

Minor in Bioprocessing Technology

Curriculum – Minor in Bioprocessing Technology

REQUIREMENTS

A total of 15 AUs shall constitute a Minor in Bioprocessing Technology and may be obtained over the duration of the student's respective degree course. To fulfill this requirement, students must take the following courses of our CBE curriculum:

1. Biochemical Engineering (CH 1032) – 4 AUs
2. Biomolecular Engineering I (CH 1031) – 4 AUs
3. Bioseparation (CH 4303) – 3 AUs
4. Bioanalytical Techniques (CH 4306) – 3 AUs
5. Therapeutic engineering (CH 4308) – 3 AUs

An optional laboratory is also offered for this course:

6. Bioprocessing Technology Laboratory (CH 4371) – 1 AU

DESCRIPTION OF MODULES

CH 1032 Biochemical Engineering

This course is designed for students with an engineering background to learn the engineering principles of biotechnology. Processing of biological materials and processing using biological agents such as cells, enzymes, or antibodies are the central domains of modern biochemical engineering. Success in biochemical engineering requires integrated knowledge of governing biological properties and principles and of chemical engineering methodology and strategy.

CH 1031 Biomolecular Engineering I

Basic cell biology from molecular structure, metabolism, and gene regulation is presented from a chemical engineer's eye. This course is designed for students with an engineering background to learn the biological fundamentals of biotechnology. The course emphasizes conceptual appreciation of the molecular interplays which are the basis of "chemical processes" in living systems. The objective of the course is to provide students with a comprehensive and concise overview of biochemical science with emphases on quantitative, especially stoichiometric and kinetic, perspectives. The fundamental processes of life are analysed quantitatively with engineering principles and mathematical tools.

CH 4303 Bioseparation

Bioseparation techniques that have been developed over the past couple decades to separate biological mechanistic analysis of key phenomena at the microscopic scale in bioseparation, will be emphasized, purification of biomolecules ranging from recombinant proteins to gene therapy products, with footnotes detailing economics of the products. Among the topics to be discussed are sedimentation, centrifugation, filtration, membrane separations, precipitation, crystallization, extraction, and the principles and scale-up of liquid chromatography.

CH 4306 Bioanalytical Techniques

The objective of this course is to provide a forum for advanced student discussion on the development, application and utility of modern analytical and bioanalytical methods and techniques used in research. A secondary purpose is to discuss the generation, application and meaning of data in addressing complex questions and problems in biochemical engineering, cell biology, molecular biology and biochemistry.

CH 4308 Therapeutic Engineering

Basic cell and structural biology. Basic histology. Tissues and Organs. Cell culture. Transport phenomenon. Biomaterials. Tissue engineering scaffolds. Cell-biomaterials interactions. Tissue engineering case studies.

CH4371 Bioprocessing Technology Laboratory

This subject focuses on teaching and imparting to the students hands-on techniques in biotechnology.

Upon successful completion of this course, students will be able to:

- a) Acquire hands-on techniques in cell and biomolecule processing and characterization
- b) Handle bioreactors and separations
- c) Acquire hands-on techniques in biomacromolecules characterization.

Contact:

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