

■ Chemistry

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Chemistry has justifiably been labeled 'The Central Science'. Training in this discipline is essential for all citizens of the modern world. Since there is no material in the universe not made up of chemicals, a knowledge of chemistry is indeed a knowledge of ourselves.

The objectives of the Chemistry program are to

1. To promote molecular literacy, i.e., the growing awareness of the importance of understanding physical, chemical and biological changes on the atomic and molecular scale.
2. To demonstrate hands-on laboratory skills utilizing modern instrumentation and techniques.
3. To offer science majors the opportunity to engage in an undergraduate research program; and
4. To enable students in other disciplines to demonstrate their integrated knowledge of the world about them.

Pre-minor requirements: CH 203-CH 203L, CH 204-CH 204L, MA 110.

Minor requirements: 12 semester hours of upper division courses in chemistry and CH 490.

Learning Outcomes for the Minor in Chemistry

Upon completion of the undergraduate minor in Chemistry, the student will demonstrate an understanding of:

1. The scientific method and its application in Chemistry
2. The different areas of research and practice in Chemistry
3. The general concepts and principles of Chemistry

Course Descriptions

Chemistry (CH)

CH 102 Chemistry for the Concerned World Citizen (3)

This is an introductory course presenting many different branches of chemistry. In contrast to other courses in the discipline, there is a significant qualitative component, where impact to environment, and how chemical knowledge can contribute to one's overall awareness are among the topics discussed. The quantitative part of the course is especially designed to be non-intimidating when covering concepts such as atomic theory, formulas, equations, thermochemistry, gases, and stoichiometry. Non-science majors, who wish to relate general principles of chemistry to socioeconomic and environmental issues, as well as science majors, who feel the need for a refresher course, are encouraged to enroll. Offered annually. *Prerequisites: High school algebra recommended.*

CH 102L Chemistry for the Concerned World Citizen Laboratory (1)

The general theme for this lab course is to demonstrate that chemistry is everywhere. A great majority of the experiments will be carried out using household supplies and equipment. During the last few weeks a transition to using conventional lab equipment is aimed to help students understand the logic of experimental design. One three-hour laboratory period per week to accompany CH 102. Offered annually.

CH 107 Marine Sciences: Chemical Perspectives (3)

This course acquaints the non-specialist with the multi-faceted marine environment. The topics covered range from wave action and reef eco-systems to marine invertebrates and drugs from the sea. Many unique features of the marine environment around the Hawaiian Islands are also covered. Offered annually. *Prerequisites: Concurrent registration in CH 107L and consent of instructor required.*

CH 107L Marine Sciences: Chemical Perspectives Laboratory (1)

Hands-on experience in data-collection and processing, observations of marine eco-systems, sample collecting, and isolation techniques are introduced through field trips and laboratory experiments. One three-hour laboratory period per week to accompany CH 107. Offered annually.

CH 103 College Chemistry (3)

A one semester introduction to chemistry for students who wish to strengthen their understanding of basic concepts in chemistry before beginning the general chemistry sequence or for students working towards associate degrees. Emphasis will be placed on problem solving. Topics covered will include: chemical measurements, properties of atoms and molecules, chemical reactions, chemical calculations, acids and bases, properties of gases and thermochemistry. Offered annually. (Concurrent registration in CH 103L required).

CH 103L College Chemistry Laboratory (1)

Laboratory experiments designed to reflect the topics presented in CH 103. Offered annually. *Concurrent registration in CH 103 required.*

CH 203 General Chemistry I (4)

A study of the general concepts and basic principles of chemistry: properties of matter, atomic and molecular structure, theories of bonding, chemical reactions and stoichiometry, equilibria, and ions in aqueous solution. Offered annually.

Prerequisites: MA 103. Concurrent registration in CH 203L required. Concurrent registration in MA 110 or consent of instructor required.

