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

**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
- Bioprocess Research and Development (BR&D) 3
- Basic Life Sciences for Engineers 3*
- Principles of Biopharmaceutical Process Engineering 3
- Applied Mathematical & Statistical Methods in Biomanufacturing 1.5
- Business & Entrepreneurship in Life Sciences 1.5
- Biopharmaceutical Process Operations 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
- Concentration Coursework 6

SUMMER SEMESTER
Capstone Project 6

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

TOTAL CREDITS 36

* 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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