHYS-UH 3219	Biological Physics: From single molecules to the cell	4
PSYCH-UH 3617EQ	Lab in Visual Neuroscience	4

Sample Plan of Study

Non-Premed

Course	Title	Credits
1st Semester/Term		
First-Year Writing Seminar		4
MATH-UH 1012Q	Calculus with Applications to Science and Engineering	4
ENGR-UH 1000	Computer Programming for Engineers	4
Core Competency		4
Physical Education		
	Credits	**16**
2nd Semester/Term		
ENGR-UH 1021	Design and Innovation	2
	Credits	**2**
3rd Semester/Term		
SCIEN-UH 1121EQ	Foundations of Science 1-2: Physics	1.5
SCIEN-UH 1122EQ	Foundations of Science 1-2: Chemistry	3
SCIEN-UH 1123EQ	Foundations of Science 1-2: Biology	1.5
SCIEN-UH 1124C	Foundations of Science 2 Lab: Chemistry	1
SCIEN-UH 1124P	Foundations of Science 1 Lab: Physics	1
MATH-UH 1020Q	Multivariable Calculus with Applications to Science and Engineering	4
Colloquia		4
	Credits	**16**
4th Semester/Term		
MATH-UH 1022Q	Linear Algebra	4
ENGR-UH 1801	Bioengineering Principles	2
ENGR-UH 2011	Engineering Statics	2
ENGR-UH 2012	Conservation Laws in Engineering	2
ENGR-UH 2013	Digital Logic	2
ENGR-UH 2017	Numerical Methods	2
ENGR-UH 2019	Circuits Fundamentals	2
Physical Education		
	Credits	**16**
5th Semester/Term		
Field Colloquia (J-Term)		3
	Credits	**3**
6th Semester/Term		
ENGR-UH 1010	Engineering Ethics	1
ENGR-UH 2710	Differential Equations for Engineers	4
ENGR-UH 2811	Biotransport Phenomena	2
SCIEN-UH 1341Q	Foundations of Science 3-4: Physics	3
SCIEN-UH 1342Q	Foundations of Science 3-4: Chemistry	3

SCIEN-UH 1343	Foundations of Science 3-4: Biology	2
SCIEN-UH 1344BE	Foundations of Science 4 Lab: Biology	1
SCIEN-UH 1344CE	Foundations of Science 3 Lab: Chemistry	1
	Credits	**17**
7th Semester/Term		
ENGR-UH 2010Q	Probability and Statistics for Engineers	2
ENGR-UH 2810	Biomechanics	2
ENGR-UH 2812	Bioimaging	2
ENGR-UH 2813	Bioinstrumentation	2
ENGR-UH 4810	Biomaterials	2
Core Competency		4
Major Elective		2
	Credits	**16**
8th Semester/Term		
Field Colloquia (J-Term)		3
	Credits	**3**
9th Semester/Term		
Major Elective		3
Major Elective		3
Major Elective		4
Major Elective		4
	Credits	**14**
10th Semester/Term		
ENGR-UH 4011	Senior Design Capstone Project I	2
Major Elective		3
Major Elective		4
Core Competency		4
	Credits	**13**
11th Semester/Term		
ENGR-UH 4020	Senior Design Capstone Project II	4
CHEM-UH 3101	Physical Chemistry for the Life Sciences	2
Major Elective		2
Core Competency		4
	Credits	**12**
	Total Credits	**128**

Pre-med

Students who wish to pursue post-graduate medical studies (pre-med track) should complete CHEM-UH 2010 Organic Chemistry 1 and CHEM-UH 3010 Organic Chemistry 2 as part of their Bioengineering Science Electives. Foundations of Science 5-6 are prerequisite for enrollment to CHEM-UH 2010 and CHEM-UH 3010, but do not count toward Bioengineering major requirements.

