

# Chemistry, B.S.

## DEPARTMENT

### Department of Chemistry

Joy Goto, Chair  
Science Building, Room 380  
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[www.fresnostate.edu/chemistry](http://www.fresnostate.edu/chemistry)

MN in Chemistry, Minor  
BA in Chemistry, B.A.  
BS in Chemistry, B.S.  
MS in Chemistry, M.S.  
BS in Biochemistry, B.S.  
CRED in Single Subject Credential - Chemistry  
Courses Offered

The Chemistry Department provides (1) undergraduate training in chemistry for students planning professional careers in chemistry, biochemistry and allied professions, and for those contemplating graduate work for advanced degrees; (2) undergraduate training in chemistry for those planning careers in professions such as medicine, chiropractic, dentistry, pharmacy, etc.; (3) participation in the preparation of teachers of chemistry and the other physical sciences in the teaching credential programs; (4) teaching of the basic chemical sciences required by students majoring in related fields such as physics, biology, nursing, engineering, geology, agriculture, home economics, and criminology; (5) stimulation of interest in and understanding of the achievements and contributions of chemistry to our civilization for non-science students, as a part of General Education; and (6) graduate instruction in chemistry for the Master of Science degree for students who intend to enter the chemical industry, pursue further advanced study, or who wish to improve their qualifications as teachers in secondary schools and community colleges. The multi-disciplinary forensic science degree program prepares students for continued success by integrating instruction with active forensic research, collaboration with local crime laboratories, and real world experiences.

The Bachelor of Science degree programs in Chemistry/Biochemistry are accredited by the American Chemical Society. Students who satisfactorily complete the program are recommended by the department for certification as graduate chemists by the American Chemical Society. Students completing the Bachelor of Arts degree may be recommended for certification by completing additional requirements of the American Chemical Society.

### Facilities

The graduate chemistry laboratories and support areas are housed in the science building. Students have access to a broad range of instrumentation, including two solution-state NMR spectrometers (300 MHz and 400 MHz), an EPR spectrometer, Jasco-1815 CD spectrometer, a TA instruments nano-DSC, a range of mass spectrometers (including ion trap, micro-TOF and MALDI-TOF-TOF), several HPLC systems. Fourier Transform Infrared spectrometers (transmission and multi-bounce ATR) a range of gas chromatographs (including instruments with mass spectrometer detectors, flame ionization detectors, and electron capture detectors), UV-vis spectrometers, a spectrofluorimeter, an isotope ratio mass spectrometer, X-ray fluorescence and diffraction instruments, and electrochemical analyzers (including spectroelectrochemical systems). Students also have access to a 108-node Linux cluster and several molecular mechanics and molecular dynamics software programs. Library facilities include over 100 journal subscriptions in chemistry plus numerous texts and related books.

## REQUIREMENTS

### Bachelor of Science Degree Requirements

The Bachelor of Science in Chemistry is intended for students who plan a career in chemistry. The B.S. is accredited by the American Chemical Society. Students who satisfactorily complete this program are recommended by the department for certification as graduate chemists by the American Chemical Society. The B.S. prepares students to enter the job market or for graduate study leading to an advanced degree, such as a Master of Science or Doctor of Philosophy.

**Note:** Chemistry majors may not take courses listed in the major or additional requirements for CR/NC grades.

## 1. The B.S. Chemistry Major requirements (46 units)

### Core Program

CHEM 1A, 1AL, 1B, 1BL, 102, 106 or 106S, 110A, 110B, 111, 123, 124, 128A, 128B, 129A, 129B, 155A

### Additional requirements (23 units)

MATH 75, 76, 77; PHYS 4A, 4AL, 4B, 4BL, 4C

## 2. General Education requirements (49 units)

### 3. Other requirements (6 units)

Upper-division writing and Multicultural and International (MI)

### 4. Sufficient elective units to meet required total units (varies)

Recommended: CHEM 140T, 155B, 156, 160, 190

## 5. Total units (120)\*

\* G.E. and MI courses can be double-counted with major requirements. The writing requirement may be met by taking the upper-division writing exam. Of the 49 required General Education units, 4 units will be satisfied by PHYS 4A and 4AL in G.E. Breadth B1, and 3 units of MATH 75 in G.E. Foundation B4. Consult the department chair or faculty advisor for details.

