

Chemistry (Department of)

College of Chemistry (<http://chemistry.berkeley.edu>)

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Chemistry Major in the College of Chemistry (BS Degree)

The requirements for a BS degree in the College of Chemistry, with a chemistry major, are: A total of 120 semester units; Mathematics 1A, 1B, 53, 54; Physics 7A, 7B; Chemistry 4A, 4B, 104A, 104B, 112A, 112B, 120A, 120B, 125, and a choice of 105, 108, 115, or 146. In addition to these specified courses, the BS chemistry major consists of 15 units of advanced study in chemistry and related fields, including at least one lecture course in chemistry. These courses permit the student to emphasize chemistry in areas of personal interest or to specialize in related fields, such as physics, biology, geology, mathematics, materials science, or nuclear science.

The Materials Chemistry concentration within the Chemistry major requires Chemistry C150, two chemistry laboratory courses (105 or 125, plus 108 or 115), and 10 units of upper division electives. These courses are taken in place of the following upper division Chemistry requirements: Chemistry 125; Chemistry 105, 108, 115, or 146; and 15 units of advanced study in chemistry and related fields.

The following requirements must also be satisfied: Entry-level Writing; American History and Institutions; American Cultures; a second-semester foreign language course or equivalent; and the 15 unit breadth requirement, which includes courses in reading and composition (English R1A and R1B or equivalent), humanities, and social sciences.

Chemical Biology Major

The requirements for a BS degree in Chemical Biology are as follows: A total of 120 semester units; Mathematics 1A, 1B, 53, 54; Physics 7A, 7B (8A, 8B may be taken in place of 7A, 7B, but 7A, 7B are recommended); Biology 1A and 1AL; Chemistry 4A, 4B, 103, C110L, 112A, 112B, 120A, 120B, 135, and one of 105, 125, C170L, or C182; Molecular and Cell Biology 110. In addition to these specified courses, the BS chemical biology major requires 7 units of advanced study in chemistry and related fields, including at least one lecture course in chemistry.

The following requirements must also be satisfied: Entry-Level Writing; American History and Institutions; American Cultures; a second-semester foreign language course or equivalent; and the 15 unit breadth requirement, which includes courses in reading and composition (English R1A and R1B or equivalent), humanities, and social sciences.

Undergraduate Research

Students are encouraged to participate in individual undergraduate research in collaboration with one of the faculty during their junior or senior year.

Intercollegiate Transfers

Transfer applicants are expected to complete, at a minimum, courses equivalent to Chemistry 1A-1B, Mathematics 1A-1B, Physics 7A (Physics 7A or 8A for chemical biology majors), English R1A-R1B, and two additional courses toward the major before transfer. In addition, completion of additional chemistry, mathematics, calculus-based physics, and some biology is encouraged. Chemistry and chemical biology majors who transfer without having covered quantitative analysis are required to take a quantitative analysis course after transfer. Coursework taken the summer before enrollment at UC Berkeley is not considered in the selection of applicants.

Chemistry Major in the College of Letters and Science (BA Degree)

The requirements are: Mathematics: 1A, 1B, 53, 54. Physics: 7A, 7B. Chemistry: 4A, 4B, 104A, 104B (103 and 135 may be taken in place of 104A, 104B), 112A, 112B, 120A, 120B, and a choice of one of the following: 105, 108, 115, 125, C170L, or C182.

Honors at Graduation for a BA Degree

To be eligible to receive honors in Chemistry at graduation, candidates for the BA degree must earn a grade point average (GPA) of at least 3.5 in upper division courses in the major and at least 3.3 overall at Berkeley; and complete at least three units of Chemistry H194 or another advanced chemistry course as approved by the department.

Chemistry Minor in the College of Chemistry

Note: The Chemistry minor is not available to Chemical Biology majors.

