Chemistry - Bachelor of Arts (BA)

Chemistry major students are prepared for many different careers after graduation. About 50 percent of chemistry majors enter directly into industry or government positions that require scientific expertise, such as chemical, oil, electronics, mining and manufacturing industries, water districts, crime laboratories, biotechnology, health and safety, atmospheric science and environmental quality.

Approximately 25 percent of chemistry graduates are attracted by specialized graduate education in chemistry and biochemistry. Graduate work is often in one of the traditional areas of biochemistry or analytical, inorganic, organic or physical chemistry and, increasingly, in interdisciplinary areas such as atmospheric, bio-organic or organo-metallic chemistry, molecular biology, biotechnology and chemical physics for their advanced work. Another 25 percent of a typical graduating class goes on to professional school, pursuing advanced degrees in medicine, dentistry, pharmacy, law, business, engineering and computer science.

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 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 and opportunity awards 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 elective credit.

Chemistry Honors Program

Opportunity is provided for qualified chemistry and biochemistry majors to participate in the departmental honors program and graduate with honors (cum laude, magna cum laude, or summa cum laude) in chemistry. Students interested in the honors program should contact the departmental honors advisor during their junior year.

American Chemical Society Certification

The American Chemical Society maintains a certification program in which a student graduating with a specified minimum program is certified to the society upon graduation. To be certified, a graduate must satisfy requirements in addition to the minimum for graduation. The department offers this certificate for the chemistry or chemistry/biochemistry double majors only. A list of these requirements may be obtained from the undergraduate chemistry and biochemistry advising office.

Research Opportunities

Undergraduate Research Opportunities Program

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 please visit the Undergraduate Research Opportunities Program (http://www.colorado.edu/suep/about-urop) website. Visit Other Funding Opportunities (http://www.colorado.edu/suep/urop/other-funding) for a list of other funding opportunities for undergraduate students.

Independent Study

Independent study (CHEM 4901), provides an opportunity for a student to work on a research project with an individual faculty member outside of the regular class structure. This generally provides an experience much more like real-life chemistry or biochemistry, where new results are being sought and the outcome of the research is not known in advance. The student may have a totally independent project or may become part of a research team working at the forefront of science. In favorable cases the project may result in publication of the results of the independent study in the scientific literature. As part of the research team in a particular group the student will usually participate in group seminars and informal discussions with other members of the group.

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

Chemistry or 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 chemistry, in addition to completing all the current requirements for the BA with a major in chemistry at the home institution, students must complete one full-time semester experiential, customized, international learning experience at the non-home institution.

Requirements

The chemistry major requires 30 credit hours of upper-division chemistry course work, including courses in general, organic, physical and analytical/instrumental chemistry, as well as an introductory general chemistry sequence and ancillary work in calculus and physics.
Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

Transfer students who plan to take a chemistry major must complete at the Boulder campus a minimum of 12 credit hours of upper-division work covering at least two subdisciplines: organic, physical, analytical and inorganic for chemistry majors.

Students must 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 chemistry major courses**

- Select one of the following general chemistry sequence options: 10
  - **Option 1:**
    - CHEM 1400 & CHEM 1401 Foundations of Chemistry and Foundations of Chemistry Lab
    - CHEM 2100 & CHEM 2101 Chemical Energetics and Dynamics and Laboratory for Chemical Energetics and Dynamics
  - **Option 2:**
    - CHEM 1113 & CHEM 1114 General Chemistry 1 and Laboratory in General Chemistry 1
    - CHEM 1133 & CHEM 1134 General Chemistry 2 and Laboratory in General Chemistry 2

- Select one of the following organic chemistry options: 8
  - **Option 1**
    - CHEM 3451 & CHEM 3471 Organic Chemistry for Chemistry and Biochemistry Majors and Organic Chemistry 2 for Chemistry Majors
  - **Option 2**
    - CHEM 3451 & CHEM 3491 Organic Chemistry for Chemistry and Biochemistry Majors and Organic Chemistry 2 for Biochemistry Majors
  - **Option 3**
    - CHEM 3311 & CHEM 3331 Organic Chemistry 1 and Organic Chemistry 2

- Other required chemistry course work:
  - CHEM 3361 & CHEM 3381 Laboratory in Organic Chemistry 1 for Chemistry Majors and Laboratory in Organic Chemistry 2 for Chemistry Majors
  - CHEM 4011 Modern Inorganic Chemistry
  - CHEM 4171 Instrumental Analysis - Lecture and Laboratory 1
  - CHEM 4181 Instrumental Analysis - Lecture and Laboratory 2
  - CHEM 4511 Physical Chemistry 1 & CHEM 4581 Physical Chemistry Lab 1
  - CHEM 4531 Physical Chemistry 2 & CHEM 4591 Physical Chemistry Lab 2

- Chemistry electives
  - All students, and especially those intending to go on to graduate school in chemistry, will benefit from additional advanced courses. Recommended electives include the following:
    - CHEM 3151 Air Chemistry and Pollution
    - CHEM 3251 Sustainable Energy from a Chemistry Perspective
    - CHEM 4021 Inorganic Laboratory
    - CHEM 4141 Environmental Water and Soil Chemistry
    - CHEM 4251 Materials Chemistry and Properties
    - CHEM 4261 Organic Materials: Structures and Functions
    - CHEM 4271 Chemistry of Solar Energy
    - CHEM 4611 Survey of Biochemistry
    - CHEM 4700 Foundations of Biochemistry
    - CHEM 4720 Metabolic Pathways and Human Disease
    - CHEM 4740 Biochemistry of Gene Transmission, Expression and Regulation
    - CHEM 4901 Independent Study in Chemistry and Biochemistry

Graduate courses in various fields of chemistry

Advanced courses in mathematics or physics

**Required ancillary course work from outside chemistry:**

**Required physics courses:**
- PHYS 1110 & PHYS 1120 General Physics 1 and General Physics 2 8
- PHYS 1140 Experimental Physics 1 1

- Select one of the following calculus sequences: 12-14
  - **Option 1:**
    - MATH 1300 Calculus 1
    - MATH 2300 Calculus 2
    - MATH 2400 Calculus 3
  - **Option 2:**
    - APPM 1350 Calculus 1 for Engineers
    - APPM 1360 Calculus 2 for Engineers
    - APPM 2350 Calculus 3 for Engineers

- Total Credit Hours 61-63

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 chemistry major.

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