College of Chemistry

Introduction to the College

Chemistry, chemical biology, chemical engineering, and biomolecular engineering provide fantastic opportunities for pursuing a stimulating and gratifying career while making a positive impact on society. Since chemistry is the gateway to all the molecular sciences and much of engineering, the College of Chemistry facilitates many possible career paths.

Humans live in a chemical world where their lives, environment, energy, food, and products are all impacted and/or provided by the activities of chemists and chemical engineers. Making new organic, inorganic, and nano materials; developing new drugs and methods for delivery; developing new synthetic procedures; understanding fundamental elements of chemical structure, bonding, and reactions; exploring chemical biology, the chemical basis of biological processes; producing sustainable energy through biofuels and photovoltaics; and improving the environment through green chemical processes—all depend critically upon chemistry and chemical engineering. Students entering these fields today will find exciting careers addressing fundamental challenges in chemistry, applying chemical concepts to problems in related scientific areas, and using established concepts to pioneer new technologies.

The Department of Chemistry and the Department of Chemical and Biomolecular Engineering in the College of Chemistry rank among the most prominent in the nation, and both are renowned for their excellence in a diverse range of sub-disciplines and applications. Nowhere else will students find such a wide selection of instructional excellence in the chemical sciences and their applications or such varied opportunities for research. Superb facilities at the Lawrence Berkeley National Laboratory enhance many of the College's research programs. The California Institute for Quantitative Biomedical Research (QB3) provides a dynamic interdisciplinary environment in which students and faculty in the college collaborate with their colleagues in the physical and biological sciences and in engineering to conduct cutting-edge research into biological problems and to produce the breakthroughs of the future.

With only two departments, the College of Chemistry provides a relatively small and collegial place in which to live and work while being nestled in one of the most beautiful and vibrant cosmopolitan areas in the world. Students' intellectual, scientific, and social experiences at Berkeley will shape their life and outlook for years to come.

Explore majors and minors (http://guide.berkeley.edu/archive/2014-15/undergraduate/degree-programs/?filter_1=true) available through the College of Chemistry.

University of California Requirements

Entry Level Writing (http://guide.berkeley.edu/archive/2014-15/undergraduate/colleges-schools/chemistry/entry-level-writing-requirement)

All students who will enter the University of California as freshmen must demonstrate their command of the English language by fulfilling the Entry Level Writing Requirement. Fulfillment of this requirement is also a prerequisite to enrollment in all reading and composition courses at UC Berkeley.

American History and American Institutions (http://guide.berkeley.edu/archive/2014-15/undergraduate/colleges-schools/chemistry/american-history-institutions-requirements)

The American History and Institutions requirements are based on the principle that a U.S. resident graduated from an American university should have an understanding of the history and governmental institutions of the United States.

Campus Requirement

American Cultures (http://guide.berkeley.edu/archive/2014-15/undergraduate/colleges-schools/chemistry/american-cultures-requirement)

American Cultures (AC) is the one requirement that all undergraduate students at UC Berkeley need to take and pass in order to graduate. The requirement offers an exciting intellectual environment centered on the study of race, ethnicity and culture of the United States. AC courses offer students opportunities to be part of research-led, highly accomplished teaching environments, grappling with the complexity of American Culture.

College Requirements

Foreign Language - Applies to Chemistry and Chemical Biology majors only.

The Foreign Language requirement may be satisfied with one foreign language, in one of the following ways:

- By completing in high school the third year of one foreign language with minimum grades of C-.
- By completing at Berkeley the second semester of a sequence of courses in one foreign language or the equivalent at another institution. Only foreign language courses that include reading and composition as well as conversation are accepted in satisfaction of this requirement. Foreign language courses may be taken on a *Pass/No Pass* basis.
- By demonstrating equivalent knowledge of a foreign language through examination, including a College Entrance Examination Board (CEEB) Advanced Placement Examination with a score of 3 or higher (if taken before admission to college), an SAT II: Subject Test with a score of 590 or higher, or a proficiency examination offered by some departments at Berkeley or at another campus of the University of California.

