



## Department of Integrative Biology

COLLEGE OF LIBERAL ARTS AND SCIENCES

UNIVERSITY OF COLORADO **DENVER**

Science Building Room 2071

Campus Box 171

P.O. Box 173364

Phone: 303-315-7600

<http://clas.ucdenver.edu/biology>

### BIOTECHNOLOGY CERTIFICATE

University of Colorado Denver

AC TTTACACTGCGGGAAACCGCGATAAGGGGACCCGAGTGCCAGCACCTAGTGCTGGCTGTCCAGCTGTCCAAAT  
AACAGTTGTTAGCAAGGGCCGGGCAAGACCGGTGCCAGCCGCCCGGTAAACACCGCGGCCGAGTGGTAGCCGTT  
AT IAT TGGGTTTAAAGGGTCCGTAGCCGGCTATTAAGTCTCTTGGGAAATCTGGCGACTCAATCGTCAGGCGTCC  
AAGAGATACTGGTAGGCTTGGGACCGGGAGAGGTGGGAGGTACTCCAGGGGTAGGGGTGAAATCTCGTAATCCTTG

#### Why earn a Biotechnology Certificate?

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Biotechnology is a rapidly growing field in Colorado and nationally that encompasses many disciplines. Agriculture, biofuels, biomedical biotechnology, pharmaceuticals, microbiology, and medical device development are all well-represented areas of biotechnology in Colorado. The Department of Integrative Biology offers a Certificate program in Biotechnology that allows students to acquire foundational knowledge and specialized skills relevant to these research areas. The certificate is designed to provide a strong background in biochemistry and molecular biology, with an emphasis on applied training via lab work and research experiences. Upon completion of the requirements, students obtain recognition in the form of a Certificate and official designation on their transcript.

#### Why earn a Biotechnology Certificate at CU Denver?

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High-quality, state-of-the-field upper-division courses and the opportunity for experiential learning comprise the core of the Biotechnology Certificate program. Upper-division courses at CU Denver are small (typically less than 20 students), and provide abundant interaction between the students and faculty, high rigor, and many opportunities for critical thinking and discussion. The three major components to the Biotechnology Certificate include advanced molecular biology training, directed student research or an internship in a research laboratory either at CU Denver or off-campus, and biochemistry training. An advanced molecular biology laboratory teaches students key techniques, experimental design, trouble-shooting, and how to work independently on research questions spanning the semester. Students receive hands-on experience with cloning, DNA and RNA isolation, gel electrophoresis, PCR, quantitative PCR, and other modern techniques in genetic engineering. The Molecular Biology Laboratory enrolls only 16 students per semester, so that each student has ample opportunity to work with the equipment and complete every experiment.

#### Obtaining the Biotechnology Certificate

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The Biotechnology Certificate is not a degree and not a program that requires admission. In order to earn a certificate, students are required to complete 17-20 credits from the required course list (see reverse side). Students must have the prerequisites for each course. Students may earn the certificate while working on their Bachelor's Degree, or the courses may be taken through non-degree admission. All CU Denver admissions questions should be directed to the Admissions office (<http://www.ucdenver.edu/admissions>).

#### For more information

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Contact the Biotechnology Certificate faculty advisor, Dr. Chris Miller, at [chris.miller@ucdenver.edu](mailto:chris.miller@ucdenver.edu).

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AC TTTACACTGCGGGAAACCGCGATAAGGGGACCCGAGTGCCAGCACCTAGTGCTGGCTGTCCAGCTGTCCAAAT  
AACAGTTGTTAGCAAGGGCCGGGCAAGACCGGTGCCAGCCGCGCGGTAACACCGGCGGCCGAGTGGTAGCCGTT  
AT TAT TGGGTTTAAAGGGTCCGTAGCCGGCCTATTAAGTCTCTTGGGAAATCTGGCGACTCAATCGTCAGGCGTCC  
AAGAGATACTGGTAGGCTTGGGACCGGGAGAGGTGGGAGGTACTCCAGGGGTAGGGGTGAAATCTCGTAATCCTTG

## Prerequisites and Certificate requirements

- Individual courses used to earn the Biotechnology Certificate carry prerequisites that must be met before enrolling.
- All courses used to satisfy the requirements for the Certificate must be completed with a grade of C or better.
- All courses used to satisfy the requirements for the Certificate must be completed at CU Denver.
- All courses used to satisfy the requirements for the Certificate must be completed within a five year period.

A certificate will be issued and noted on your transcript upon proof of satisfactory completion of the course work. You must contact the Biotechnology Certificate faculty advisor no later than the start of the semester of graduation in order for the certificate recognition to appear on your transcripts.

## Required Courses

- |                             |           |        |  |
|-----------------------------|-----------|--------|--|
| <input type="checkbox"/>    | BIOL 4024 | 3 crs. | Introduction to Biotechnology  |
| <input type="checkbox"/>    | BIOL 3124 | 3 crs. | Introduction to Molecular Biology  |
| <input type="checkbox"/>    | BIOL 4125 | 3 crs. | Molecular Biology Lab  |
| <input type="checkbox"/> or | CHEM 4820 | 3 crs. | General Biochemistry II  |
|                             | CHEM 3810 | 4 crs. | Biochemistry   |
| <input type="checkbox"/> or | BIOL 3939 | 3 crs. | Internship (consult the Experiential Learning Center at 303-315-7258 or<br>Experiential.LearningCenter@ucdenver.edu) |
|                             | BIOL 4880 | 3 crs. | Directed Research (consult the Biotechnology Certificate faculty advisor)  |

## Elective (ONE from among those listed below, or a course pre-approved by the Biotechnology Certificate faculty advisor)

- |                          |           |        |                             |
|--------------------------|-----------|--------|-----------------------------|
| <input type="checkbox"/> | BIOL 3612 | 3 crs. | Cell Biology Lab            |
| <input type="checkbox"/> | BIOL 3763 | 4 crs. | Biostatistics               |
| <input type="checkbox"/> | BIOL 4051 | 3 crs. | Virology                    |
| <input type="checkbox"/> | BIOL 4126 | 3 crs. | Molecular Genetics          |
| <input type="checkbox"/> | BIOL 4144 | 3 crs. | Medical Microbiology        |
| <input type="checkbox"/> | BIOL 4225 | 3 crs. | Genomics and Bioinformatics |
| <input type="checkbox"/> | BIOL 4622 | 3 crs. | Topics in Immunology        |
| <input type="checkbox"/> | BIOL 4634 | 3 crs. | Biology of Cancer           |
| <input type="checkbox"/> | BIOL 4064 | 3 crs. | Advanced Cell Biology       |
| <input type="checkbox"/> | CHEM 3111 | 3 crs. | Analytical Chemistry        |
| <input type="checkbox"/> | CHEM 4121 | 3 crs. | Instrumental Analysis       |
| <input type="checkbox"/> | CHEM 4828 | 2 crs. | Biochemistry lab            |
| <input type="checkbox"/> | CHEM 4835 | 3 crs. | Biochemistry of Cancer      |