

# BIOTECHNOLOGY & GOOD MANUFACTURING PRACTICE

## Associate of Science Degree

### Program Description

The Biotechnology Program is designed to prepare students for entry-level positions in the biomanufacturing industry. Students will develop a broad laboratory science-based background through courses focused in the life and chemical sciences, and will obtain industry-specific knowledge in the areas of quality control (QC), process development (PD), and upstream and downstream processing, while following current, good manufacturing practices (cGMP). In addition, students will learn valuable laboratory techniques and instrumentation, and develop critical thinking skills. Upon successful completion of the program, students may enter the workforce directly as entry-level laboratory technicians or research assistants, or may transfer to a four-year university to continue their studies at the baccalaureate level.

### Program Outcomes

At the completion of this program, the student should be able to:

- Practice ethical standards of integrity, honesty, and fairness in scientific practices and professional conduct.
- Apply appropriate computer software and hardware skills to accomplish biotechnology lab tasks.
- Demonstrate technical knowledge of specialized techniques and instrumentation relating to biomanufacturing.
- Communicate thoughts, orally and in writing, in a clear well-organized manner that effectively informs scientific principles and lab techniques.
- Perform basic molecular biology & biochemical techniques.
- Apply GMP documentation to biomanufacturing.
- Perform all aspects of upstream and downstream processing in biomanufacturing.
- Develop critical thinking skills to solve complex scientific problems.

### **Please note**

Some courses in the curriculum for the degree may require prior completion of a prerequisite course that is not specifically required for the degree. In such cases, the prerequisite course must be completed even though it is not part of the degree requirement.

General Education Requirements – see p. 98	Credits
<b>25 credits total</b>	
BIO 111 General Biology I w/Lab	4 credits
Computer Science	3 credits
ENG 101 English Composition I	3 credits
ENG 102 English Composition II <sup>1</sup>	3 credits
History/Government	3 credits
IDS 167 First Year Seminar	3 credits
MAT 103 College Algebra <sup>1</sup>	3 credits
Social Science/Psychology	3 credits

Program Requirements – 40-41 credits total	Credits
BIO 251 Microbiology w/lab <sup>1</sup>	4 credits
BTC 101 Introduction to Biotechnology w/lab <sup>1</sup>	4 credits
BTC 210 Biochemistry w/lab <sup>1</sup>	4 credits
BTC 220 Biomanufacturing I <sup>1</sup>	4 credits
BTC 230 Biomanufacturing II <sup>1</sup>	4 credits
BTC 240 Seminar in Biotechnology <sup>1</sup>	1 credit
BTC 250 Biomanufacturing III <sup>1</sup> (S)	2 credits
CHE 121 General Chemistry I w/Lab <sup>1</sup>	4 credits
CHE 122 General Chemistry II w/Lab <sup>1</sup>	4 credits
PHL 103 Medical Ethics	3 credits
Math Elective <sup>2</sup>	3 credits
Program Elective (see below)	3-4 credits

**Total credits required for graduation** **65-66 credits**

Program Electives	Credits
BTC 260 Chromatography I <sup>1</sup> (S)	4 credits
BTC 270 Chromatography II <sup>1</sup>	4 credits
CHE 213 Organic Chemistry I w/lab <sup>1</sup> (F)	4 credits
ENV 101 Intro Environmental Studies w/lab (S)	4 credits
EXP 297 Internship I	3 credits
PHY 111 General Physics I w/lab <sup>1</sup>	4 credits

### **Additional Information**

All Biotech (BTC) courses should be taken sequentially; the Chair of Biotechnology & Good Manufacturing Practices Program should approve any changes. The Chair can be reached via phone (617) 405-5983

1. Indicates course requires the completion of a prerequisite.
2. Math Elective: Complete either MAT 113 or MAT 107.

NOTE: All classes are offered in the fall and the spring unless otherwise designated:

F=Class is only offered in the Fall

S=Class is only offered in the Spring

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Semester 1	Credits	Pre-Requisites
BIO 111 General Biology I w/lab	4 credits	
Computers Science	3 credits	
ENG 101 English Composition I	3 credits	
IDS 167 First Year Seminar	3 credits	
MAT 103 College Algebra	3 credits	May require a prerequisite of MAT 097
<b>Total</b>	<b>17 credits</b>	

Semester 2	Credits	Pre-Requisites
BIO 251 Microbiology w/Lab	4 credits	BIO 111
BTC 101 Introduction to Biotechnology w/Lab	4 credits	CHE 121 and/or BIO 111
CHE 121 General Chemistry I w/lab	4 credits	MAT 103
ENG 102 English Composition II	3 credits	ENG 101
Math Elective	3 credits	
<b>Total</b>	<b>18 credits</b>	

Semester 3	Credits	Pre-Requisites
BTC 210 Biochemistry w/Lab	4 credits	CHE 121 & MAT 103
BTC 220 Biomanufacturing I	4 credits	BIO 111, CHE 121, & BTC 101
CHE 122 General Chemistry II w/Lab	3 credits	CHE 121
Social Science/Psychology	3 credits	
<b>Total</b>	<b>14 credits</b>	

Semester 4	Credits	Pre-Requisites
BTC 230 Biomanufacturing II	4 credits	BIO 111, BIO 251, CHE 121, BTC 101, BTC 210, & BTC 220
BTC 240 Seminar in Biotechnology	1 credit	BTC 220
BTC 250 Biomanufacturing III	2 credits	BIO 111, BIO 251, CHE 121, BTC 101, & BTC 220
History/Government	3 credits	
PHL 103 Medical Ethics	3 credits	
Program Elective	3-4 credits	
<b>Total</b>	<b>16-17 credits</b>	

### Semester Path:

Recommended course of study for a full-time student. It is recommended that students speak to an Academic Advisor before registering for courses each semester.

### Student Resources:

**Academic Advising**  
617-984-1720

**Dean's Office of Arts and Sciences & Professional Programs**  
617-405-5920

**Dean's Office of Allied Health**  
617-405-5960

**Dean's Office of Nursing**  
617-405-5990

**Financial Aid Office**  
617-984-1620

**Registrar's Office**  
617-984-1650

**Student Accessibility and Academic Support Services**  
617-405-5915