Chemistry (CHEM)

Head of Department: Professor Amy R. Howell
Department Office: Room A100, Chemistry Building

Commented [mwh1]: New department head

For major requirements, see the College of Liberal Arts and Sciences section of this *Catalog*.

1101. Chemistry for an Informed Electorate

~~(101)~~ Three credits. Three class periods. Not open to students who have passed CHEM 1122, 1124, 1127, 1137, or 1147.

Basic concepts and applications of chemistry. Contributions of chemistry to our everyday lives. Chemical issues and problems in our society. Designed for students in fields outside of science. Assumes no prior knowledge of chemistry. CA 3.

1122. Chemical Principles and Applications

~~(122)~~ Four credits. Three class periods and one 1-hour discussion and one 2-hour laboratory per week. Not open for credit to students who have passed CHEM 1124, 1127 or 1137 or 1147.

Brief but comprehensive survey of important chemical theories and applications of chemistry. Preparation for one-semester courses in organic chemistry and biochemistry. Atomic structures, chemical bonding, chemical reactions, stoichiometry, states of matter, and theories of solutions. Does not fulfill the two-semester general chemistry requirement for majors in biology, chemistry, pharmacy, physics and agriculture and natural resources. Does not satisfy the admission requirements of medical and dental schools. A fee of $50 is charged for this course. CA 3-LAB.

1124Q. Fundamentals of General Chemistry I

~~(124Q)~~ Four credits. Three class periods and one 3-hour laboratory period. Not open to students who have passed CHEM 1127Q, 1137Q, or 1147Q. Recommended preparation: MATH 1011Q or equivalent.

The first semester of a 3-semester sequence that is designed to provide a foundation for the principles of chemistry with special guidance provided for the quantitative aspects of the material. Topics include the physical and chemical properties of some elements, chemical stoichiometry, gases, atomic theory and covalent bonding. A fee of $20 is charged for this course. CA 3-LAB

1125Q. Fundamentals of General Chemistry II

~~(125Q)~~ Three credits. Two class periods and one 3-hour laboratory period. Prerequisite: CHEM 1124Q. Open by consent of instructor for only 1 credit to students who have passed CHEM 1127Q, 1137Q, or 1147Q. Not open to students who have passed CHEM 1128Q, 1138Q, or 1148Q.

Follows CHEM 1124Q. Topics include the properties of aqueous solutions and chemical equilibria. A fee of $20 is charged for this course.

1126Q. Fundamentals of General Chemistry III

~~(126Q)~~ Three credits. Two class periods and one 3-hour laboratory period. Prerequisite: CHEM 1125Q. Not open to students who have passed CHEM 1128Q, 1138Q, or 1148Q.

Follows CHEM 1125Q. Topics include the properties of kinetics, complex ions, thermodynamics and electrochemistry. A fee of $75 is charged for this course.

1127Q-1128Q. General Chemistry

~~(127Q-128Q)~~ Four credits. Three class periods and one 3-hour laboratory period. Students who have passed CHEM 1122 will receive only 2 credits for CHEM 1127 but 4 credits will be used for calculating the GPA. CHEM 1127 is not open for credit to students who have passed CHEM 1124 or 1137 or 1147; CHEM 1128 is not open to students who have passed CHEM 1126 or 1138 or 1148.

Designed to provide a foundation for more advanced courses in chemistry. Atomic theory; laws and theories concerning the physical and chemical behavior of gases, liquids, solids, and solutions. Properties of some of the more familiar elements and their compounds. Quantitative measurements illustrating the laws of chemical combination in the first semester lab. Equilibrium in solutions and qualitative reactions of the common cations and anions in the second semester lab. A fee of $10 is charged for this course for the first semester and $27 for the second semester. CA 3-LAB.

1137Q-1138Q. Enhanced General Chemistry

~~(137Q-138Q)~~ Four credits each semester. Three class periods and one 3-hour laboratory period. Prerequisite: One year of high school chemistry. Prerequisite or corequisite: MATH 1120Q or 1125Q or 1131Q; or consent of instructor.

Primarily for majors in chemistry and related disciplines. This course can be used as an alternate wherever CHEM 1127Q-1128Q is listed as a prerequisite. Not open for credit to students who have passed CHEM 1124Q-1125Q-1126Q, or CHEM 1127Q-1128Q or CHEM 1147Q-1148Q.

Atoms, molecules, ions, chemical bonding. Gases, liquids, solids, solutions, equilibrium, thermodynamics, nuclear chemistry, kinetics and organic chemistry. May include modern materials, environmental chemistry, metallurgy, and biochemistry. A fee of $75 is charged for this course for the first semester and $75 for the second semester. CA 3-LAB.

1147Q-1148Q. Honors General Chemistry

~~(129Q-130Q)~~ (Honors Course.) Four credits each semester. Three class periods and one 3-hour laboratory period. Prerequisite: Strong background in high school chemistry and physics. Prerequisite or corequisite: MATH 1120Q or 1125Q or 1131Q; consent of instructor. Designed primarily for exceptionally well-prepared science and engineering students, although any qualified honors student may take it. This course can be used as an alternate wherever CHEM 1127Q-1128Q is listed as a prerequisite. Not open for credit to students who have passed CHEM 1127Q-1128Q, or CHEM 1124Q-1125Q-1126Q or 1137Q-1138Q.