Course	Title	Credits
1st Semester/Term		
First-Year Writing Seminar		4
MATH-UH 1012Q	Calculus with Applications to Science and Engineering	4
ENGR-UH 1000	Computer Programming for Engineers	4
Core Competency		4
Physical Education		
	Credits	**16**
2nd Semester/Term		
ENGR-UH 1021	Design and Innovation	2
	Credits	**2**
3rd Semester/Term		
MATH-UH 1020Q	Multivariable Calculus with Applications to Science and Engineering	4
SCIEN-UH 1121EQ	Foundations of Science 1-2: Physics	1.5
SCIEN-UH 1122EQ	Foundations of Science 1-2: Chemistry	3
SCIEN-UH 1123EQ	Foundations of Science 1-2: Biology	1.5
SCIEN-UH 1124C	Foundations of Science 2 Lab: Chemistry	1
SCIEN-UH 1124P	Foundations of Science 1 Lab: Physics	1
Colloquium		4
	Credits	**16**
4th Semester/Term		
MATH-UH 1022Q	Linear Algebra	4
ENGR-UH 1801	Bioengineering Principles	2
ENGR-UH 2011	Engineering Statics	2
ENGR-UH 2012	Conservation Laws in Engineering	2
ENGR-UH 2013	Digital Logic	2
ENGR-UH 2017	Numerical Methods	2
ENGR-UH 2019	Circuits Fundamentals	2
Physical Education		
	Credits	**16**
5th Semester/Term		
Field Colloquia (J-Term)		3
	Credits	**3**
6th Semester/Term		
ENGR-UH 2710	Differential Equations for Engineers	4
ENGR-UH 2811	Biotransport Phenomena	2
ENGR-UH 1010	Engineering Ethics	1
SCIEN-UH 1341Q	Foundations of Science 3-4: Physics	3
SCIEN-UH 1342Q	Foundations of Science 3-4: Chemistry	3
SCIEN-UH 1343	Foundations of Science 3-4: Biology	2
SCIEN-UH 1344BE	Foundations of Science 4 Lab: Biology	1
SCIEN-UH 1344CE	Foundations of Science 3 Lab: Chemistry	1
	Credits	**17**
7th Semester/Term		
ENGR-UH 2010Q	Probability and Statistics for Engineers	2
ENGR-UH 2813	Bioinstrumentation	2
SCIEN-UH 1561Q	Foundations of Science 5-6: Physics	3
SCIEN-UH 1563	Foundations of Science 5-6: Biology	3
SCIEN-UH 1564BE	Foundations of Science 5 Lab: Biology	1
SCIEN-UH 1564EP	Foundations of Science 6 Lab: Physics	1
Core Competency		4
	Credits	**16**
8th Semester/Term		
Field Colloquia (J-Term)		3
	Credits	**3**
9th Semester/Term		
CHEM-UH 2010	Organic Chemistry 1	5
BioE: Engineering Elective		4
BioE: Engineering Elective		3
BioE: Engineering Elective		3
	Credits	**15**
10th Semester/Term		
ENGR-UH 4011	Senior Design Capstone Project I	2
ENGR-UH 2810	Biomechanics	2
ENGR-UH 2812	Bioimaging	2
ENGR-UH 4810	Biomaterials	2
CHEM-UH 3010 & CHEM-UH 3050	Organic Chemistry 2 and Organic Chemistry 2 Lab	5
Core Competency		4
	Credits	**17**
11th Semester/Term		
ENGR-UH 4020	Senior Design Capstone Project II	4
CHEM-UH 3101	Physical Chemistry for the Life Sciences	2
BioE: Engineering Elective		2
Core Competency		4
	Credits	**12**
	Total Credits	**133**

Learning Outcomes

Upon graduation, NYU Abu Dhabi Bioengineering students will possess:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Policies

Program Policies

Foundations of Science Grading Policy

While each level of Foundations of Science is an integrated course, separate grades are provided for various components as a means to allow students to document their completion of the specific disciplinary and laboratory content that makes up these courses. Consistent with this integrated approach, students must earn an average grade of C for the components of each level of Foundations of Science to continue into the next level or to use the course to satisfy the prerequisites for other courses outside of Foundations of Science. Additionally, students majoring in biology, chemistry, or physics, must have grades of at least C in all Foundations of Science components in their specific, respective major fields. Finally, although continuation into other courses is based on the average performance in each level of Foundations of Science, students earn academic credits only for those graded components they pass or, for students subject to the transcript policy (see Academic Policies), only for those components with grades of at least C−. The number of earned credits for Foundations of Science components is particularly important for all engineering majors who must earn at least 16 credits in science.

NYU Abu Dhabi Policies

A full list of relevant policies can be found on NYU Abu Dhabi's undergraduate academic policies page (https://bulletins.nyu.edu/undergraduate/abu-dhabi/academic-policies/).

NYU Policies

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