Reading and Composition (http://guide.berkeley.edu/archive/2014-15/undergraduate/colleges-schools/chemistry/reading-composition-requirement)

In order to provide a solid foundation in reading, writing and critical thinking the College requires lower division work in composition.

- Chemical Engineering majors – A-level Reading and Composition course (e.g., English R1A) by the end of freshman year
- Chemical Biology and Chemistry majors – A- and B-level courses by end of sophomore year

Breadth Elective Requirement – Chemistry & Chemical Biology majors

- 15 units total; includes Reading & Composition (R1A + R1B) and American Cultures courses

- Remaining units must come from the College of Chemistry's list of acceptable Humanities and Social Science courses (Group II): http://chemistry.berkeley.edu/student_info/undergrad_info/degree_programs/docs/breadth-requirements-grp-2.pdf
- Breadth elective courses may be taken on a *Pass/No Pass* basis (excluding Reading and Composition)
- AP, IB, and GCE A-level exam credit may be used to satisfy the breadth requirement: http://chemistry.berkeley.edu/student_info/undergrad_info/exams.php

Breadth Elective Requirement – Chemical Engineering major

- 19 unit total; includes Reading and Composition (R1A only) and American Cultures courses
- Breadth Series requirement: As part of the 19 units, students must complete two courses, at least one being upper division, in the same or very closely allied humanities or social science department(s). AP credit may be used to satisfy the lower division aspect of the requirement.
- Breadth Series courses and all remaining units must come from the College of Chemistry's list of acceptable Humanities and Social Science courses (Group II): http://chemistry.berkeley.edu/student_info/undergrad_info/degree_programs/docs/breadth-requirements-grp-2.pdf
- Breadth elective courses may be taken on a *Pass/No Pass* basis (excluding Reading and Composition)
- AP, IB, and GCE A-level exam credit may be used to satisfy the breadth requirement: http://chemistry.berkeley.edu/student_info/undergrad_info/exams.php

Class Schedule Requirements

Minimum units per semester – 13

Maximum units per semester – 19.5

12 units of course work each semester must satisfy degree requirements.

Chemical Engineering freshmen and Chemistry majors are required to enroll in a minimum of one chemistry course each semester.

After the freshman year, Chemical Engineering majors must enroll in a minimum of one chemical and biomolecular engineering course each semester.

Semester Limit

- Students who entered as freshmen – 8 semesters
- Chemistry & Chemical Biology majors who entered as transfer students – 4 semesters
- Chemical Engineering majors who entered as transfer students – 5 semesters

Summer sessions are excluded when determining the limit on semesters. Students who wish to delay graduation to complete a minor, a double major, or simultaneous degrees must request approval for delay of graduation before what would normally be their final two semesters. The College of Chemistry does not have a rule regarding maximum units that a student can accumulate.

Senior Residence

After 90 units toward the bachelor's degree have been completed, at least 24 of the remaining units must be completed in residence in the College of Chemistry, in at least two semesters (the semester in which the 90 units are exceeded, plus at least one additional semester).

To count as a semester of residence for this requirement, a program must include at least 4 units of successfully completed courses. A summer session can be credited as a semester in residence if this minimum unit requirement is satisfied.

Juniors and seniors who participate in the UC Education Abroad Program (UCEAP) for a *full year*#may meet a modified senior residence requirement. After 60 units toward the bachelor's degree have been completed, at least 24 (excluding UCEAP) of the remaining units must be completed in residence in the College of Chemistry, in at least two semesters. At least 12 of the 24 units must be completed after the student has already completed 90 units. Undergraduate Dean's approval for the modified senior residence requirement must be obtained before enrollment in the Education Abroad Program.

Minimum Total Units

A student must successfully complete at least 120 semester units in order to graduate.

Minimum Academic Requirements

Grades

A student must earn at least a C average (2.0 GPA) in all courses undertaken at UC including those from UC Summer Sessions, UC Education Abroad Program, and UC Berkeley Washington Program as well as XB courses from University Extension.

Minimum Course Grade Requirements

Students in the College of Chemistry who receive a grade of D+ or lower in a chemical and biomolecular engineering or chemistry course for which a grade of C- or higher is required must repeat the course *at UC Berkeley*.

