Bioprocess Engineering

The Master of Bioprocess Engineering (MBPE) degree is a 9-month degree program designed to prepare graduates for meaningful careers in Bioprocess Engineering spanning the biopharmaceutical, industrial biotech, and food tech industries (and beyond). These include ways to produce bio-based chemicals and fuels, proteins, pharmaceuticals, and other high-value biologics; how to design and/or operate appropriate unit operations (e.g., fermentation systems), mammalian-cell culture systems, and instrumentation to monitor and control biotechnological processes; and how to apply and test bioprocess and purification technologies. The MBPE program has access to state-of-the-art bioprocessing equipment on and at the Advanced Biofuels and Bioproducts Process Demonstration Unit (ABPDU), which is part of the Lawrence Berkeley National Laboratory funded by US DOE. Emphasis on translating fundamentals into practical applications across the bench, pilot, and commercial production scales offers an integrated didactic experience. As a result, you will be able to immediately apply hands-on skills and knowledge to develop, design, and scale-up bio-based processes and products from concept through commercialization.

Industrial Advisory Board
- Paul Hill, Amyris
- Ashley Hesslein, Bayer Pharmaceuticals
- Paul Wu, Bayer Pharmaceuticals
- Marcella Yu, Boehringer Ingelheim
- Brian Kelley, Vir Biotechnology
- Jay Keasling, UC Berkeley

MBPE admissions requirements include a background in Chemical Engineering (B.S.) and an undergraduate biochemistry/molecular biology course equivalent to BIO EN 11 or MCELBI 102. Candidates from other backgrounds will be reviewed on a case-by-case basis with focus on a strong foundation to undergo the MBPE program. We are open to working with the motivated applicant (either graduating senior student or industry worker) who wishes to complete appropriate coursework during the summer prior to joining the program.

Applying for Graduate Admission

Thank you for considering UC Berkeley for graduate study! UC Berkeley offers more than 120 graduate programs representing the breadth and depth of interdisciplinary scholarship. A complete list of graduate academic departments, degrees offered, and application deadlines can be found on the Graduate Division website (http://grad.berkeley.edu/programs/list/).

Prospective students must submit an online application to be considered for admission, in addition to any supplemental materials specific to the program for which they are applying. The online application can be found on the Graduate Division website (http://grad.berkeley.edu/admissions/).

Admission Requirements

The minimum graduate admission requirements are:

1. A bachelor’s degree or recognized equivalent from an accredited institution;
2. A satisfactory scholastic average, usually a minimum grade-point average (GPA) of 3.0 (B) on a 4.0 scale; and
3. Enough undergraduate training to do graduate work in your chosen field.

For a list of requirements to complete your graduate application, please see the Graduate Division’s Admissions Requirements page (https://grad.berkeley.edu/admissions/steps-to-apply/requirements/). It is also important to check with the program or department of interest, as they may have additional requirements specific to their program of study and degree. Department contact information can be found here (http://guide.berkeley.edu/graduate/degree-programs/).

Where to apply?

Visit the Berkeley Graduate Division application page (http://grad.berkeley.edu/admissions/apply/).

Required Courses

Master of Bioprocess Engineering degree candidates will be required to complete a minimum of 28 core units over two semesters. This includes a Biochemical Engineering lecture and laboratory series covering 1) cells and the production of biomolecules; and 2) the recovery, separations, and purification of biomolecules, respectively. This foundational series is complemented by required coursework in Good Manufacturing Practice (GMP), Quality by Design (QbD), statistical experimental design, and a Bioprocess Industry seminar series to ensure that you graduate with the necessary skill set and exposure to begin or continue your career in the bioprocess industries.

CHM ENG 170A  Biochemical Engineering  4
CHM ENG 170B  Biochemical Engineering  4
CHM ENG C170L Biochemical Engineering Laboratory  3
CHM ENG 275  Advanced Bioprocess Engineering  3
CHM ENG 275L Advanced Bioprocess Engineering Laboratory  4
CHM ENG 298  Seminar in Chemical Engineering  1
CHM ENG 298B Seminar in Bioprocess Engineering (Students are required to take 2 units; 1 unit in fall and 1 unit in spring)  1

The curriculum also allows room to personalize your MBPE education and experience by choosing electives from a wide variety of approved options offered by the Department and across campus:

Elective Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>CHM ENG 180</td>
<td>Chemical Engineering Economics</td>
<td>3</td>
</tr>
<tr>
<td>CHM ENG 274</td>
<td>Biomolecular Engineering</td>
<td>3</td>
</tr>
<tr>
<td>BIO ENG 124</td>
<td>Basic Principles of Drug Delivery</td>
<td>3</td>
</tr>
<tr>
<td>BIO ENG 133</td>
<td>Course Not Available</td>
<td>3</td>
</tr>
<tr>
<td>CHEM C130</td>
<td>Biophysical Chemistry: Physical Principles and the Molecules of Life</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 135</td>
<td>Chemical Biology</td>
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<tr>
<td>CHEM C230</td>
<td>Protein Chemistry, Enzymology, and Bio-organic Chemistry</td>
<td>2</td>
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<tr>
<td>CHEM C271A</td>
<td>Chemical Biology I - Structure, Synthesis and Function of Biomolecules</td>
<td>1</td>
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<tr>
<td>CHEM C271B</td>
<td>Chemical Biology II - Enzyme Reaction Mechanisms</td>
<td>1</td>
</tr>
<tr>
<td>CHEM C271C</td>
<td>Chemical Biology III - Contemporary Topics in Chemical Biology</td>
<td>1</td>
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<tr>
<td>IND ENG 185</td>
<td>Course Not Available</td>
<td>1</td>
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Upon completion of the Master of Bioprocess Engineering program, you will be prepared for a role as an Associate Scientist or Bioprocess Engineer in the biopharmaceutical, industrial biotech, or food tech industries.

The CHM ENG 298B Seminar in Bioprocess Engineering provides an interactive interface for students, bioprocess industry experts, and the MBPE program. This 80-min weekly seminar pairs our students with industry partners to discuss relevant bio-based technologies, processes, and products spanning the biopharmaceutical, industrial biotech, and food tech industries (and beyond).