CH 203L General Chemistry Laboratory (1)

Inorganic qualitative and quantitative analysis with emphasis on gravimetric, volumetric, and spectrophotometric techniques. One three-hour laboratory period per week to accompany CH 203. Offered annually. *Concurrent registration in CH 203 required.*

CH 204 General Chemistry II (3)

Continuation of CH 203. Acids and bases, thermodynamics, electrochemistry, additional aspects of chemical equilibria, descriptive chemistry. Offered annually. *Prerequisites: MA 110, and CH 203 or equivalent. Concurrent registration in CH 204L required.*

CH 204L General Chemistry Laboratory II (2)

Two three-hour laboratory periods per week to accompany CH 204. Offered annually. *Concurrent registration in CH 204 required.*

CH 254 A Survey of Organic and Bioorganic Chemistry (3)

An introductory course aiming at surveying what goes on within biological systems from a molecular point of view, with an emphasis on specific ecological interactions. Offered annually. *Prerequisites: CH 103 or consent of instructor. Concurrent registration in CH 254L required.*

CH 254L A Survey of Organic and Bioorganic Chemistry Laboratory (1)

One three-hour laboratory period per week to accompany CH 254. Offered annually. *Prerequisites: CH 103L or consent of instructor.*

CH 323 Organic Chemistry I (4)

Chemistry of carbon compounds is investigated according to the functional group classification. A full understanding of organic reaction mechanisms is emphasized in order to guide the students through numerous reactions. Three-dimensionality of carbon compounds is introduced and referred to in the context of relevant reactions. Offered annually. *Prerequisites: One year of college chemistry. Concurrent registration in CH 323L required.*

CH 323L Organic Chemistry Laboratory I (1)

Separation and purification techniques such as distillation, recrystallization, liquid-liquid extraction are introduced. Having performed several functional interconversion reactions, students are competent enough to carry out multi-step syntheses by the end of the semester. Offered annually. *Concurrent registration in CH 323 required.*

CH 324 Organic Chemistry II (4)

Spectroscopic methods such as IR, NMR, MS, and UV/VIS are introduced to solve structural identifications of the different classes of compounds studied in the first semester. The chemistry of carbonyl compounds is investigated in detail and principles of multi-step syntheses are introduced. Biologically relevant molecules such as saccharides, amino acids, peptides, and nucleic acids are studied with the strong implication that structural features and principal chemical behaviors of these molecules are related to their biological functions. Offered annually. *Prerequisites: CH 323. Concurrent registration in CH 324L required.*

CH 324L Organic Chemistry Laboratory II (1)

Students are trained to carry out more complex reactions using sensitive reagents. Most of the semester is used to learn to determine partial and full structures of organic compounds utilizing qualitative chemical and spectroscopic analyses. Hands-on training with the actual instruments and with computerized simulations is offered. Students are also introduced to microscale reaction techniques and apparatus. Offered annually. *Concurrent registration in CH 324 required.*

CH 360 Biochemistry (3)

This is a one-semester course where the vast knowledge of biochemistry is filtered through a rational perspective guided by general chemical and biological principles. Following a survey and review of common classes of biologically significant metabolites such as peptides, carbohydrates, lipids, nucleic acids, as well as equally important smaller molecules, the emphasis is shifted to biological thermodynamics and enzyme mechanisms. During the latter part of the course the broad spectrum of principles studied is utilized to cover individual metabolic pathways in detail. Cross-listed as BI 360. Offered annually. *Prerequisites: BI 203/203L, BI 204/204L, CH 324/342L. Concurrent registration in CH 360L required.*

CH 360L Biochemistry Laboratory (1)

Students gain experience in the isolation, purification, identification, and quantification of biologically important molecules. Spectroscopic, chromatographic, as well as chemical modification techniques are used in identifying peptides and proteins. Enzyme kinetic studies are carried out for quantification purposes. Cross-listed as BI 360L. Offered annually.

Concurrent registration in CH 360 required.

CH 434 Analytical Chemistry (3)

A one-semester course in analytical chemistry where separation techniques and quantitative identifications of chemical entities are discussed. The quantitative techniques include gravimetric, volumetric, and potentiometric analyses. Sampling techniques and the statistical treatment of data are also discussed. During the latter part of the semester instrumental methods are emphasized. Offered annually. *Prerequisites: CH 204, CH 324, and PHY 252. Concurrent registration in CH 434L required.*

CH 434L Analytical Chemistry Laboratory (1)

One three-hour laboratory period per week to accompany CH 434. Offered annually. *Concurrent registration in CH 434 required*

CH 480 Special Topics (1-3)

Special topics in organic, inorganic, physical, analytical, or biochemistry. Prerequisites vary according to course.

CH 490 Seminar (2)

Reading and discussion of current topics as well as expertise in modern library searching and retrieval methods to obtain information. One oral presentation by each participant required. May be repeated for credit. Offered annually.