Students in the College of Chemistry must achieve:

- C- or higher in CHEM 4A General Chemistry and Quantitative Analysis before taking CHEM 4B General Chemistry and Quantitative Analysis
- C- or higher in CHEM 4B General Chemistry and Quantitative Analysis before taking more advanced courses
  C- or higher in CHEM 112A Organic Chemistry before taking CHEM 112B Organic Chemistry GPA of at least 2.0 in all courses taken in the college in order to advance to and continue in the upper division

Chemistry or chemical biology majors must also achieve:

- C- or higher in CHEM 120A Physical Chemistry and CHEM 120B Physical Chemistry if taken before CHEM 125 Physical Chemistry Laboratory or CHEM C182 Atmospheric Chemistry and Physics Laboratory
- 2.0 GPA in all upper division courses taken at the University to satisfy major requirements

Chemical engineering students must also achieve:

- C- or higher in Chemical and Biomolecular Engineering (CBE) 140 before taking any other CBE courses
- C- or higher in CHM ENG 150A Transport Processes to be eligible to take any other course in the 150 series
- 2.0 GPA in all upper division courses taken at the University to satisfy major requirements

Chemical engineering students who do not achieve a grade of C- or higher in CHM ENG 140 Introduction to Chemical Process Analysis on their first attempt are advised to change to another major. If the course is not passed with a grade of C- or higher on the second attempt, continuation in the Chemical Engineering program is normally not allowed.

Minimum Progress

To make normal progress toward a degree, undergraduates must successfully complete 30 units of coursework each year. The continued enrollment of students who do not maintain normal progress will be subject to the approval of the Undergraduate Dean. To achieve minimum academic progress, the student must meet two criteria:

1. Completed no fewer units than 15 multiplied by the number of semesters, less one, in which the student has been enrolled at Berkeley. Summer sessions do not count as semesters for this purpose.
2. A student's class schedule must contain at least 13 units in any term, unless otherwise authorized by the staff adviser or the Undergraduate Dean.

The College of Chemistry admits students as first-semester freshmen or as junior transfer students. The College does not accept spring admits. Spring admits who wish to change into the College of Chemistry must speak with the Freshman Adviser as soon as possible.

Admission to the joint major programs (Chemical Engineering and Materials Science and Chemical Engineering and Nuclear Engineering) is open to transfer students but closed to freshmen. Continuing students may petition for a change to a joint major program after their first year.

Admission as a Freshman

High school students preparing to major in Chemistry, Chemical Biology, or Chemical Engineering should take the following courses:

- Chemistry (one year minimum; two years strongly recommended, including AP Chemistry)
- Physics (one year)
- Mathematics (four years, preferably ending with introductory calculus)
- Foreign language (three years)

Advice for Prospective Freshmen

Before applying, please take some time to learn about the programs and make sure that the College of Chemistry is right for you!

Frequently Asked Questions

How do I declare my major?

When applying to the College of Chemistry as a Chemistry, Chemical Biology, or Chemical Engineering major, students are officially declaring their major. Students will be expected to enroll in courses that are appropriate for the major starting in the fall semester of their freshman year. Students may petition to change into a different major within the College of Chemistry after their first year.

Will I have time to take other courses?

Students have some room in their schedule to explore other subjects and to take breadth electives, but they will be expected to follow the basic program for their major including courses in chemistry, mathematics, and physics.

Can I follow the Pre-med path in the College of Chemistry?

Students can prepare for medical, dental, or pharmacy school with a major in the College of Chemistry. Generally, medical schools do not favor any particular undergraduate major. See the UC Berkeley Career Center web site (https://career.berkeley.edu/Health/Health.stm) for more information.

Is the College of Chemistry right for me?

Choosing a major is a big decision. Students who are unsure about what they want to study may prefer to apply to the College of Letters and Science where they will have time to explore several different areas before declaring a major.

However, for students who are ready to commit to a course of study in the chemical sciences, the College of Chemistry is a good choice. The College of Chemistry is a small, collegial college within a large cosmopolitan university. The 850 undergraduates have access to a broad array of research facilities and other resources including a strong support staff.

