This minor prepares students for careers in the field of bioprocess engineering, which includes pharmaceutical engineering and manufacturing, and agricultural engineering and processing. Biological processes are being increasingly utilized by major chemical, pharmaceutical, and food manufacturers, creating a strong demand for graduates with expertise in this area. The students who are interested in this program are those who want to work in bio-related organizations, including the largest chemical and pharmaceutical companies in the world, several of which are based in Michigan.

Required credits: 18cr
Required classes: See other side
## Interdisciplinary Minor in Bioprocess Engineering (IMBE)

**Department of Chemical Engineering and Biological Sciences**

**Credits Required:** 18

*Topic must be approved by academic advisor*

### Student Name and ID Number

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<td><strong>Total Credits Required = 18</strong></td>
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### Required Engineering Course (Select one course, 3 credits)

- **CM 2110 Fund of Chem Engg I (3)** *(Prereqs: CH1112 or (CH1150 and CH1151))*
- **CM 2200 Intro to Minerals and Materials (3)** *(Prereqs: none)*
- **CEE 3501 Env Engg Fundamentals (3)** *(Prereqs: MA2160 and CH1112 or (CH1150 and CH1151))*
- **CEE 3503 Environmental Engineering (3)** *(Prereqs: MA2160 and CH1112 or (CH1150 and CH1151))*

### Required Biochemistry Course (Select one course, 3 credits)

- **BL 2100 Principles of Biochemistry (3)** *(Prereqs: BL1020 or BL1040 or (BE2400 and CH1112 or (CH1150 and CH1151)))*
- **CH 4710 Biomolecular Chemistry I (3)** *(Prereqs: CH2420)*

### Required Applied Biochemistry Courses (Select 3 or more courses)

- **CM 4710 Biochemical Processes (3)** *(Prereqs: CM3110(C))*
- **BL 4120 Environmental Remediation and Toxicology (3)** *(Prereqs: BL1020 or BL1040)*
- **BL 4220 Applied and Industrial Microbiology (3)** *(Prereqs: BL 3210 or BL3310)*

### Elective Courses (Select remaining credits from course list below, 3 - 9 Credits)

- **BL 3210 General Microbiology (4)** *(Prereqs: (BL1020 or BL1040) and (BL2100 or CH4710)) or BL 3310 Environmental Micorbiology (3)** *(Prereqs: BL1040 or BL3070 or BL3080)*
- **BL 4000 Research in Biology (1-6)** *(Prereqs: none)*
- **BL 4010 Biochemistry I (3)** *(Prereqs: (BL1020 or BL1040 or BL2010) and BL2100 and (CH2410 or CH2420))*
- **BL 4020 Biochemistry II (3)** *(Prereqs: BL4010)*
- **BL 4820 Biochem Lab Techniques I (2)** *(Prereqs: BL4010(C) or CH4710(C))*
- **CH 4110 Pharmaceutical Chemistry: Drug Action (3)** *(Prereqs: BL4010 or CH4710)*
- **CH 4120 Pharmaceutical Chemistry: Drug Design (3)** *(Prereqs: CH 2420)*
- **CH 4140 Pharmaceutical Analysis (3)** *(Prereqs: CH2410)*
- **CH 4720 Biomolecular Chemistry II (3)** *(Prereqs: BL4010 or CH4710)*
- **CM 4040 UG Research in Bioengineering (1-6)** *(Prereqs: none)*
- **CM 4080 UG Research in Biofuels (1-6)** *(Prereqs: none)*
- **CM 4125 Bioprocess Engineering Lab (1)** *(Prereqs: CM4710(C) or BL3210 or BL3310)*
- **CM 4770 Analytical Microdevice Technologies (3)** *(Prereqs: PH2200)*
- **CM 4780 Biomanufactiring and Biosafety (3)** *(Prereqs: BL2100 or CH4710 or CM4040 or CM4080 or CM4710 or (CM3110(C) and BL1040))*

*Student Signature*  
*Date*  
*Academic Advisor Signature*  
*Date*

*Topic must be approved by academic advisor*