Atomic and molecular theory and the properties of gases, liquids, solids, and solutions. Topics which may be covered in depth are the nature of the chemical bond, chemical equilibria, thermodynamics, electrochemistry and nuclear chemistry. The laboratory work is primarily quantitative in nature. Considerable personal initiative will be demanded of students in carrying out laboratory assignments. A fee of $75 is charged for this course for the first semester and $20 for the second semester. CA 3-LAB.

1189. Introduction to Chemical Research

~~(155)~~ Credits, not to exceed 3 and hours by arrangement; three laboratory hours for each credit. Prerequisite: CHEM 1127 or 1137 or 1147 and instructor consent.

Internship in research laboratories.

1194. The Science of Chemistry

~~(195)~~ One credit. One 1-hour class period.

Readings, lectures, films and field trips exploring the field of chemistry and its scientific and social implications.

2241. Organic Chemistry

~~(141)~~ Three credits. Prerequisite: CHEM 1122 or 1124 or 1127 or 1137 or 1147. Not open for credit to students who have passed CHEM 2443.

An abridged course in organic chemistry designed to provide a background for related fields in which a general rather than a detailed knowledge of the compounds of carbon is required.

2242. Organic Chemistry Laboratory

~~(142)~~ One credit. One 4-hour laboratory period including discussion. Prerequisite or corequisite: CHEM 2241. Not open to students who have passed CHEM 2443.

A fee of $75 is charged for this course.

2443. Organic Chemistry

~~(243)~~ Three credits. (Two credits for students who have passed CHEM 2241.) Prerequisite: CHEM 1128Q or 1138Q or 1148Q or 1126. CHEM 1126Q may be taken concurrently.

Structure and reactions of the simpler classes of the compounds of carbon.

2444. Organic Chemistry

~~(244)~~ Three credits. Prerequisite: CHEM 2443.

A continuation of CHEM 2443.

2445. Organic Chemistry Laboratory

~~(245)~~ Three credits. (Students who have passed CHEM 2446 will receive only 2 credits for CHEM 2445. Students who have passed CHEM 2242 will receive only 2 credits for CHEM 2445, but 3 credits will be used for calculating GPA scores.) Two 3-hour laboratory periods and one 1-hour discussion period. Prerequisite or corequisite: CHEM 2444.

A fee of $75 is charged for this course.

2446. Organic Chemistry Laboratory

~~(240)~~ One credit. One 4-hour laboratory period. Not open for credit to students who have passed CHEM 2445. Prerequisite: CHEM 2443; open only to Chemical Engineering or Biomedical Engineering majors or by consent of instructor.

Introduction to techniques, manipulations, calculations and spectroscopy. A fee of $75 is charged for this course.

3170W. Technical Communications

~~(270W)~~ Three credits. Prerequisite: CHEM 2443; ENGL 1010 or 1011 or 2011.

Covers various aspects of technical writing and oral presentation of technical reports. The student will be introduced to the broad spectrum of the chemical literature; various approaches to information retrieval, including computer searches, will be demonstrated. Short reports based on chemical literature will include references and bibliographies. A major paper on a technical topic will be evaluated and corrected at each stage of its development. An oral report based on this material will also be required.

3189. Undergraduate Research

~~(296)~~ Credits, not to exceed 3 each semester, and hours by arrangement (three laboratory hours for each credit). Prerequisite: Open only with consent of instructor.

Original investigation carried on by the student under the guidance of a staff member. The student is required to submit a brief report at the end of each semester.

3193. Foreign Study

~~(293)~~ Credits and hours by arrangement up to a maximum of six credits. Prerequisite: Consent of Department head required prior to student's departure. May count toward the major with consent of the Department Head. May be repeated for credit.

3194. Undergraduate Seminar

~~(295)~~ One credit. Prerequisite: Open only to chemistry majors or by consent of instructor. With a change of subject, this course may be repeated once for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Discussion of topics relevant to further study and work in the field of chemistry.

3195. Special Topics

~~(298)~~ Credits and hours by arrangement. With a change in content, may be repeated for credit. Prerequisites and recommended preparation vary.

3198. Variable Topics

~~(291)~~ Three credits. With a change in topic, may be repeated for credit. Prerequisites, required preparation, and recommended preparation vary.

3199. Independent Study

~~(299)~~ Credits, not to exceed 3 per semester, and hours by arrangement. Prerequisite: Open only with consent of instructor. With a change of subject, this course may be repeated for credit.

3210. Descriptive Inorganic Chemistry

~~(210)~~ Two credits. Two class periods. Prerequisite: CHEM 1126 or 1128 or 1138 or 1148.

Introduction to bonding, structure, spectroscopy, physical properties, and reactivity of inorganic compounds.

