

BIOLOGICAL ENGINEERING BACHELOR OF SCIENCE

Leading to the Bachelor of Science Degree in Biological Engineering

Program Mission Statement

The mission of the Biological Engineering program is to prepare students to become practicing engineers/scientists, who will go on to be innovative problem solvers in medicine, industry, government, and academia.

Program Overview

Biological engineering is at the leading edge of emerging engineering disciplines, applying the engineering principles of analysis, synthesis, and design to biology at the molecular and cellular levels to create new products and processes. By understanding biological functions at the fundamental level, and how systems and processes are structured, new technologies, materials, and systems can be created to improve quality of life through a broad array of sectors from health care to the environment. The Biological Engineering program provides opportunities for students who wish to study engineering, but also want to study biology because it is the fundamental building block of life sciences. This program opens opportunities for students to study science and engineering and apply the principles of each area while working with diverse applications involving living organisms.

Program Educational Objectives

Within three to five years after graduation, graduates of the Biological Engineering program will:

- Effectively contribute to the profession of Biological Engineering or related professional fields.
- Demonstrate leadership in their chosen fields and make decisions that are socially and ethically responsible.
- Collaborate within their chosen profession and across technical disciplines.
- Further their education either through directed or independent studies to advance personally and professionally.

Student Outcomes

By the time of graduation, students enrolled in the Biological Engineering program will be able to demonstrate the following outcomes:

1. An ability to identify, formulate, and resolve complex engineering problems by applying principles of engineering, science and mathematics.
2. An ability to apply engineering design to produce solutions that meet specific 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 function effectively on a team whose members together provide leadership, create collaborative and inclusive environment, and societal contexts.
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.

Total credits for degree: 132

This is a four-year program, starting in the fall of the student's first year and ending in the summer semester of the student's fourth year.

Biological Engineering (BSBE)

Course	Title	Credits
Freshman Year		
Fall Semester		
ENGR1000	INTRODUCTION TO ENGINEERING	3
CHEM1100	GENERAL CHEMISTRY I	4
MATH1750	ENGINEERING CALCULUS I	4
PHYS1250	ENGINEERING PHYSICS I	4
English Sequence		4
	Credits	19
Spring Semester		
BIOL1100	CELL & MOLECULAR BIOLOGY	4
ENGR1500	INTRODUCTION TO ENGINEERING DESIGN	3
ENGR1600	FUNDAMENTALS OF CAD & CAM	1
ENGR1800	PROGRAMMING WITH MATLAB	1
MATH1850	ENGINEERING CALCULUS II	4
English Sequence		4
	Credits	17
Sophomore Year		
Fall Semester		
BIOL2200	ADVANCED MOLECULAR BIOLOGY	4
BIOE2000	FUNDAMENTALS OF BIOLOGICAL ENGINEERING	4
MATH2500	DIFFERENTIAL EQUATIONS	4
PHYS1750	ENGINEERING PHYSICS II	4
	Credits	16
Spring Semester		
BIOE2100	BIOSTATISTICS FOR BIOENGINEERS	4
BIOE2500	BIOLOGICAL INSTRUMENTATION & MEASUREMENT	4
CHEM1600	GENERAL CHEMISTRY II	4
HSS Elective		4
	Credits	16
Summer Semester		
COOP3000	PRE CO-OP WORK TERM (OPTIONAL) (Optional)	0
	Credits	0
Junior Year		
Fall Semester		
BIOE3500	GENETICS AND TRANSGENICS	4

Course	Title	Credits
CHEM2500	ORGANIC CHEMISTRY I	4
Biological Engineering Elective/EPIC		4
HSS Elective		4
Credits		16
Spring Semester		
COOP3500	COOP EDUCATION 1	
Credits		0
Summer Semester		
BIOE3025	BIOMATERIALS & TISSUE ENGINEERING	4
BIOE3550	UNIT OPERATIONS & PROCESS CONTROL	4
CHEM3550	BIOCHEMISTRY	4
HSS Elective		4
Credits		16
Senior Year		
Fall Semester		
COOP4500	COOP EDUCATION 2	
Credits		0
Spring Semester		
BIOL3200	CELL PHYSIOLOGY & SIGNALING	4
BIOE4500	BIOTRANSPORT PHENOMENA	4
ENGR5000	ENGINEERING SENIOR DESIGN I	4
HSS Elective		4
Credits		16
Summer Semester		
BIOL4400	SYNTHETIC BIOLOGY	4
ENGR5500	ENGINEERING SENIOR DESIGN II	4
Biological Engineering Elective/EPIC		4
HSS Elective		4
Credits		16
Total Credits		132