

# MS in Biopharmaceutical Process Engineering



**Jefferson**  
Thomas Jefferson University

**KANBAR COLLEGE of DESIGN, ENGINEERING and COMMERCE**



The **MS in Engineering concentration in Biopharmaceutical Process Development** is a transformational 36-credit program delivered at the Jefferson Institute for Bioprocessing (JIB). The laboratory intensive program provides hands-on preparation in JIB's pilot-scale facility, fully equipped with the most advanced technologies and processes used by industry to manufacture biopharmaceuticals. The program's immersive group-based coursework\* will provide you with a solid foundation in upstream/downstream operations, bioanalytical, quality by design, regulatory and process-based application of the skills required to enter the biopharmaceutical workforce. The program is ideal for employment-focused graduates with foundational degrees in Life Sciences and Engineering.

The **Jefferson Institute for Bioprocessing** (JIB) is a 25,000 sq. ft. state-of-the-art facility designed for the training of industry professionals, as well as the education of the next generation of scientists and engineers interested in pursuing rewarding careers in biomanufacturing. Biopharmaceutical Processing is a rapidly growing industry focused on the development of robust processes to manufacture high value biologics and advanced therapeutics for patients with debilitating and life-limiting diseases that affect millions of patients worldwide, such as cancer, rheumatoid arthritis, Alzheimer's, and Parkinson's.

\* Courses are delivered in a "Hy-Flex" format

## COMPETITIVE ADVANTAGE

- Emphasize hands-on learning in JIB's single-use pilot-scale biopharmaceutical training facility, rather than traditional classroom learning
- Enter the workforce with more preparation, earlier. Earn your MS degree in 12 months over 3 semesters
- Professional engagement through networking opportunities with industry leaders, site visits and conference attendance

## ADMISSIONS REQUIREMENTS

- A Bachelor of Science or equivalent in Engineering or Life Sciences, or a related discipline from a recognized institution
- Minimum Cumulative Grade Point Average (cGPA) of 3.0
- For international students that have not earned their primary degree at a U.S. institution, one of the following marks of English proficiency:
  - Minimum TOEFL score of 80
  - Minimum IELTS score of 6.5
  - Minimum Duolingo score of 105
- Two (2) letters of recommendation
- Knowledge of the profession displayed through a short writing sample

**Jefferson.edu/JIB**

# Curriculum

## FALL SEMESTER

Bioprocess Engineering For Scientists.....	3*
-or-	
Basic Life Sciences for Engineers.....	3*
Principles of Biopharmaceutical Process Engineering.....	3
Business & Entrepreneurship in Life Sciences.....	1.5
Biopharmaceutical Process Operations.....	3
Applied Mathematical & Statistical Methods in Biomanufacturing.....	1.5
Bioanalytical/Regulatory/ Quality Principles.....	3

## SPRING SEMESTER

Intro to Upstream Unit Operations.....	3
Intro to Downstream Unit Operations.....	3
Quality by Design (QbD), Process Selection & Optimization.....	1.5
Process Characterization & Validation.....	1.5
<b>Concentration Coursework.....</b>	<b>6</b>

### Career paths in Biopharmaceutical Processing and Biomanufacturing include the following:

- Bioprocess Research and Development (BR&D)
- Manufacturing Science and Technology (MST)
- Analytical Scientists and Engineers
- Tech Transfer and Process Validation Scientists and Engineers
- Regulatory and Quality Compliance
- Cell Culture (Upstream) Functional Area Lead  
Process Scientist and Engineer
- Purification (Downstream) Functional Area Lead  
Process Scientist and Engineer
- Process Supervisor and Manager
- Commercial Personnel –  
Supply Chain, Procurement, Etc.
- Facility Director, Senior Director and C-Level  
Professionals in Biomanufacturing

## SUMMER SEMESTER

Capstone Project.....	6
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## CONCENTRATIONS

### Option 1: Protein Replacement Therapies

Vector and Cell Line Design.....	3
Emerging Therapeutics.....	1.5
Drug Product Development and Formulation.....	1.5

-or-

### Option 2: Analytical Techniques and Regulatory Principles

Pharmaceutical Good Manufacturing Practices.....	1.5
Analytical Quality by Design and Method Validation.....	1.5
Biologics and Biosimilars: Regulatory Overview.....	1.5
Quality Systems for Regulatory Compliance.....	1.5

-or-

### Option 3: Advanced Vaccine Manufacture

Vector and Cell Line Design.....	3
Emerging Therapeutics.....	1.5
Vaccine Formulation.....	1.5

<b>TOTAL CREDITS.....</b>	<b>36</b>
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\* The required course is dictated by the nature of your Bachelor's Degree. (i.e. Life Scientists will take the Bioprocess Engineering for Scientists course)

### Contact:

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