CHEMICAL AND BIOMOLECULAR ENGINEERING (BS)

Department Website (https://engineering.nyu.edu/academics/departments/chemical-and-biomolecular-engineering/)

NYSED: 08796 **HEGIS:** 0906.00 **CIP:** 14.0701

Program Description

The undergraduate program in Chemical and Biomolecular Engineering (CBE) leads to rewarding, impactful careers in industries that span chemical, pharmaceutical, consumer products, materials, and related fields. The CBE major also provides excellent preparation for graduate studies in engineering, medicine, business, and law. It introduces students to a discipline that applies broad scientific and engineering principles to the understanding and design of processes ranging from molecular to manufacturing scale, based on thorough grounding in mathematics and the sciences, including physics, chemistry, and biology. Students in the program learn how to transform raw material and energy resources into valuable products needed by society with emphasis on making such processes sustainable, environmentally friendly, economical, and safe. They develop expertise in subjects that include thermodynamics, reaction kinetics, fluid mechanics, heat and mass transport, as well as the instrumentation and processes encountered in manufacturing and R & D settings. The curriculum culminates in a capstone design project, and includes a year-long laboratory that introduces students to both classic and modern aspects of chemical engineering operations.

The undergraduate program leads to a Bachelor of Science in Chemical and Biomolecular Engineering and is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

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

The program requires the completion of 128 credits, comprised of the following:

Course	Title	Credits
General Education Requirements		
EXPOS-UA 1	Writing as Inquiry	4
EXPOS-UA 22	Advanced Writing for Engineers	4
Humanities and Social Science Electives (four 4-credit courses, for a total of 16 credits)		16
Major Requirements		
Engineering		
EG-UY 1004	Introduction to Engineering and Design	4
Mathematics		
MA-UY 1024	Calculus I for Engineers	4
MA-UY 1124	Calculus II for Engineers	4
MA-UY 2034	Linear Algebra and Differential Equations	4
MA-UY 2114	Calculus III: Multi-Dimensional Calculus	4
Chemistry		
CM-UY 1003	General Chemistry for Engineers	3
CM-UY 1001	General Chemistry for Engineers Laboratory	1
CM-UY 2213	Organic Chemistry I	3
CM-UY 3714	Physical Chemistry I	4
CM-UY 2223	Organic Chemistry II	3
Biology		
BMS-UY 1003	Introduction to Cell and Molecular Biology	3
BMS-UY 1001	Introduction to Cell and Molecular Biology Laboratory	1
Chemical & Biomolecular Engineering		
CBE-UY 1002	Introduction to Chemical & Biomolecular Engineering (recommended, but not required) [1]	2
CBE-UY 2124	Analysis of Chemical and Biomolecular Processes	4
CBE-UY 2233	Chemical Engineering Computation	3
CBE-UY 3153	Chemical and Biomolecular Engineering Thermodynamics	3
CBE-UY 3313	Transport I	3
CBE-UY 3173	Polymeric Materials	3
CBE-UY 3233	Chem & Biomolecular Eng Separations	3
CBE-UY 3223	Kinetics and Reactor Design	3
CBE-UY 3323	Transport II	3
CBE-UY 4113	Engineering Laboratory I	3
CBE-UY 4143	Process Dynamics and Control	3
CBE-UY 4163	Chemical and Biomolecular Process Design I	3
CBE-UY 4213	Engineering Laboratory II	3
CBE-UY 4223	Biochemical Engineering	3
CBE-UY 4263	Chemical and Biomolecular Process Design II	3
Physics		
PH-UY 1013	Mechanics	3
PH-UY 2023	Electricity, Magnetism, & Fluids	3
PH-UY 2033	Waves, Optics, & Thermodynamics	3
PH-UY 2121	General Physics Laboratory I	1
PH-UY 2131	General Physics Laboratory II	1
Electives		
Other Elective Credits		12
Total Credits		**128**

[1] Students who complete this course in the first year can count it as part of the 12 credits of free electives.

Required Safety Trainings

CBE majors in their sophomore year must complete initial safety training provided by NYU's Office of Research and Laboratory Safety. There are three mini courses that must be completed:

1. Lab Safety
2. Hazardous Waste
3. Bloodborne Pathogens

Students must show proof of completion (certificate) that they completed the training to their advisor during the sophomore spring advisement meeting as part of removing the registration hold. In their junior fall they must take the corresponding refresher courses for all three topics, and present proof of completion at the junior spring advising meeting.

