Bachelor of Science in Bioprocess Engineering  
Department of Chemical Engineering

Summary of Changes

**Inserting DEISJ as the required general education requirement, replacing the one of the General Education electives in the program.**

Proposed Catalog Description

**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](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](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.

Undergraduate Program Requirements

**Lower Division Required Courses (62 credits)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>APM 205</td>
<td>Calculus I</td>
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</tbody>
</table>
APM 206  Calculus II G,M 4  
APM 307  Multivariable Calculus M 4  
APM 485  Differential Equations for Engineers and Scientists M 3  
ECH 132  Orientation and Introduction to Chemical Engineering I ES 1  
ECH 133  Introduction to Chemical Engineering II ES 1  
BPE 300  Intro to Bioprocess Engineering ENG 3  
EWP 190  Writing and the Environment G 3  
EWP 290  Writing, Humanities, and the Environment G 3  
EFB 103  General Biology II G,NS 3  
EFB 104  General Biology II lab G,NS 1  
FCH 150  General Chemistry I G,NS 3  
FCH 151  General Chemistry Laboratory I G,NS 1  
FCH 152  General Chemistry II G,NS 3  
FCH 153  General Chemistry Laboratory II G,NS 1  
FCH 221  Organic Chemistry I NS 3  
FCH 222  Organic Chemistry Laboratory I NS 1  
FOR 207  Introduction to Economics G 3  
GNE 160  Computing Methods PE 3  
PHY 211  General Physics I G,NS 3  
PHY 221  General Physics Laboratory I NS 1  
PHY 212  General Physics II G,NS 3  
PHY 222  General Physics Laboratory II NS 1  
ECH 202  Principles of Mass & Energy Balances ENG 3  
ECH 212  Engineering Thermodynamics ENG 3  

Electives (3 credits, choose one from below)  
- United States History and Civic Engagement G 3  
- World History and Global Awareness G 3  
- The Arts G 3  
- World Languages G 3-4  

Upper Division Required Courses (47 credits)  
APM 395  Probability and Statistics for Engineers ES 3  
Professional Experience: BPE 498 or BPE 304 + BPE 306 ENG 2*  
ECH 312  Chemical Engineering Thermodynamics & Colloids ES 3  
ECH 322  Fluid Mechanics ENG 3  
BPE 321  Biomolecular Kinetics ENG 3  
BPE 420  Bioseparations ENG 3  
BPE 421  Bioprocess Kinetics and Systems Engineering ENG 3  
BPE 440  Bioprocess and Systems Engineering Laboratory ENG 3  
BPE 450  Bioprocess Engineering Product Design ENG 3  
BPE 481  Bioprocess Engineering Design ENG 3  
EWP 444  Writing for Science Professionals 2  
ESF 200  Information Literacy 1  
ECH 322  Transport Phenomena ENG 3  

DEISJ  G 3
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Department</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECH 324</td>
<td>Process Operations Laboratory</td>
<td>ENG</td>
<td>3</td>
</tr>
<tr>
<td>ECH 355</td>
<td>Engineering Design Economics</td>
<td>ENG</td>
<td>3</td>
</tr>
<tr>
<td>ECH 371</td>
<td>Process Control</td>
<td>ENG</td>
<td>3</td>
</tr>
<tr>
<td>EFB 325</td>
<td>Cell Biology</td>
<td>NS</td>
<td>3</td>
</tr>
</tbody>
</table>

*Professional experience: BPE 304 must be taken in the summer + BPE 306 in the after right after, while BPE 498 can be taken in any semester.

**Directed Electives (13 credits)**

- Science 3 - 6
- Junior or higher Biology, Biochemistry, or Engineering Electives 7 - 10

**TOTAL MINIMUM CREDITS FOR THE DEGREE** 128