# BIOTECHNOLOGY A.A.S. (CAREER)

Program website (https://www.frederick.edu/programs/science,-technology,-engineering,-and-math-(stem)/biotechnology.aspx)

**Program Description**

Prepares individuals to work as process operators in biological products manufacturing facilities. Students will combine basic science and communication skills, manufacturing technologies and good manufacturing practices in the course of study. Students will develop a strong basic science foundation with a sound understanding of the major technologies employed in the industry. They will also develop collaborative and disciplined work ethics while consistently practicing problem-solving skills. Upon successful completion of the program, individuals will possess the necessary skills to qualify for employment in a variety of bioprocessing industries.

## Program Learning Outcomes

- Articulate central themes of the discipline. \\nCHANGE TO:\\nUse discipline-specific terminology when communicating.
- Apply and demonstrate entry-level biotechnology skills and techniques.\\nCHANGE TO:\\nDemonstrate entry-level biotechnology skills and techniques.
- Demonstrate discipline-specific scientific inquiry.\\nCHANGE TO:\ \nDemonstrate industry-specific practices.
- Communicate discipline-specific knowledge.\\nDELETE
- Integrate discipline-specific technology.\\nDELETE
- Demonstrate appropriate quantitative skills. \\nCHANGE TO:\ \nDemonstrate discipline-specific quantitative skills.
- Analyze the role of biotechnology in society.
- ADD THIS: Demonstrate industry-specific practices.
- ADD: Apply basic biotechnology techniques, including molecular biology and cell culture techniques.

## Program Requirements

- Students must complete their credit **English and Mathematics** within the first 24 credits.
- One course must meet the cultural competence graduation requirement **(**https://frederick-public.courseleaf.com/general-education-core/#cultural**).**
- **CORE: The General Education CORE** is that foundation of the higher education curriculum providing a coherent intellectual experience for all students. Students should check with an advisor or the transfer institution (ARTSYS) before selecting General Education CORE requirements. http://artsys.usmd.edu/
- In some General Education categories (Mathematics, Biological & Physical Sciences), a 4-credit course selected from the GenEd course list will satisfy the requirement in place of a 3-credit course. Students should check with an advisor before selecting these courses.
- For the Physical Education, Health, or Nutrition requirement, a 3-credit PHED, HLTH, or NUTR course may satisfy the requirement in place of a 1-credit course. Students should check with an advisor before selecting this course.
- Students must earn a grade of "C" or better in ENGL 101 English Composition.

| Code | Title | Credits |
|---|---|---|
| **English** | | |
| ENGL 101 | English Composition | 3 |
| **Mathematics** | | |
| Mathematics Elective (Gen Ed course list) (https://frederick-public.courseleaf.com/general-education-core/#mathematics) (MATH 120 or higher) | | 3 |
| **Social & Behavioral Sciences** | | |
| Social & Behavioral Sciences Elective (Gen Ed course list) (https://frederick-public.courseleaf.com/general-education-core/#social-behavioral) | | 3 |
| **Arts & Humanities** | | |
| Communication Elective (Gen Ed course list) (https://frederick-public.courseleaf.com/general-education-core/#communication) | | 3 |
| **Biological & Physical Sciences** | | |
| BSCI 150 | Principles of Biology I | 4 |
| CHEM 101 | General Chemistry I | 4 |
| **Physical Education, Health, or Nutrition Requirement** | | |
| Select one PHED, HLTH, or NUTR course | | 1 |
| **Departmental Requirements** | | |
| BSCI 223 | Microbiology for Allied Health | 4 |
| or BSCI 263 | Elements of Microbiology (Fall) | |
| BIOT 101 | Biotechnology and Society | 3 |
| BIOT 102 | Regulatory Aspects of Biotechnology (Fall) | 3 |
| BIOT 103 | Basic Lab Techniques (Fall) | 1 |
| BIOT 110 | Molecular Biology Techniques (Spring) | 4 |
| BIOT 214 | Introduction to Biomanufacturing (Fall) | 4 |
| BIOT 220 | Cell Biology and Cell Culture Techniques (Spring) | 4 |
| BIOT 222 | Cell Therapy and Flow Cytometry (Spring) | 4 |
| BIOT 224 | Gene Therapy Fundamentals (Fall) | 4 |
| Electives – Recommended courses below: | | 8 |
| BIOT 130 | Forensic Biology | |
| BSCI 240 | Genetics (Spring) | |
| CHEM 102 | General Chemistry II | |
| CMSC 105 | Introduction to Programming with Python | |
| ENGL 219 | Technical Writing | |
| INTR 103 | Internship | |
| Total Credits | | 60 |