Sample Plan of Study

Course	Title	Credits
1st Semester/Term		
MA-UY 1024	Calculus I for Engineers	4
CM-UY 1003	General Chemistry for Engineers	3
CM-UY 1001	General Chemistry for Engineers Laboratory	1
EXPOS-UA 1	Writing as Inquiry	4
EG-UY 1004	Introduction to Engineering and Design	4
	Credits	**16**
2nd Semester/Term		
MA-UY 1124	Calculus II for Engineers	4
BMS-UY 1003	Introduction to Cell and Molecular Biology	3
BMS-UY 1001	Introduction to Cell and Molecular Biology Laboratory	1
CBE-UY 1002	Introduction to Chemical & Biomolecular Engineering (recommended, but not required)	2
EXPOS-UA 22	Advanced Writing for Engineers	4
PH-UY 1013	Mechanics	3
	Credits	**15**
3rd Semester/Term		
CM-UY 2213	Organic Chemistry I	3
CBE-UY 2124	Analysis of Chemical and Biomolecular Processes	4
MA-UY 2034	Linear Algebra and Differential Equations	4
PH-UY 2023	Electricity, Magnetism, & Fluids	3
PH-UY 2121	General Physics Laboratory I	1
	Credits	**15**
4th Semester/Term		
CM-UY 3714	Physical Chemistry I	4
CM-UY 2223	Organic Chemistry II	3
MA-UY 2114	Calculus III: Multi-Dimensional Calculus	4
CBE-UY 2233	Chemical Engineering Computation	3
PH-UY 2033	Waves, Optics, & Thermodynamics	3
PH-UY 2131	General Physics Laboratory II	1
	Credits	**18**
5th Semester/Term		
CBE-UY 3153	Chemical and Biomolecular Engineering Thermodynamics	3
CBE-UY 3313	Transport I	3
CBE-UY 3173	Polymeric Materials	3
Humanities and Social Sciences Elective		4
Free Elective		3
	Credits	**16**
6th Semester/Term		
CBE-UY 3233	Chem & Biomolecular Eng Separations	3
CBE-UY 3223	Kinetics and Reactor Design	3
CBE-UY 3323	Transport II	3
Free Elective		3
Humanities and Social Sciences Elective		4
	Credits	**16**
7th Semester/Term		
CBE-UY 4113	Engineering Laboratory I	3
CBE-UY 4143	Process Dynamics and Control	3
CBE-UY 4163	Chemical and Biomolecular Process Design I	3
Free Elective		3
Humanities and Social Sciences Elective		4
	Credits	**16**
8th Semester/Term		
CBE-UY 4213	Engineering Laboratory II	3
CBE-UY 4223	Biochemical Engineering	3
CBE-UY 4263	Chemical and Biomolecular Process Design II	3
Free Elective		3
Humanities and Social Sciences Elective		4
	Credits	**16**
	Total Credits	**128**

Learning Outcomes

Upon successful completion of the program, graduates will have:

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.
8. An ability to analyze and design chemical and biomolecular processes and systems.

Program Educational Objectives

The Chemical and Biomolecular Engineering program prepares graduates who:

1. Creatively apply their knowledge and skills to a broad range of contemporary pursuits, taking into account industrial, environmental, economic, safety, global, diversity, and ethical considerations;
2. Apply their technical, communication, and problem-solving skills to the pursuit of careers in the chemical, biochemical, energy and related industries or;
3. Pursue advanced study in graduate programs in chemical engineering and related fields, and in professional programs such as medicine, business, and law;
4. Work both independently and collaboratively to manage complex technical projects;
5. Provide innovation, leadership, and inspiration in their chosen field, continually augmenting their understanding and expertise through formal and informal education.

Policies

Program Policies

GPA and Grade Policy

In addition to the NYU Tandon requirement of a 2.0 GPA or better for graduation, students must also meet the department's academic standards. For chemical and biomolecular engineering students to advance to senior-year, they must maintain a minimum average GPA of 2.5 in courses CBE-UY 2124 Analysis of Chemical and Biomolecular Processes, CBE-UY 3153 Chemical and Biomolecular Engineering Thermodynamics, CBE-UY 3313 Transport I, CBE-UY 3233 Chem & Biomolecular Eng Separations, CBE-UY 3223 Kinetics and Reactor Design and CBE-UY 3323 Transport II. The same course must not be failed twice. Students who fail to meet these requirements are not allowed to register for senior courses. All listed prerequisites must be satisfied before students may enroll in CBE courses. In addition, students need a grade of B- or better in their first college level mathematics course (typically MA-UY 1024 Calculus I for Engineers) for registering into the sophomore course CBE-UY 2124 Analysis of Chemical and Biomolecular Processes. Should the above requirements not be met, students must meet with their faculty advisor to formulate an individual remedial plan. Typically, one or more courses will need to be retaken until the missing requirement is satisfied, possibly leading to a delayed graduation.

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/undergraduate/engineering/academic-policies/).