BIOLOGY - BIOTECHNOLOGY TRACK, BS

Introduction
The Biotechnology Track will allow students to master skills used within areas such as biotechnology, medicine, agriculture, and response to climate change. Students in this track will practice employable laboratory and research skills. Example employers for this track include biotechnology companies, Centers for Disease Control and Prevention, hospital laboratories, pharmaceutical research labs, and food science labs.

Program Delivery
• This is an on-campus program.

Declaring This Major
• Click here [http://catalog.ucdenver.edu/cu-denver/undergraduate/schools-colleges-departments/college-liberal-arts-sciences/#policies pretext] to go to information about declaring a major.

General Requirements
To earn a degree, students must satisfy all requirements in each of the three areas below, in addition to their individual major requirements.

• CU Denver General Graduation Requirements [http://catalog.ucdenver.edu/cu-denver/undergraduate/graduation/]
• CU Denver Core Curriculum [http://catalog.ucdenver.edu/cu-denver/undergraduate/graduation-undergraduate-core-requirements/]
• College of Liberal Arts & Sciences Graduation Requirements [http://catalog.ucdenver.edu/cu-denver/undergraduate/academic-policies-procedures/]

Program Requirements
1. Students must complete a minimum of 36 BIOL credit hours.
2. Students must complete a minimum of 18 credit hours in ancillary coursework.
3. Students must complete a minimum of 18 upper division (3000- level and above) BIOL credit hours.
4. Students must earn a minimum grade of C- (1.7) in all courses that apply to the major and must achieve a minimum cumulative major GPA of 2.0. All graded attempts in required and elective courses are calculated in the major GPA. Courses taken using P+/P/F or S/U grading cannot apply to major requirements.
5. Students must complete a minimum of 18 upper division (3000-level and above) BIOL credit hours with CU Denver faculty and at least 6 credits must be at 4000-level or higher.

Program Restrictions, Allowances and Recommendations
1. All upper division biology courses applied to the undergraduate biology major must be completed within 10 years of graduation.

2. Undergraduate students may count up to six credit hours of independent study or internship (any combination of BIOL 3840 Independent Study, BIOL 3939 Internship, BIOL 4840 Independent Study, BIOL 4880 Directed Research) toward the upper-division Biology electives requirement in the major.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>BIOL 2010</td>
<td>Organisms to Ecosystems (Gen Bio) or BIOL 203CHonors Organisms to Ecosystems (Gen Bio)</td>
<td>20</td>
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<td>BIOL 2011</td>
<td>Organisms to Ecosystems Lab (Gen Bio) or BIOL 2031Honors Organisms to Ecosystems Lab (Gen Bio)</td>
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<tr>
<td>BIOL 2020</td>
<td>Molecules to Cells (Gen Bio) or BIOL 204CHonors Molecules to Cells (Gen Bio)</td>
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<td>BIOL 2021</td>
<td>Molecules to Cells Lab (Gen Bio) or BIOL 2041Honors Molecules to Cells Lab (Gen Bio)</td>
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<tr>
<td>BIOL 3124</td>
<td>Introduction to Molecular Biology</td>
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<tr>
<td>BIOL 3611</td>
<td>General Cell Biology</td>
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<td>BIOL 4024</td>
<td>Introduction to Biotechnology</td>
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<tr>
<td>BIOL 4125</td>
<td>Molecular Biology Laboratory</td>
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<tr>
<td>BIOL 3612</td>
<td>Cell Biology Laboratory</td>
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<td>BIOL 3651</td>
<td>General Microbiology Lab</td>
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<td>CHEM 4828</td>
<td>Biochemistry Lab</td>
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<tr>
<td>CHEM 2031</td>
<td>General Chemistry I or CHEM 208Honors General Chemistry I</td>
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<td>CHEM 2038</td>
<td>General Chemistry Laboratory I or CHEM 201 Majors General Chemistry I Laboratory or CHEM 201 Honors General Chemistry I Laboratory</td>
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<td>CHEM 2061</td>
<td>General Chemistry II or CHEM 209 Honors General Chemistry II Lecture</td>
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<td>CHEM 2068</td>
<td>General Chemistry Laboratory II or CHEM 209 Majors General Chemistry II Laboratory or CHEM 209 Honors General Chemistry II Laboratory</td>
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<td>CHEM 3810</td>
<td>Biochemistry</td>
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<td>CHEM 4820</td>
<td>General Biochemistry II</td>
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<td>BIOL 3763</td>
<td>Biostatistics</td>
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<tr>
<td>MATH 1401</td>
<td>Calculus I</td>
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<tr>
<td>MATH 4830</td>
<td>Applied Statistics</td>
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<tr>
<td>IWKS 2300</td>
<td>Fundamentals of Computational Innovation</td>
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<tr>
<td>ENGL 3154</td>
<td>Technical Writing (also satisfies CLAS Communicative Skills requirement)</td>
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<tr>
<td>ENGL 4175</td>
<td>Writing in the Sciences (also satisfies CLAS Communicative Skills requirement)</td>
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<tr>
<td>ENGL 4180</td>
<td>Argumentation and Logic (also satisfies CLAS Humanities requirement)</td>
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<tr>
<td>ENGL 4280</td>
<td>Proposal and Grant Writing (also satisfies CLAS Humanities requirement)</td>
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<tr>
<td>COMM 4550</td>
<td>Rhetorics of Medicine &amp; Health</td>
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Choose at least two upper division BIOL 4000 level classes from this list, must be from UCD faculty:

BIOL 4055 Virology
BIOL 4064 Cell Biology of Disease
BIOL 4126 Molecular Genetics
BIOL 4128 Topics in Molecular Biology
BIOL 4134 Human Genetics
BIOL 4144 Medical Microbiology
BIOL 4225 Genomics and Bioinformatics
BIOL 4335 Plant Structure and Development
BIOL 4415 Applied Microbial Ecology
BIOL 4475 Mechanisms of Human Pathology
BIOL 4550 Cell Signaling
BIOL 4634 Biology of Cancer
BIOL 4674 Endocrinology
BIOL 4815 Structural Biology of Neurodegenerative Diseases
BIOL 4825 Biochemistry of Metabolic Disease
BIOL 4835 Biochemistry of Gene Regulation and Cancer

Choose at least two from the following list that have not already been used anywhere above (be sure to reach 36 credits in BIOL):

Internship, Directed Research, or Independent Study is highly recommended

BIOL 3010 Biology Career and Professional Development Seminar
BIOL 3134 Advanced Topics
BIOL 3137 Advanced Special Topics with Lab
BIOL 3445 Introduction to Evolution
BIOL 3611 General Cell Biology
BIOL 3621 Introduction to Immunology
BIOL 3650 General Microbiology
BIOL 3612 Cell Biology Laboratory
BIOL 3804 Developmental Biology
BIOL 3832 General Genetics
BIOL 3840 Independent Study
BIOL 3939 Internship
BIOL 4050 Advanced Biology Topics
BIOL 4055 Virology
BIOL 4064 Cell Biology of Disease
BIOL 4126 Molecular Genetics
BIOL 4128 Topics in Molecular Biology
BIOL 4134 Human Genetics
BIOL 4144 Medical Microbiology
BIOL 4225 Genomics and Bioinformatics
BIOL 4335 Plant Structure and Development
BIOL 4415 Applied Microbial Ecology
BIOL 4475 Mechanisms of Human Pathology
BIOL 4550 Cell Signaling
BIOL 4634 Biology of Cancer
BIOL 4674 Endocrinology
BIOL 4815 Structural Biology of Neurodegenerative Diseases
BIOL 4825 Biochemistry of Metabolic Disease
BIOL 4835 Biochemistry of Gene Regulation and Cancer

BIOL 4880 Directed Research
CHEM 4121 Instrumental Analysis
CHEM 4128 Instrumental Analysis Laboratory
CHEM 4221 Practical Applications of Spectroscopy
CHEM 4388 Nucleic Acid Technologies I
CHEM 4411 Bioconjugate Techniques and Theranostic Nanomedicine
CHEM 4580 Molecular Informatics
CHEM 4630 Programming for Data Analysis in the Physical Sciences
CHEM 4845 Molecular Modeling and Drug Design
CHEM 4860 Bioinorganic Chemistry: Bioinorganic compounds in medicine

Total Hours 45-48

To learn more about the Student Learning Outcomes for this program, please visit our website. (https://clas.ucdenver.edu/integrative-biology/academics/undergraduate-programs/#biology_major-73)

To review the Degree Map for this program, please visit our website (https://www.ucdenver.edu/student/advising/undergraduate/degree-maps/clas/).