3214. Intermediate Inorganic Chemistry

~~(214)~~ Three credits. Prerequisite: CHEM 3210. Recommended preparation: CHEM 3564.

A systematic presentation of bonding, structure, properties, and reactions of inorganic compounds.

3215. Inorganic Chemistry Laboratory

~~(215)~~ Three credits. One class period and two 3-hour laboratory periods. Prerequisite or corequisite: CHEM 3214.

The preparation, isolation, purification, and characterization of inorganic compounds; special techniques and instrumentation may be required. A fee of $75 is charged for this course.

3332. Quantitative Analytical Chemistry

~~(232)~~ Four credits. Two class periods and two 3-hour laboratory periods. Prerequisite: CHEM 1126 or 1128 or 1138 or 1148. Recommended preparation: CHEM 3563.

Fundamentals of analytical chemistry. While it is a course for chemistry majors, it is also suitable for students in other technical fields who have an interest in learning quantitative analytical chemistry procedures applicable to analytical instrumentation. Traditional wet chemical techniques and instrumental methods. Quantitative chemistry and chemical computations. A fee of $20 is charged for this course.

3334. Instrumental Analysis I

~~(234)~~ Four credits. Two class periods and two 3-hour laboratory periods. Prerequisite: CHEM 3332. Recommended

preparation: CHEM 3564.

Instrumental analytical techniques including molecular spectroscopy, atomic spectroscopy, electrochemistry, separations, and introductory electronics. This course is an extension of the instrumental portion of CHEM 3332. A fee of $75 is charged for this course.

3442W. Advanced Organic Chemistry Laboratory

~~(242W)~~ Three credits. One class period and two 3-hour laboratory periods. Prerequisite: CHEM 2445; ENGL 1010 or 1011 or 2011.

Advanced techniques and fundamentals of organic synthesis and identification. A fee of $75 is charged for this course.

3563-3564. Physical Chemistry

~~(263-264)~~ Four credits each semester. Prerequisite: CHEM 1126 or 1128 or 1138 or 1148; PHYS 1230, or 1402, or 1502, or 1602; MATH 2110 or 2130 for CHEM 3563; and MATH 2410 or 2420 for CHEM 3564. CHEG 3112 may be substituted for CHEM 3563 as a prerequisite for CHEM 3564.

A study of gases, liquids, solids, solutions, and thermodynamics in CHEM 3563 and kinetics, atomic and molecular theory, and spectroscopy in CHEM 3564.

3565W. Physical Chemistry Laboratory

~~(265WC)~~ Two credits. Two 3-hour laboratory periods. Prerequisite: CHEM 3564, may be taken concurrently; ENGL 1010 or 1011 or 2011.

A fee of $75 is charged for this course.

3566. Physical Chemistry Laboratory

~~(256)~~ One credit. One 3-hour laboratory period. Prerequisite or corequisite: CHEM 3563. Not open for credit to students who have passed CHEM 3565. This laboratory course is for students majoring in chemical engineering and cannot be counted toward the chemistry major group.

Laboratory experiments in thermodynamics, kinetics and spectroscopy. A fee of $75 is charged for this course.

3661. Polymeric Materials

~~(280)~~ Three credits. Prerequisite: CHEM 2444. Not open for credit to students who have passed CHEG 3156.

Structure, properties and chemistry of high polymers. Methods of production and applications.

4196W. Thesis for Undergraduate Chemistry Majors

~~(297W)~~ Three credits. Hours by arrangement. Prerequisite: A minimum of three credits in CHEM 3189 or 3199; ENGL 1010 or 1011 or 2011; open only with consent of instructor.

A formal thesis is required, based on original investigation carried on by the student.

4370. Environmental Chemistry - Atmosphere

Three credits. Prerequisite: CHEM 2443, 2444, and 2445; or CHEM 2241, 2242. Corequisite or prerequisite: CHEM 3332, 3563; or instructor consent. Intended for senior chemistry majors choosing the environmental chemistry option, or as an elective, and for environmental science majors pursuing a concentration in environmental chemistry.

Sources, transport, effects, fate, analytical chemistry, monitoring and management of chemical species; chemical principles, equilibria and reactions. The earth's atmosphere and atmospheric pollution; acid rain, global warming, ozone.

4371. Environmental Chemistry - Hydrosphere

Three credits. Prerequisite: CHEM 2443, 2444, and 2445; or CHEM 2241, 2242. Corequisite or prerequisite: CHEM 3332, 3563; or instructor consent. Intended for senior chemistry majors continuing in the environmental chemistry option, or as an elective and for environmental science majors pursuing a concentration in environmental chemistry.

Sources, transport, effects, fate, analytical chemistry, monitoring and management of chemical species; chemical principles, equilibria and reactions. The hydrosphere, water and soil pollution. Inorganic metals and organic chemicals in the environment.

4551. Introduction to Quantum Chemistry

~~(251)~~ Three credits. Prerequisite: CHEM 3564.

An introduction to quantum theory and its applications to atomic and molecular structure and spectroscopy.