Biotechnology (Certificate)

Certificate of Mastery

Minimum of 20-21 credit hours

If you want to quickly learn the biotechnology skills you need to quickly enter the job market as a technician, a Certificate of Mastery program in biotechnology could be the right path for you. In this program, you'll learn the fundamentals of biology and chemistry as well as molecular biology and its use in separation techniques, gene splicing, recombinant DNA, fermentation and cell development and production processes. These are all used in many areas of human health, plant and animal agriculture, pharmaceuticals, food processing, cosmetic and household products, environmental technology, and bioremediation. There are some prerequisites for this program, including: BIO 2125, CHEM 1115 and 1215, College Biology, MATH 1513 or MATH 2013 and BIO 2243 or the equivalent. Just check with your advisor to see if you have met these requirements.

Course Sequence

Course ID	Course Name	Credits	Type	Min Gd
Suggested Freshman 1st Semester				
BIOT 1022	MEDIA AND SOLUTION PREPARATION	2	Major	
BIOT 2823	BIOTECHNOLOGY LABORATORY I	3	Major	
BIOT 2843	ADVANCED NUCLEIC ACID LABORATORY	3	Major	
BIOT 1011	SURVEY OF BIOTECHNOLOGY	1	Major	
BINFO 1011	INTRODUCTION TO BIOINFORMATICS	1	Major	
BIO 2203	CELL BIOLOGY	3	Major	
Suggested Freshman 2nd Semester				
BIOT 2933	BIOTECHNOLOGY LABORATORY II	3	Major	
BIOT 2921	CELL CULTURE METHODS	1	Major	
BIOT 2352	IMMUNOLOGY	2	Major	
BIOT 2942	BIOMANUFACTURING	2	Major	
Suggested Freshman Summer Semester				
BIOT 2993	BIOTECHNOLOGY INTERNSHIP	3	Major	

Course Grouping

Major Courses: (20-21 credit hours) Biotechnology: BIOT 1011; BIOT 1022; BIOT 2352; BIOT 2823; BIOT 2933; BIOT 2921; BIOT 2993; * Students pick 2 of the following 3: BIO 2203, BIOT 2843, BIOT 2942
General Education Courses: None
Life Skills Courses: None
Support Courses: None

Program Notes

Notes: A Certificate of Mastery program is designed to meet the needs of an individual who wants to enter the job market following the completion of the certificate.

Degree Program Course Descriptions

BINFO 1011 - INTRODUCTION TO BIOINFORMATICS
Prerequisites: Math 0103 or adequate math placement test score and ENGL 0203, adequate placement score, or by meeting determined placement measures
1 Credit Students are introduced to the field of bioinformatics. They will explore the field of bioinformatics in a comprehensive overview, which includes ethics, as well as current trends in bioinformatics careers and applications.

BIO 2203 - CELL BIOLOGY
Prerequisites: BIO 1124
3 Credits Students are introduced to the basic features of cells and methods of studying them. Emphases are on cellular chemistry, structure, functions of organelles and processes. Students will demonstrate knowledge of the mechanisms of cellular processes, energetics, reproduction and differentiation.

BIOT 1011 - SURVEY OF BIOTECHNOLOGY
Prerequisites: Math 0203 or adequate math placement test score and ENGL 0203, adequate placement score, or by meeting determined placement measures
1 Credit The student will explore the field of biotechnology in a comprehensive overview. Course topics will include ethics, current trends in biotechnology careers and research through demonstrations, seminars, and field-trips.

BIOT 1022 - MEDIA AND SOLUTION PREPARATION
Prerequisites: College biology, CHEM 1115; Corequisite: BIO 2125
2 Credits The student will prepare media and solutions, use calculations required for solution preparation, and use equipment for solution preparation such as the analytical balance, pH meter, and autoclave.

BIOT 2352 - IMMUNOLOGY
Prerequisites: BIO 2125
2 Credits The student will discuss the nonspecific and specific immune systems of the human organism. Course topics will include antigen-antibody interaction, cell-mediated immunity, interferon, natural killer cells, and complement.

BIOT 2823 - BIOTECHNOLOGY LABORATORY I
Prerequisites: MATH 2013 or MATH 1513, BIOT 1022; Corequisite: BIO 2343, CHEM 1215
3 Credits Students become familiar with recombinant DNA techniques and gene expression. Students work with genomic and plasmid DNA, transfer, select for, identify, characterize, quantify, amplify, and purify DNA. Experience with electrophoresis, polymerase chain reaction, plasmid preps, and bioinformatics will be included.

BIOT 2843 - ADVANCED NUCLEIC ACID LABORATORY
Prerequisites: BIOT 2823
3 Credits Students build on the skills learned in Biotechnology Laboratory I to explore more advanced DNA and RNA techniques.

BIOT 2921 - CELL CULTURE METHODS
Prerequisites: BIO 2125; BIOT1022
1 Credit The student will learn to successfully maintain mammalian culture cells in a healthy uncontaminated state for an extended period of time. The course will include making cell culture media, monitoring cell growth, freezing cells, and bringing up frozen cells.

BIOT 2933 - BIOTECHNOLOGY LABORATORY II
Prerequisites: BIOT 2823
3 Credits The student will characterize, quantify and partially purify proteins with a variety of methods. Immunochemistry will be examined including ELISA and Western Blot.

BIOT 2942 - BIOMANUFACTURING
Prerequisites: BIOT 2823 and BIOT 2933
2 Credits The student will use a biofermenter to grow and monitor cells on a laboratory scale that simulates the large-scale production used in industry. Students will clean, sterilize, inoculate, operate and monitor the fermenter and then recover and purify protein products. Principles of upstream and downstream processing in the manufacture of a protein product using current Good Manufacturing Practices (cGMPs) and following Standard Operating Procedures (SOPs) will be emphasized.

BIOT 2993 - BIOTECHNOLOGY INTERNSHIP
Prerequisites: BIOT 2933, BIOT 2921
3 Credits Students receive 320 hours of practical experience at one of the affiliated corporations or a university research facility. The techniques learned in BIOT 2823, BIOT 2933 and BIOT 2921 will be applied in an actual research setting to give the student more experience while learning practical applications for laboratory procedures.