A minor in Chemistry will be awarded to students who have successfully completed one year of organic chemistry (3A plus 3AL and 3B plus 3BL or 112A-112B or equivalent), one year of physical chemistry taken at Berkeley (120A-120B, or C130 and 130B), and two additional upper division chemistry courses taken at Berkeley (with the exception of courses numbered 190-199). All of the courses taken for the minor must be taken for a letter grade. Students must achieve at least a 2.0 GPA in the courses taken for the minor for each of the following: upper division courses, courses taken at Berkeley, and organic chemistry courses if taken at another institution and accepted by the College of Chemistry as equivalent to 3A plus 3AL, 3B plus 3BL, 112A, or 112B. For the minor to be awarded, students must submit a notification of completion of the minor to the College of Chemistry Undergraduate Advising Office.

Please consult with your college or school for information on rules regarding overlap of courses between majors and minors.

California Teaching Credential

For information concerning the California Teaching credential (Single or Multiple Subject), see the Graduate School of Education's *Guide to Graduate Studies*.

Graduate Programs

Students interested in graduate study are invited to visit the department's website (http://chem.berkeley.edu/grad_info) for more information.

CHEM 1A General Chemistry 3 Units

Department: Chemistry

Course level: Undergraduate

Terms course may be offered: Fall, spring and summer

Grading: Letter grade.

Hours and format: 3 hours of Lecture and 1 hour of Discussion per week for 15 weeks. 6 hours of Lecture and 2 hours of Discussion per week for 8 weeks.

Prerequisites: High school chemistry recommended.

Stoichiometry of chemical reactions, quantum mechanical description of atoms, the elements and periodic table, chemical bonding, real and ideal gases, thermochemistry, introduction to thermodynamics and equilibrium, acid-base and solubility equilibria, introduction to oxidation-reduction reactions, introduction to chemical kinetics.

Students will receive no credit for 1A after taking 4A.

CHEM 1AL General Chemistry Laboratory 1 Unit

Department: Chemistry

Course level: Undergraduate

Terms course may be offered: Fall, spring and summer

Grading: Letter grade.

Hours and format: 1 hour of Lecture and 3 hours of Laboratory per week for 15 weeks. 1 hour of Lecture and 6 hours of Laboratory per week for 8 weeks.

Prerequisites: 1A (may be taken concurrently).

An experimental approach to chemical sciences with emphasis on developing fundamental, reproducible laboratory technique and a goal of understanding and achieving precision and accuracy in laboratory experiments. Proper use of laboratory equipment and standard wet chemical methods are practiced. Areas of investigations include chemical equilibria, spectroscopy, nanotechnology, green chemistry, and thermochemistry. Concurrent enrollment in 1A is recommended.

Students will receive no credit for 1AL after taking 4A.

CHEM 1B General Chemistry 4 Units

Department: Chemistry

Course level: Undergraduate

Terms course may be offered: Spring and summer

Grading: Letter grade.

Hours and format: 2 hours of Lecture and 4 hours of Laboratory per week for 15 weeks. 6 hours of Lecture and 8 hours of Laboratory per week for 8 weeks.

Prerequisites: 1A and 1AL or equivalent, or a score of 3, 4, or 5 on the Chemistry AP test.

Introduction to chemical kinetics, electrochemistry, properties of the states of matter, binary mixtures, thermodynamic efficiency and the direction of chemical change, quantum mechanical description of bonding introduction to spectroscopy. Special topics: Research topics in modern chemistry and biochemistry, chemical engineering.

Students will receive no credit for 1B after taking 4B.

CHEM W1A General Chemistry 3 Units

Department: Chemistry

Course level: Undergraduate

Terms course may be offered: Fall, spring and summer

Grading: Letter grade.

Hours and format: 3 hours of Web-based lecture and 1 hour of Web-based discussion per week for 15 weeks. 6 hours of Web-based lecture and 2 hours of Web-based discussion per week for 8 weeks. This is an online course.

Prerequisites: High school chemistry is recommended.

Stoichiometry of chemical reactions, quantum mechanical description of atoms, the elements and periodic table, chemical bonding, real and ideal gases, thermochemistry, introduction to thermodynamics and equilibrium, acid-base and solubility equilibria, introduction to oxidation-reduction reactions, introduction to chemical kinetics. This course is web-based.