Find out more about the College of Chemistry by contacting the College of Chemistry Freshman Adviser.

Admission as a Transfer Student

The requirements for entry to the University may be met by establishing a good record at another collegiate institution. Transfer applicants must complete at least 60 semester units or 90 quarter units of UC-transferable course work by the end of the spring term before transferring to UC Berkeley. Students are encouraged to investigate the University-preparatory programs offered by the many community colleges throughout California. Up to 70 UC-transferable semester units may be transferred from a community college.

Transfer students may apply to the following majors:

- Chemistry
- Chemical Biology
- Chemical Engineering
- Chemical Engineering and Materials Science and Engineering (joint major)
- Chemical Engineering and Nuclear Engineering (joint major)

Chemistry or Chemical Biology applicants must complete, at a minimum, courses equivalent to the following:

CHEM 1A & 1AL & CHEM 1B	General Chemistry and General Chemistry Laboratory and General Chemistry	8
CHEM 3A & 3AL & CHEM 3B & CHEM 3BL	Chemical Structure and Reactivity and Organic Chemistry Laboratory and Chemical Structure and Reactivity and Organic Chemistry Laboratory	10

MATH 1A & MATH 1B & MATH 53	Calculus and Calculus and Multivariable Calculus	12
PHYSICS 7A	Physics for Scientists and Engineers [1]	4
ENGLISH R1A & ENGLISH R1B	Reading and Composition and Reading and Composition	8

1 Choice of PHYSICS 7A Physics for Scientists and Engineers or PHYSICS 8A Introductory Physics for chemical biology majors

In addition, chemistry or chemical biology candidates are encouraged to complete MATH 54 Linear Algebra and Differential Equations and PHYSICS 7B Physics for Scientists and Engineers (choice of PHYSICS 8B Introductory Physics for chemical biology majors). Chemical biology majors are also encouraged to complete BIOLOGY 1A General Biology Lecture-BIOLOGY 1AL General Biology Laboratory.

Please note that courses taken the summer before enrollment at Berkeley are not considered in the selection of applicants.

Completion of a year of organic chemistry (lecture and lab), combined with a score in the 75th percentile or higher on the American Chemical Society (ACS) Organic Chemistry Exam constitutes satisfactory completion of UC Berkeley's CHEM 112A Organic Chemistry-CHEM 112B Organic Chemistry sequence. Students are encouraged to take the exam through their community college, if possible.

Completion of the Intersegmental General Education Transfer Curriculum (IGETC) is not required. However, when completed by the end of the spring term before transferring to UC Berkeley, IGETC is accepted in satisfaction of the English Reading and Composition Requirement and the Foreign Language Requirement (IGETC does not necessarily satisfy the entire breadth requirement).

Transfer applicants need grades of A or B in math and science courses to be adequately prepared to continue with junior-level courses.

Chemical Engineering and Chemical Engineering joint major applicants must complete, at a minimum, courses equivalent to the following:

CHEM 1A & 1AL & CHEM 1B	General Chemistry and General Chemistry Laboratory and General Chemistry	8
MATH 1A & MATH 1B & MATH 53 & MATH 54	Calculus and Calculus and Multivariable Calculus and Linear Algebra and Differential Equations	16
PHYSICS 7A & PHYSICS 7B	Physics for Scientists and Engineers and Physics for Scientists and Engineers	8
ENGLISH R1A	Reading and Composition	4

In addition, chemical engineering and chemical engineering joint major candidates are encouraged to complete ENGIN 7 Introduction to Computer Programming for Scientists and Engineers and ENGIN 45 Properties of Materials, if available. Chemical engineering applicants are also encouraged to complete BIOLOGY 1A General Biology Lecture.

Please note that courses taken the summer before enrollment at Berkeley are not considered in the selection of applicants.

Completion of a year of organic chemistry (lecture and lab), combined with a score in the 75th percentile or higher on the American Chemical Society (ACS) Organic Chemistry Exam will constitute satisfactory completion of UC Berkeley's CHEM 112A Organic Chemistry-CHEM 112B Organic Chemistry sequence. Students are encouraged to take the exam through their community college, if possible.

