

CELL AND GENE THERAPY ESSENTIALS CERTIFICATE (CAREER)

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

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Program Description

Provides students with the essential skills, knowledge, and preparation to enter the cell and gene therapy industry. Explores the steps involved in the manufacturing process, the equipment used, the regulatory aspects, and the current state and future of the field. Students will have hands-on experience with industry-standard equipment and will be exposed to common techniques used in the manufacturing process.

Program Learning Outcomes

- Describe the applications of cell and gene therapy.
- Identify the existing FDA approved therapies and the ones in clinical trials.
- Demonstrate the ability to follow good documentation practices (GDP) and good manufacturing practices (GMP).
- Demonstrate the ability to follow correct aseptic technique and maintain cell cultures.
- Demonstrate the ability to work with AAV virus and perform transfections.
- Perform industry-specific techniques including ELISA, real-time PCR, and cell-based assays.
- Demonstrate the ability to work with cells in bags and tubing aseptically.
- Demonstrate the ability to work with AKTA go systems for viral purification.
- Explain flow cytometry principles and applications.
- Demonstrate the ability to follow a flow cytometry protocol.
- Demonstrate the ability to use Flo Jo software and analyze data.

Program Requirements

Code	Title	Credits
BIOT 102	Regulatory Aspects of Biotechnology (Fall)	3
BIOT 103	Basic Lab Techniques (Fall)	1
BIOT 110	Molecular Biology Techniques (Spring)	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
Total Credits		20

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.

First Year		
Recommended First Semester		Credits
BIOT 102	Regulatory Aspects of Biotechnology (Fall)	3
BIOT 103	Basic Lab Techniques (Fall)	1
Credits		4
Recommended Second Semester		
BIOT 110	Molecular Biology Techniques (Spring)	4
BIOT 220	Cell Biology and Cell Culture Techniques (Spring)	4
BIOT 222	Cell Therapy and Flow Cytometry (Spring)	4
Credits		12
Recommended Third Semester		
BIOT 224	Gene Therapy Fundamentals (Fall)	4
Credits		4
Total Credits		20

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.