### Advising Note for Chemistry Majors

Transfer students are strongly urged to consult their advisor.

Many of the courses listed above have chemistry or other prerequisites. For that reason, the following sample four-year program leading to a B.S. in Chemistry is provided. This sample program emphasizes the need to take sequences in mathematics and physics prior to CHEM 110A. In addition, it specifies certain semesters for some courses that are offered only once a year. Finally, this program is constructed in such a way as to leave adequate time for independent study experience (CHEM 190) in the senior year.

If a student wished to deviate significantly from this sample program, particularly in regard to chemistry, physics, and mathematics requirements, it is very important that an alternate program be developed in consultation with a departmental advisor. Any course substitutions or other changes to degree requirements can only be initiated by submitting a written request to the chair of the Chemistry Department.

### First Semester - Fall

CHEM 1A and 1AL (5 units)

MATH 75 (4 units)

ENGL 5B or 10 (3 units)

General Education (3 units)

**Total (15 units)**

### Second Semester - Spring

CHEM 1B and 1BL (5 units)

MATH 76 (4 units)

PHYS 2A or 4A, 4AL (4 units)

General Education (3 units)

**Total (16 units)**

### Third Semester - Fall

CHEM 128A (3 units)

CHEM 129A (2 units)

MATH 77 (4 units)

PHYS 4B, 4BL (4 units)

General Education (3 units)

**Total (16 units)**

### Fourth Semester - Spring

CHEM 128B (3 units)

CHEM 129B (2 units)

CHEM 102 (5 units)  
PHYS 4C (3 units)  
General Education (3 units)  
**Total (16 units)**

**Fifth Semester - Fall\***

\*\*CHEM 110A (3 units)  
\*\*CHEM 155 (3 units)  
\*\*CHEM 123 (3 units)  
CHEM or other elective (1 unit)  
General Education (5 units)  
**Total (15 units)**

**Sixth Semester - Spring**

\*\*\*CHEM 110B (3 units)  
\*\*\*CHEM 111 (3 units)  
\*\*\*CHEM 124 (2 units)  
General Education (8 units)  
**Total (16 units)**

**Seventh Semester - Fall**

\*\*CHEM 106 or 106S (4 units)  
Chemistry or other elective (3 units)  
CHEM 190 (recommended) or other elective (3 units)  
General Education (4 units)  
**Total (14 units)**

**Eighth Semester - Spring**

CHEM 190 (recommended) or other elective (3 units)  
General Education (9 units)  
**Total (12 units)**

**TOTAL = 120 UNITS**

\* It is important to fulfill the upper-division writing skills requirement by exam or W class during the junior year.

\*\* Offered fall semester only.

\*\*\* Offered spring semester only.

## **FACULTY**

Our faculty provide excellent research opportunities in analytical, biochemistry, inorganic, organic, and physical chemistry. The broad interests within the faculty have resulted in interdisciplinary research projects in collaboration with scientists and professors in other science areas: agricultural chemistry, biotechnology, clinical chemistry, forensic chemistry, forensic biochemistry, chemical physics, enology, nutritional science, and molecular biology. Research projects have involved local facilities such as the California State Crime Laboratory, University Medical Center, UCSF Fresno Medical Education Program, USDA Research Station, U.S. Veteran's Administration Hospital, U.S. Forest Laboratory, and Valley Children's Hospital.

The graduate faculty are dedicated to providing students with a high-quality, rigorous M.S. program. Several of the faculty have received awards for the quality of their mentoring and teaching. They are widely respected in their field and regularly publish their work in leading scientific journals. The faculty have received funding to support their work from private foundations, and state and federal agencies, including the National Institutes of Health and the National Science Foundation. They also work with researchers at several National Laboratories and a number of top-tier research universities.

For faculty phone numbers and e-mail, see the campus directory.

For more on the faculty, see the faculty pages.

The faculty pages are updated by the department or program.