

# BACHELOR OF SCIENCE IN BIOPROCESS ENGINEERING

The [bioprocess engineering program](#) prepares students for careers as engineers in the bioprocess or biotechnology industry filling positions that are typically filled by chemical engineers with additional training. The bioprocess engineering program seeks to educate engineers versed in the chemical engineering fields in biologics / biopharmaceutical, bioprocess, biotechnology, biochemical and bioenergy, with a focus on developing products from sustainable sources in a sustainable manner or through the applications of green chemistry. The bioprocess engineering program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org> following the criteria of Chemical, Biochemical, Biomolecular and Similarly Named Engineering Programs since 2012 (<https://www.aiche.org/abet-accredited-universities>).

Students gain valuable experience through a capstone-design experience in which they work on significant problems in the design and implementation of new technologies. In addition, a summer internship is required of all students during which they gain valuable skills and experience in terms of technical knowledge and professional development. Both of these experiences serve to integrate the knowledge gained in their coursework with real-world work experiences commonly seen in their first positions after graduation.

The curriculum consists of a number of categories of courses. The general education component, which is required of all ESF students, broadens the students' perspectives on global and societal issues, an important component of any education. Students also take a number of courses in math and the basic sciences—chemistry, physics, and biology—to provide the background for the courses that prepare students for engineering practice. The engineering courses cover a variety of topics that are traditional for a chemical engineering program, supplemented with courses specific to bioprocess engineering. The moderate requirement of 128 credits hour allows room for students to supplement more courses at their own desire (no limitation on free electives).

Students may be admitted to the bioprocess engineering program as first-year students with appropriate science backgrounds from their high school or as transfer students at any level with accommodations for coursework requirements. Students who have the associate degree in engineering science, chemical technology, biological sciences, or general science and mathematics are encouraged to apply as transfer students.

## *Lower Division Required Courses*

APM 205	Calculus I:Science & Engr	4
APM 206	Calculus II:Science & Engr	4
APM 307	Multivariable Calculus	4
APM 485	Diff Equat/Engr&Scientist	3
ECH 132	Orientatn&Intro to Chem Eng I	1
ECH 133	Orientatn&Intro to Chem Eng II	1
BPE 300	Intro/Industrial Bioprocessing	3

EFB 103	Gen Bio II:Cell Bio & Genetics	3
EFB 104	General Biology II Laboratory	1
EWP 190	Writing And The Envrnment	3
EWP 290	Research Writing & Humanities	3
FCH 150	General Chemistry I	3
FCH 151	General Chemistry I Lab	1
FCH 152	General Chemistry II	3
FCH 153	General Chemistry II Lab	1
FCH 221	Organic Chemistry 1	3
FCH 222	Organic Chemistry Lab 1	1
FOR 207	Introduction To Economics	3
GNE 160	Comp Methods/Engrs&Scientists	3
PHY 211	General Physics I	0 - 8
PHY 221	General Physics I Laboratory	0 - 8
PHY 212	General Physics II	0 - 8
PHY 222	General Physics II Laboratory	0 - 8
ECH 202	Prin Mass/Energy Balance	3
ECH 212	Engr Thermodynamics	3

## General Education Electives

Course Name	Codes*	Credits
General Education Course in one of the following categories: US History & Civic Engagement, The Arts, World History and Global Awareness, World Languages	G	3
General Education Course in Diversity, Equity, Inclusion and Social Justice	G	3

### Upper Division Required Courses

APM 395	Probability & Stats/Engr	3
	Professional Experience: BPE 498	
	BPE 304 + BPE 306	
ECH 312	Chemical Engrn Thermo&Colloids	3
ECH 322	Fluid Mechanics	3
BPE 321	Biomolecular Kinetics	3
ECH 323	Transport Phenomena	3
BPE 420	Bioseparations Engineering	3
BPE 421	Bioprocess Kinetics&System Eng	3
BPE 440	Bioproc Kinetics&Sys Engr Lab	3
BPE 450	Chemical&BPE Product Design	3
BPE 481	Bioprocess Eng Design	3
ESF 200	Information Literacy	1
EWP 444	Prof Writing/Paper&Bioproc Eng	2
ECH 324	Unit Operations Laboratory	3
ECH 355	Engr Design Economics	3
ECH 371	Process Control	3
EFB 325	Cell Biology	3

\*Professional experience: BPE304 must be taken in the summer + BPE306 in the after right after, while BPE498 can be taken in any semester.

## Directed Electives

13 credits out of the following.

Course Name	Codes*	Credits
Science Electives		3 - 6
Junior or higher Biology, Biochemistry, or Engineering Electives		7 - 10

The list of directed elective courses is available in the student handbook and from the student's advisor. Students are encouraged to select elective courses to focus on one concentration area from among the following: biomolecular engineering, biochemical engineering, biopolymer engineering, bioenergy engineering, biomaterials, environmental engineering, industrial engineering or paper engineering.

### **Internships, Co-ops, and Research Experiences**

Bioprocess engineering students enjoy the advantage of hands-on learning in the bioprocess and allied industries through faculty-guided internships and cooperative education (co-op) assignments. All students are required to complete an internship, co-op or research experience in the industry or in a research setting. Internships provide students with valuable experience and financial benefits. There is a two credit course following the Bioprocess Engineering experience to summarize the experience with a report and a presentation for completion of the internship.

**Total Minimum Credits For Degree: 128**

