

## BIOTECHNOLOGY CERTIFICATE

University of Colorado  
Downtown Denver Campus

### Why earn a Biotechnology Certificate?

Biotechnology is a rapidly growing field in Colorado, and nationally. Biotechnology is a broad term covering many disciplines. Agriculture, pharmaceuticals, microbiology, and medical device development are a few of the thriving areas of biotechnology in Colorado. Those wishing to pursue a career in biotechnology need to have a strong knowledge of biology and chemistry. The Department of Integrative Biology offers a Certificate program in Biotechnology that allows students to acquire special skills in research-based biology and chemistry. The certificate is designed to provide a strong background in chemistry, including organic and biochemistry and in Biology, including both prokaryotic and eukaryotic molecular biology and gene regulation. Upon completion of the requirements, the student will obtain recognition in the form of a Certificate and designation on their transcript.

### Why earn a Biotechnology Certificate at the Downtown Campus?

Upper division classes at the Downtown Campus are small (20-40 people), allowing for greater interaction between the student and the faculty. The level of rigor is high in our upper division courses, and you will be challenged to critically analyze problems, just as you would in a biotech position. There are three very important requirements for the certificate; and emphasis on upper level chemistry, the Independent Stud/Internship, and the Molecular Biology Lab course. First, we require students to complete six credits of upper level chemistry; either a year of Biochemistry, or Biochemistry and Analytical Chemistry. A strong knowledge of chemistry is in high demand in today's biotech job market. Second, we require a student to do an Independent Study or Internship in a research lab. This is an incredible opportunity for students to make connections and get experience in a research lab in the Denver metro area. The Experimental Learning Center on campus help the student set up and internship in an area of the student's interest. Finally, we require students to take an intense Molecular Biology Techniques Laboratory. This course is designed to teach the students the basics of lab math, experimental design, trouble shooting, as well as carrying out an independent genomics project throughout the semester. The students get hands-on experience with DNA and RNA isolation, gel electrophoresis, Northern blots, Western blots, PCR and RT-PCR. These are basic skills required in most molecular biology labs. This class is small in size, limited to 16 students per semester, and therefore the student has ample opportunity to work with the equipment and perform every experiment.

### How to apply?

The Biotechnology Certificate is not a degree and is not a program that requires special admissions. In order to earn a certificate, students are required to satisfactorily complete (with a grade of B- (2.7) or better) 21-22 credits from the required course list (see reverse side). Please note, students must have the prerequisites for each course. Students may earn the certificate while working on their bachelors or Masters Degree; or the courses may be taken through non-degree admission. All admissions questions should be directed to the Registrar's office (303-556-2389). All questions regarding tuition and fees should be directed to the Bursar's office (303-556-2710).

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## Prerequisites:

- One year of General Biology and one semester of General Microbiology, both with labs
- Cumulative GPA of 2.75 or better
- All courses (21-22 credits) used to satisfy the requirements for the Biotechnology Certificate must be completed with a grade of B- (2.7) or better.
- No fewer than 14 credits of those used to satisfy the requirements for the Biotechnology Certificate must be completed at UCD.
- All Courses used to satisfy the requirements for the Biotechnology Certificate must be completed within a five year period

Students interested in completing the Biotechnology certificate should contact Dr. Lisa Johansen at [lisa.johansen@ucdenver.edu](mailto:lisa.johansen@ucdenver.edu) in the Department of Integrative Biology. A certificate will be issued and noted on your transcript upon proof of satisfactory completion of the course work. **You must contact Dr. Johansen when you have completed all the requirements, the semester you are going to graduate, in order for the certificate recognition to appear on your transcripts**

## Required Courses (completed with a grade of B- (2.7) or better):

- |                          |        |   |
|--------------------------|--------|---|
| • BIOL 4024/5024         | 3 crs. | Biotechnology   |
| • BIOL 4128 or BIOL 3124 | 3 crs. | Topics in Molecular Biology (replaces 4124/5124)<br>Introduction to Molecular Biology |
| • BIOL 4125/5125         | 3 crs. | Molecular Biology Lab   |
| • CHEM 4810/5810         | 3 crs. | General Biochemistry I  |
| and CHEM 4820/5820       | 3 crs. | General Biochemistry II   |
| - Or -                   |        |   |
| CHEM 3810                | 4 crs. | Biochemistry  |
| and CHEM 3111            | 3 crs. | Analytical Chemistry  |
| • BIOL 3939/5939         | 3 crs. | Internship (consult the Experimental Learning Center at 303.556.2250)                 |
| - Or -                   |        |   |
| BIOL 4840/5840           | 3 crs. | Independent Study (consult a Biology Advisor)   |

## Elective (ONE from among those listed below or a course pre-approved by Dr. Johansen)

- |                  |        |   |
|------------------|--------|---|
| • BIOL 4051/5051 | 3 crs. | Virology                                    |
| • BIOL 4144/5144 | 3 crs. | Medical Microbiology                        |
| • BIOL 4621/5621 | 3 crs. | Immunology                                  |
| • CHEM 3111      | 3 crs. | Analytical Chemistry (if not applied above) |
| • CHEM 4121      | 3 crs. | Instrumental Analysis                       |
| • CHEM 4828/5828 | 2 crs. | Biochemistry lab                            |
| • BIOL 4126/5126 | 3 crs. | Molecular Genetics                          |

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