BIOCHEMISTRY - BACHELOR OF ARTS (BA)

Biochemistry major students are prepared for many different careers after graduation. Career Services (http://www.colorado.edu/careerservices) offers a number of programs and services designed to help students plan their career, including workshops, internships, and placement services after graduation. For an appointment with a career counselor or for more information call 303-492-6541, or stop by Center for Community, N352.

Announcements

See the undergraduate blog (http://www.colorado.edu/chembio/undergraduate-blog) and the second-floor Ekeley bulletin board for announcements and postings. Some examples of the information posted are:

- Main page: contact information and general announcements.
- Student opportunities: internship/job announcements, summer programs, events/programs offered by other campus offices and departments that may be of interest.
- Scholarship announcements: announcements of scholarships opportunities and information meetings.
- Seminars and conferences: seminar and conference announcements.
- Academic support: SASC workshop schedule, tutors, and other academic support opportunities.
- Career services: schedule of events offered by this office.
- Study abroad: announcements from study abroad about their programs and information meetings.
- Courses: information about new and/or interesting courses for core and elective credit.

Research Opportunities

Undergraduate Research Opportunities Program (UROP and other opportunities)

The Undergraduate Research Opportunities Program (UROP) offers students a chance to work alongside a faculty sponsor on original research. Learn to write proposals, conduct research, pursue creative work, analyze data and present the results. For more information, visit the UROP Website (http://www.colorado.edu/suep/about-urop).

Study Abroad

The experience of studying abroad can prove invaluable. For information about study abroad programs, visit the Office of International Education/Study Abroad (http://studyabroad.colorado.edu) website.

Teaching Certification

Biochemistry majors can also earn certification as teachers through the School of Education. The program for a secondary school science-teaching certificate is challenging requiring a broad, strong background in science, as well as course work in education and practice teaching. It usually requires at least five years of study. Students interested in teacher certification are encouraged to contact the School of Education (http://www.colorado.edu/education).

International Bachelor of Arts (IBA)

The International Bachelor of Arts (IBA) is a joint degree between the University of Colorado Boulder and the University of Wollongong, Wollongong, Australia. To earn an IBA in Biochemistry, in addition to completing all the current requirements for the BA with a major in Biochemistry at the home institution, students must complete one full-time semester experiential, customized, international learning experience at the non-home institution.

Requirements

The biochemistry major requires extensive course work, including courses in general, organic, physical and analytical/instrumental chemistry, as well as in biology, calculus and physics.

In addition to these requirements, students must fulfill the College of Arts and Sciences’ core curriculum. The core curriculum covers three skills acquisition areas and seven content areas of study. Credits taken for the major may also apply toward these core hours.

Transfer students who plan to complete a BA degree in biochemistry must complete at the Boulder campus a minimum of 12 credit hours of upper-division courses in biochemistry covering at least 2 of the sub-disciplines in their major: organic, physical and biochemistry.

Students may want to consult each semester’s Registration Handbook and Schedule of Courses (http://www.colorado.edu/registrar) as well as the Professor Performance Guide (http://www.colorado.edu/pba/fcq) for further information about course offerings and faculty.

Required Courses and Credit Hours

Required Major Courses

Select one of the following general chemistry sequence options: 5-10

Option 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1400</td>
<td>Foundations of Chemistry</td>
</tr>
<tr>
<td>&amp; CHEM 1401</td>
<td>and Foundations of Chemistry Lab</td>
</tr>
</tbody>
</table>

Option 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1113</td>
<td>General Chemistry 1</td>
</tr>
<tr>
<td>&amp; CHEM 1114</td>
<td>and Laboratory in General Chemistry 1</td>
</tr>
<tr>
<td>CHEM 1133</td>
<td>General Chemistry 2</td>
</tr>
<tr>
<td>&amp; CHEM 1134</td>
<td>and Laboratory in General Chemistry 2</td>
</tr>
</tbody>
</table>

Select one of the following organic chemistry options: 10-12

Option 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 3451</td>
<td>Organic Chemistry for Chemistry and Biochemistry Majors</td>
</tr>
<tr>
<td>&amp; CHEM 3361</td>
<td>and Laboratory in Organic Chemistry 1 for Chemistry Majors</td>
</tr>
<tr>
<td>CHEM 3491</td>
<td>Organic Chemistry 2 for Biochemistry Majors</td>
</tr>
<tr>
<td>&amp; CHEM 3381</td>
<td>and Laboratory in Organic Chemistry 2 for Chemistry Majors</td>
</tr>
</tbody>
</table>