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Transfer applicants need grades of A or B in math and science courses to be adequately prepared to continue with junior-level courses.

Applicants must satisfy UC minimum admissions requirements (http://admission.universityofcalifornia.edu/transfer/requirements/minimum-requirements) . For questions about admission as a transfer student, contact the Undergraduate Advising office (http://chemistry.berkeley.edu/student_info/undergrad_info/people/office_directory.php) .

The College of Chemistry Undergraduate Advising team supports student success by helping students define and achieve their academic and personal goals. Advisers guide students in course selection, completion of degree requirements, and other academic decision-making. They serve as a resource for information about research and internship opportunities, enrichment programs, and a wide variety of campus support services. Their goal is to empower students to create a meaningful educational experience at UC Berkeley.

Each College of Chemistry student also has a **Faculty Adviser**, who provides professional mentoring in Chemistry, Chemical Biology, or Chemical Engineering. Students meet with their Faculty Adviser at least once per semester to discuss course planning, research, and professional development.

Finally, College of Chemistry **Peer Advisers** offer an essential student perspective on academic and co-curricular issues and opportunities. They hold office hours in the Undergraduate Advising Center and maintain an active social media presence.

Undergraduate Advising Contact Information

Marcin Majda, Ph.D., Undergraduate Dean
(510) 642-8961; undergrad.dean@cchem.berkeley.edu

Maura Daly, Freshman Adviser
(510) 643-0550; mdaly@berkeley.edu

Monica Jackson, Continuing Students, A-R
(510) 642-3451; majt@berkeley.edu

Shamaya Pellum, Continuing Students, S-Z
(510) 643-1745; spellum@berkeley.edu

Joey Wong, Transfer Student Adviser
(510) 642-7919; joeywong@berkeley.edu

Address

Office of Undergraduate Advising
Que Family Undergraduate Advising Center

121 Gilman Hall, #1460
University of California, Berkeley
Berkeley, CA 94720-1460

Web Information

College of Chemistry Undergraduate Information
http://chemistry.berkeley.edu/student_info/undergrad_info/

Degree Program Information
http://chemistry.berkeley.edu/student_info/undergrad_info/degree_programs/

Dean's Honor List

A list comprised of students who attain a term-GPA of 3.9 or higher, published every semester.

Awards & Scholarships

The College of Chemistry offers a number of awards and scholarships to its currently enrolled sophomores, juniors, and seniors.

Study Abroad

The College of Chemistry encourages all undergraduates in the college to study abroad. Whether students are interested in fulfilling breadth requirements, taking courses related to their major/career, or simply living and studying in another country, the College will work with them to make it happen.

College of Chemistry Scholars Program

The College of Chemistry Scholars Program (http://chemistry.berkeley.edu/student_info/undergrad_info/cocsp) was established in 1991 to promote and advance the educational and career opportunities of students from underrepresented groups in the fields of chemistry and chemical engineering.

It also seeks to address industry's need for a diverse pool of individuals qualified for technical employment as well as the societal need to understand the chemical and technical processes that shape lives. Contact Maura Daly or Monica Jackson for more information.

College of Chemistry Teaching Scholars Program

The College of Chemistry Teaching Scholars Program (http://chemistry.berkeley.edu/student_info/undergrad_info/teacher_scholars) enables undergraduate students to participate in the instruction of lower division chemistry courses. The program fosters a sense of community in chemistry courses, and enhances conceptual learning via one-on-one interactions between students and instructors. Participants gain a sound understanding of instructional techniques and strategies while earning two units of *Pass/No Pass* credit.

Undergraduate Research

College of Chemistry students are encouraged to do research for credit under the direction of a faculty member. Students follow their own scientific interests in the selection of research projects. Such research usually involves experimental, theoretical, or computational work within the context of funded research directed by a faculty member in the College of Chemistry or in other departments on campus. Please go to the Undergraduate Research page (http://chemistry.berkeley.edu/student_info/undergrad_info/degree_programs/chem_major/undergraduate_research.php) for more information.