BIOENGINEERING MAJOR (B.S.)

https://ceps.unh.edu/chemical-engineering/bioengineering-bs

Description

Bioengineering, as defined by the NIH, is "the application of life sciences, mathematics, and engineering principles to define and solve problems in biology, medicine, health care, and other fields."

The bioengineering program will train graduates in biology and physiology as well as engineering. The program will provide graduates with capabilities in advanced mathematics (including differential equations and statics), science, and engineering. Graduates will be conversant with solving problems at the interface of biology and engineering that may arise in the fields of biotechnology and pharmaceuticals, as well as medicine and biofuels. By graduation, students will have experience measuring and interpreting data from living systems and addressing the interactions between living and non-living materials.

Students are required to obtain a minimum 2.0 grade-point average in CHE 501 Introduction to Chemical Engineering I/CHE 502 Introduction to Chemical Engineering II and in overall standing at the end of the sophomore year in order to continue in the major. Study abroad (Exchange) students are required to have a cumulative GPA of 3.0 or better in math, physics, chemistry, and other required courses at the end of the semester prior to their exchange semester.

For more information on the bioengineering program, please contact Russell Carr, professor and chair, Russell.Carr@unh.edu.

Requirements

Major Requirements

Code	Title	Credits
BENG 763	Bioengineering Design I	2
BENG 764	Bioengineering Design II	4
BENG 766	Biomaterials	4
BMCB 658 & BMCB 659	General Biochemistry and General Biochemistry Lab	5
BMS 503	General Microbiology	3
BMS 504	General Microbiology Laboratory	2
BIOL 410	Principles of Molecular and Cellular Biology	3
CHE 400	Chemical Engineering Lectures	1
CHE 501	Introduction to Chemical Engineering I	3
CHE 502	Introduction to Chemical Engineering II	3
CHE 601	Fluid Mechanics and Unit Operations	3
CHE 604	Chemical Engineering Thermodynamics	3
CHE 614	Separation Processes	3
CHE 761	Biochemical Engineering	4
CHE 762	Biomedical Engineering	4
CHEM 405	Chemical Principles for Engineers	4
CHEM 545 & CHEM 546	Organic Chemistry and Organic Chemistry Laboratory	5
GEN 604	Principles of Genetics	4
MATH 425	Calculus I	4
MATH 426	Calculus II	4
MATH 527	Differential Equations with Linear Algebra	4
MATH 644	Statistics for Engineers and Scientists	4
PHYS 407	General Physics I	4
BMS 508	Human Anatomy and Physiology II	4
Electives		
Select five courses from the following: [1]		
BENG 620	Tissue Engineering Cell Culture Laboratory [1]	
BENG 755	Computational Molecular Bioengineering [1]	
BMCB 753	Cell Culture [1]	
BMS 702	Endocrinology	
BMS 704	Pathologic Basis of Disease	
BMS 706 & BMS 708	Virology and Virology Laboratory	
CEE 502	Project Engineering [1]	
CEE 724	Environmental Engineering Microbiology [1]	
CHE 602	Heat Transfer and Unit Operations [1]	
CHE 603	Applied Mathematics for Chemical Engineers [1]	
CHE 651	Biotech Experience/Biomanufacturing [1]	
CHE 703	Mass Transfer and Stagewise Operations [1]	
CHE 722	Introduction to Microfluidics [1]	
CHE 752	Process Dynamics and Control [1]	
ECE 537	Introduction to Electrical Engineering [1]	
ECE 784	Biomedical Instrumentation [1]	
GEN 711	Genomics and Bioinformatics	
or GEN 711W	Genomics and Bioinformatics	
GEN 712	Programming for Bioinformatics	
GEN 717	Molecular Microbiology	
GEN 771	Molecular Genetics	
GEN 774	Techniques in Plant Genetic Engineering and Biotechnology [1]	
Total Credits		84

[1] At least four of the elective courses must be engineering.

Degree Plan

Course	Title	Credits
First Year		
Fall		
CHE 400	Chemical Engineering Lectures	1
MATH 425	Calculus I [1]	4
CHEM 405	Chemical Principles for Engineers [2]	4
BIOL 410	Principles of Molecular and Cellular Biology	3
Discovery Program Elective (1)		4
	Credits	16
Spring		
MATH 426	Calculus II	4
GEN 604	Principles of Genetics	4

PHYS 407	General Physics I	4
ENGL 401	First-Year Writing [3]	4
	Credits	16
Second Year		
Fall		
CHE 501	Introduction to Chemical Engineering I	3
MATH 527	Differential Equations with Linear Algebra	4
CHEM 545	Organic Chemistry	3
CHEM 546	Organic Chemistry Laboratory	2
Discovery Program Elective (1)		4
	Credits	16
Spring		
CHE 502	Introduction to Chemical Engineering II	3
MATH 644	Statistics for Engineers and Scientists	4
Discovery Program Elective (1)		4
BMS 503	General Microbiology	3
BMS 504	General Microbiology Laboratory	2
	Credits	16
Third Year		
Fall		
CHE 601	Fluid Mechanics and Unit Operations	3
BENG 766	Biomaterials	4
BMCB 658	General Biochemistry	3
BMCB 659	General Biochemistry Lab	2
Bioengineering Program Elective		4
	Credits	16
Spring		
CHE 604	Chemical Engineering Thermodynamics	3
CHE 761	Biochemical Engineering	4
BMS 508	Human Anatomy and Physiology II	4
Bioengineering Program Elective		4
	Credits	15
Fourth Year		
Fall		
BENG 763	Bioengineering Design I	2
BENG 762	Biomedical Engineering	4
Discovery Program Elective (1)		4
Bioengineering Program Electives (2)		8
	Credits	18
Spring		
BENG 764	Bioengineering Design II	4
CHE 614	Separation Processes	3
Discovery Program Elective (1)		4
Bioengineering Program Elective (1)		4
	Credits	15
	Total Credits	128

[1] MATH 425 Calculus I satisfies the Discovery Foundation Quantitative Reasoning category.

[2] CHEM 405 Chemical Principles for Engineers satisfies the Discovery Physical Science (with lab) category.

[3] ENGL 401 First-Year Writing satisfies the Discovery Foundation Writing Skills category.

34 credits engineering, 16 credits math, 14 credits chemistry, 16 credits life science

Five electives: 15 to 16 credits engineering; 4 credits science, math, or engineering