Option 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 3451</td>
<td>Organic Chemistry for Chemistry and Biochemistry Majors</td>
</tr>
<tr>
<td>&amp; CHEM 3361</td>
<td>and Laboratory in Organic Chemistry 1 for Chemistry Majors</td>
</tr>
<tr>
<td>CHEM 3471</td>
<td>Organic Chemistry 2 for Chemistry Majors</td>
</tr>
<tr>
<td>&amp; CHEM 3381</td>
<td>and Laboratory in Organic Chemistry 2 for Chemistry Majors</td>
</tr>
</tbody>
</table>

Option 3
Biochemistry - Bachelor of Arts (BA)

CHEM 3311 Organic Chemistry 1
& CHEM 3321 and Laboratory in Organic Chemistry 1
CHEM 3331 Organic Chemistry 2
& CHEM 3341 and Laboratory in Organic Chemistry 2

Select one of the following physical chemistry options: 4-6

Option 1
CHEM 4400 Core Concepts in Physical Chemistry for Biochemists

Option 2
CHEM 4511 Physical Chemistry 1
& CHEM 4531 and Physical Chemistry 2

Other required chemistry course work:
CHEM 4700 Foundations of Biochemistry 4
CHEM 4720 Metabolic Pathways and Human Disease 4
or CHEM 4740 Biochemistry of Gene Transmission, Expression and Regulation
CHEM 4761 Biochemistry Laboratory 4

Select three of the following elective courses: 9-12
CHEM 4720 Metabolic Pathways and Human Disease (if not taken as a required major course)
CHEM 4740 Biochemistry of Gene Transmission, Expression and Regulation (if not taken as a required major course; cannot also count MCDB 3135 as a required ancillary course)
CHEM 4751 Current Topics in Biochemical Research
CHEM 4791 Bioorganic Chemistry in Biotechnology
CHEM 4011 Modern Inorganic Chemistry
CHEM 4171 Instrumental Analysis - Lecture and Laboratory 1
CHEM 4181 Instrumental Analysis - Lecture and Laboratory 2
CHEM 5341 Chemical Biology and Drug Design
MCDB 3135 Molecular Cell Biology I (cannot also count CHEM 4740 as a required ancillary course)
MCDB 3145 Molecular Cell Biology II
MCDB 3150 Biology of the Cancer Cell
MCDB 3501 Structural Methods for Biological Macromolecules
MCDB 3650 The Brain - From Molecules to Behavior
MCDB 3990 Introduction to Systems Biology for Biologists
MCDB 4310 Microbial Genetics and Physiology
MCDB 4410 Human Molecular Genetics
MCDB 4471 Mechanisms of Gene Regulation in Eukaryotes
MCDB 4520 Bioinformatics and Genomics
EBIO 2070 Genetics: Molecules to Populations (cannot also count MCDB 2150 as a required ancillary course)
EBIO 3400 Microbiology
EBIO 4530 Functional Plant Biology
IPHY 3430 Introduction to Human Physiology
IPHY 3470 Human Physiology 1
IPHY 3480 Human Physiology 2

Required ancillary course work from outside chemistry:

Required physics courses:
PHYS 1110 General Physics 1
& PHYS 1120 and General Physics 2
PHYS 1140 Experimental Physics 1

Select one of the following calculus sequences: 8-10

MATH 1300 Calculus 1
& MATH 2300 and Calculus 2
APPM 1350 Calculus 1 for Engineers
& APPM 1360 and Calculus 2 for Engineers

Select one of the following biology sequence options: 8

Option 1
MCDB 1150 Introduction to Cellular and Molecular Biology
& MCDB 1151 and Introduction to Cell and Molecular Biology Lab
MCDB 2150 Principles of Genetics
& MCDB 2151 and Principles of Genetics Laboratory

Option 2
EBIO 1210 General Biology 1
& EBIO 1230 and General Biology Laboratory 1
EBIO 1220 General Biology 2
& EBIO 1240 and General Biology Laboratory 2

Total Credit Hours 65-79

All students, and especially those intending to go onto graduate school in biochemistry, will benefit from additional advanced courses. Recommended electives include graduate courses in various fields of chemistry, or advanced courses in biology or mathematics.

Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain progress in chemistry and biochemistry, students should meet the following requirements:

• In the first semester, declare the biochemistry major.

Students must consult with a major advisor to determine adequate progress toward completion of the major.