

BIOPROCESSING (BP)

BP 401: Bas Engineering for Scientists**Credits:** 2**College:** School of Design & Engineering**Schedule Type:** Lecture**BP 402: Bas Biochem & Bio for Engineer**

This course introduces students to the underlying principles and applications of key concepts in microbiology, biochemistry, and biology to highlight the importance of cells, genes and proteins as the basis of disease and as therapeutics. The course will cover basic recombinant DNA technology as used in the production of therapeutic proteins and monoclonal antibodies. The course will also cover basic properties of amino acids, peptides, proteins and monoclonal antibodies, structure-function of proteins and DNA, and cellular reactions involved in cell growth and metabolism, translation, transcription, and replication.

Topics will cover different expression systems, basic design of vectors, cell transfection and protein expression and associated analytical methods and techniques.

Credits: 2**College:** School of Design & Engineering**Schedule Type:** Lecture**BP 403: Intro to Biopharm Processing****Credits:** 2**College:** School of Design & Engineering**Schedule Type:** Lecture**BP 404: Intro to Downstream Unit Oper****Credits:** 4**College:** School of Design & Engineering**Schedule Type:** Lecture/Lab**BP 405: Intro to Upstream Unit Oper****Credits:** 4**College:** School of Design & Engineering**Schedule Type:** Lecture/Lab**BP 406: Basics of Analytic Tech**

This course is intended for participants with no prior knowledge of analytical bioprocess operations in a manufacturing setting. The course prepares participants for entry-level positions in analytical / bioanalytical through hands-on sessions in the state-of-the art pilot-scale facility at Jefferson's institute for Bioprocessing (JIB). Classroom seminars, presentations, discussions and laboratory training activities introduce students to the basic analytical techniques used in biopharmaceutical industry along with regulatory guidelines and quality control strategies. The intent is to introduce students to the challenges and opportunities in biomanufacturing of a new biologic / biosimilar with a specific focus on using analytical instruments such as HPLC, Capillary Electrophoresis, Mass Hunter Software for LCMS data analysis etc.

Credits: 2**College:** School of Design & Engineering**Prerequisites:** BP 407 and BP 408 [Min Grade: D]**Schedule Type:** Lecture/Lab**BP 407: Princ of Downstream Bio Manuf**

This course is intended for participants with no prior knowledge of bioprocess operations in a manufacturing setting. The course prepares participants for entry-level positions in bio manufacturing through hands-on sessions in the state-of-the art pilot-scale facility at Jefferson's institute for Bioprocessing (JIB). Classroom seminars, presentations and discussions and laboratory training activities introduce students to the basic methods and techniques used by industry practitioners in downstream functional areas including chromatography, buffer exchange and product concentration operations. The intent is to introduce students to the challenges and opportunities in bio manufacturing of a new biologic with the focus specifically on downstream process operations, from the clarified cell free medium to formulated final Active Pharmaceutical Ingredient (API).

Credits: 2**College:** School of Design & Engineering**Prerequisites:** BP 406 and BP 408 [Min Grade: D]**Schedule Type:** Lecture/Lab**BP 408: Princ of Upstream Bio Manufa**

This introductory course is intended for participants with no prior knowledge of bioprocess operations in a manufacturing setting. The course prepares participants for entry-level positions in biomanufacturing through hands-on sessions in the state-of-the art pilot-scale facility at Jefferson's institute for Bioprocessing (JIB). Classroom seminars, presentations, discussion and laboratory training activities introduce students to the basic methods and techniques used by industry practitioners in upstream functional areas. The intent is to introduce students to the challenges and opportunities in biomanufacturing of a new biologic with the focus specifically in this course on upstream process operations, from a removing a cryovial from the Dewar vessel to seeding and expansion through shake flasks and wave bags to production bioreactors and harvesting operations.

Credits: 2**College:** School of Design & Engineering**Prerequisites:** BP 406 and BP 407 [Min Grade: D]**Schedule Type:** Lecture/Lab