## Transfer Note

For more information on careers and transfer, contact the Career and Academic Planning Services office at 301.846.2471 or visit Transfer Services (https://www.frederick.edu/student-resources/counseling-advising/transfer-services.aspx).

## Guided Pathway to Success (GPS)

Suggested schedules map your path to degree completion.

Students should meet with an advisor each semester to carefully select and sequence courses based on their specific academic goals and interests. Visit Jefferson Hall or call 301.846.2471 for advising.

| Recommended First Semester | | Credits |
|---|---|---|
| ENGL 101 | English Composition [1] | 3 |
| Mathematics Elective (Gen Ed course list) (https://frederick-public.courseleaf.com/general-education-core/#mathematics) (MATH 120 or higher) [1] | | 3-4 |
| BSCI 150 | Principles of Biology I | 4 |
| BIOT 101 | Biotechnology and Society | 3 |
| BIOT 102 | Regulatory Aspects of Biotechnology (Fall) (Milestone) | 3 |

| | | |
|---|---|---|
| BIOT 103 | Basic Lab Techniques (Fall) | 1 |
| | Credits | 17-18 |
| **Recommended Second Semester** | | |
| BIOT 110 | Molecular Biology Techniques (Spring) (Milestone) | 4 |
| CHEM 101 | General Chemistry I | 4 |
| | | |
| Communication Elective (Gen Ed course list) (https://frederick-public.courseleaf.com/general-education-core/#communication) | | 3 |
| Electives [2] | | 3 |
| | Credits | 14 |
| **Recommended Third Semester** | | |
| BSCI 223<br>or BSCI 263 | Microbiology for Allied Health<br>or Elements of Microbiology (Fall) | 4 |
| BIOT 214 | Introduction to Biomanufacturing (Fall) (Milestone) | 4 |
| BIOT 224 | Gene Therapy Fundamentals (Fall) | 4 |
| Electives (INTR 102 recommended) | | 2 |
| | Credits | 14 |
| **Recommended Fourth Semester** | | |
| BIOT 220 | Cell Biology and Cell Culture Techniques (Spring) | 4 |
| BIOT 222 | Cell Therapy and Flow Cytometry (Spring) | 4 |
| Physical Education, Health, or Nutrition Requirement | | 1,3 |
| Social & Behavioral Sciences Elective (Gen Ed course list) (https://frederick-public.courseleaf.com/general-education-core/#social-behavioral) | | 3 |
| Electives | | 3 |
| | Credits | 15-17 |
| | Total Credits | 60-63 |

**1**

Take this course within the first 24 credits.

**2**

Choose electives in consultation with an advisor (credits may vary to fulfill 60 credits for degree) - recommended electives below:
BIOT 130 Forensic Biology, BSCI 240 Genetics, CHEM 102 General Chemistry II, CMSC 105 Introduction to Programming with Python ENGL 219 Technical Writing, INTR 103 Internship

## Part-time Students

Part-time students should complete courses in the order listed on the pathway. Please contact program manager for questions about part-time status.

Students who take fewer than 15 credits each semester or who require developmental English or Math coursework will need additional semesters to complete their degrees. Summer term and January session classes may help students to make faster progress.

### Pathway Legend

Milestone - courses with the Milestone notation should be taken within the recommend credit range to stay on track for program completion.

Fall, Spring, Summer - courses with a Fall, Spring, or Summer notation indicate the course is offered in the specified semester only.