

# BIOLOGICAL ENGINEERING BACHELOR OF SCIENCE

## Leading to the Bachelor of Science Degree in Biological Engineering

The Bachelor of Science in Biological Engineering program is accredited by the Engineering Accreditation Commission of ABET (<http://www.abet.org> (<http://www.abet.org/>)).

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 seek to study engineering and 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

Graduates of the biological engineering program will (within a few years of graduation):

- Effectively contribute to the profession of Biological Engineering or related professional fields.
- Demonstrate leadership and accountability in their chosen fields and make decisions that are socially and ethically responsible.
- Demonstrate personal and professional growth through self-directed or independent studies.

### Student Outcomes

Students from the biological engineering program will attain (by the time of graduation):

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: 128

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.

Course	Title	Credits
<b>Freshman Year</b>		
<b>Fall Semester</b>		
ENGR1100	INTRODUCTION TO ENGINEERING EXPERIENCE	2
ENGR1201	ENGINEERING LABORATORY-BSBE	2
CHEM1100	GENERAL CHEMISTRY I	4
MATH1776	CALCULUS 1A	2
MATH1777	CALCULUS 1B	2
English Sequence*		4
<b>Credits</b>		<b>16</b>
<b>Spring Semester</b>		
ENGR1300	FIRST-YEAR ENGINEERING DESIGN	2
ENGR1401	APPLIED ENGINEERING ANALYSIS-BSBE	2
BIOL1100	CELL & MOLECULAR BIOLOGY	4
MATH1876	CALCULUS 2A	2
MATH1877	CALCULUS 2B	2
English Sequence*		4
<b>Credits</b>		<b>16</b>
<b>Sophomore Year</b>		
<b>Fall Semester</b>		
BIOE2000	FUNDAMENTALS OF BIOLOGICAL ENGINEERING	4
BIOL2200	ADVANCED MOLECULAR BIOLOGY	4
MATH2500	DIFFERENTIAL EQUATIONS	4
PHYS1250	ENGINEERING PHYSICS I	4
<b>Credits</b>		<b>16</b>
<b>Spring Semester</b>		
BIOE2100	BIOSTATISTICS FOR BIOENGINEERS	4
BIOE2500	BIOLOGICAL INSTRUMENTATION & MEASUREMENT	4
CHEM1600	GENERAL CHEMISTRY II	4
HSS Elective*		4
<b>Credits</b>		<b>16</b>
<b>Summer Semester</b>		
COOP3000	PRE CO-OP WORK TERM (OPTIONAL) (Optional)	0
<b>Credits</b>		<b>0</b>
<b>Junior Year</b>		
<b>Fall Semester</b>		
BIOE3500	GENETICS AND TRANSGENICS	4
CHEM2500	ORGANIC CHEMISTRY I	4
PHYS1750	ENGINEERING PHYSICS II	4
HSS Elective*		4
<b>Credits</b>		<b>16</b>

Course	Title	Credits
<b>Spring Semester</b>		
COOP3500	COOP EDUCATION 1	
	<b>Credits</b>	<b>0</b>
<b>Summer Semester</b>		
BIOE3025	BIOMATERIALS & TISSUE ENGINEERING	4
BIOE3550	UNIT OPERATIONS & PROCESS CONTROL	4
CHEM3550	BIOCHEMISTRY	4
HSS Elective*		4
	<b>Credits</b>	<b>16</b>
<b>Senior Year</b>		
<b>Fall Semester</b>		
COOP4500	COOP EDUCATION 2	
	<b>Credits</b>	<b>0</b>
<b>Spring Semester</b>		
BIOE4000	CELL PHYSIOLOGY AND SIGNALING	4
BIOE4500	BIOTRANSPORT PHENOMENA	4
ENGR5000	ENGINEERING SENIOR DESIGN I	4
BIOE Elective		4
	<b>Credits</b>	<b>16</b>
<b>Summer Semester</b>		
BIOE4400	SYNTHETIC BIOLOGY	4
ENGR5500	ENGINEERING SENIOR DESIGN II	4
BIOE Elective		4
HSS Elective*		4
	<b>Credits</b>	<b>16</b>
	<b>Total Credits</b>	<b>128</b>

**ENGL/HSS Note**

Students are required to complete:

- At least one course in Humanities
- At least one course in the Social Sciences
- The remaining course from either the Humanities or Social Sciences category.

Students with a three English course sequence may use the third English course to satisfy a Humanities requirement.

A minimum of 20 credits total, including English, humanities, and social science credit, is required to complete the humanities and social sciences graduation requirement.