CHEMISTRY

Contact Information

Division
STEM

Dean
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Overview

The Chemistry program at Sierra College is designed to meet the needs of the diverse community of interests served by the community college. A full program of chemistry for the professional scientist is offered through analytical chemistry and a two-semester course in organic chemistry. A separate track is offered for nursing students that presents general inorganic, organic and biochemistry in a one-year sequence. The Chemistry Department also has a strong commitment to the student with no prior chemistry, or to those whose background is weak.

The entire program is taught with a strong emphasis on the laboratory. In the more advanced classes, students receive hands-on experience with a wide variety of instruments.

TRANSFER MAJOR REQUIREMENTS in Chemistry are available in the Counseling Center. In all cases, students should consult with a counselor for specific transfer requirements. Four-year graduates in Chemistry are qualified for positions in research, industry, education, engineering and the allied medical fields.

Faculty

Daudi Bogonko
Professor, Chemistry
B.S., Fresno Pacific Univeristy
M.S., California Polytechnic State University, Pomona

Michael C. Brelle
Professor, Chemistry
B.S., California State University, Chico
Ph.D., University of California, Santa Cruz

Hannah Brinkman
Assistant Professor, Chemistry
B.S., ?Central Michigan University
Ph.D., University of California, Davis

Keri Clemens
Professor, Chemistry
B.S., University of California, Davis
Ph.D., University of California, Davis

Essmaiil Djamali
Assistant Professor, Chemistry
B.S., Barry University
Ph.D., University of California, San Diego

Jason R. Giuliani
Professor, Chemistry
B.S., California State University, Chico
Ph.D., University of California, Davis

Stuart D. Hay
Professor, Chemistry
B.S., California Polytechnic State University, San Luis Obispo
M.S., California State University, Sacramento

Susan L. Kurnett
Professor, Chemistry
B.A., University of California, Irvine
M.S., California State University, Sacramento

Yuting Lin
Assistant Professor, Chemistry
B.S., University of Washington
M.S., University of North Carolina at Chapel Hill

Rhiannon Porter
Professor, Chemistry
B.S., California Polytechnic State University, San Luis Obispo
Ph.D., University of California, Davis

Trevor Roberti
Professor, Chemistry
B.S., California State University, Long Beach
Ph.D., University of California, Santa Cruz

Moises Romero
Assistant Professor, Chemistry
B.S., California State University, San Bernardino
Ph.D., University of California, Irvine

Mark F. Springsteel
Professor, Chemistry
B.S., California State University, Fullerton
Ph.D., University of California, Davis

Doug White
Assistant Professor, Chemistry
B.S., University of California, Davis: M.S., Oregon State University

Degrees/Certificates

Associate Degree for Transfer

- Chemistry for Transfer (p. 1)
- UC Transfer Pathway (UCTP): Chemistry (p. 2)

Associate Degree

- Chemistry (p. 2)
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Chemistry for Transfer

AS-T Degree

This program provides students with a strong foundation in chemistry, covering the composition, structure, properties, and reactions of substances. Courses in general chemistry, organic chemistry, physics, and calculus are required. Upon completion of this degree, students will demonstrate proficiency in chemistry concepts and scientific communication, and apply critical thinking skills to problem solving.

The Associate in Science in Chemistry for Transfer degree (AS-T) prepares students to transfer into the CSU system to complete a bachelor's degree in chemistry, or a major deemed similar by a CSU campus. Students earning an associate degree for transfer and meeting the CSU minimum transfer admission requirements are guaranteed admission with junior standing within the CSU system. Students are also given priority admission consideration to their local CSU campus but not to a particular campus or major. Upon transfer, students will be required to complete no more than 60 additional prescribed units to earn a bachelor's degree.

To earn the Associate in Science in Chemistry for Transfer degree, students must complete 60 CSU-transferable semester units with a minimum grade point average of 2.0, including both of the following:

- completion of all courses required for the major with grades of "C" or better; and
- (https://catalog.sierracollege.edu/archive/2025-2026/student-resources/general-education/associate-degree-requirements/)California General Education Transfer Curriculum (Cal-GETC) (https://catalog.sierracollege.edu/archive/2025-2026/student-resources/general-education/california-general-education-transfer-curriculum-cal-getc/)

NOTE: The California State University General Education Breadth pattern (CSU GE) is NOT an option for this degree.

The exact wording of the law pertaining to associate degrees for transfer may be found in Education Code Section 66746.

It is highly recommended that, prior to transferring, students complete courses that satisfy the CSU United States History, Constitution and American Ideals graduation requirement. In all cases, students should consult with a counselor for more information on university admission and transfer requirements.

RESTRICTION: International coursework from non-United States regionally accredited institutions cannot be applied to associate degrees for transfer.

Required Courses

Code	Title	Units
CHEM 0001A or CHEM 0003A & CHEM 0003B	General Chemistry I (OR) General Chemistry I - Part 1 and General Chemistry I - Part 2	5-6
CHEM 0001B	General Chemistry II	5
CHEM 0012A	Organic Chemistry I	5
CHEM 0012B	Organic Chemistry II	5
PHYS 0205	Principles of Physics: Mechanics	4
PHYS 0205L	Principles of Physics Laboratory: Mechanics	1
PHYS 0210	Principles of Physics: Electricity and Magnetism	3
PHYS 0210L	Principles of Physics Laboratory: Electricity and Magnetism	1
MATH 0030	Analytical Geometry and Calculus I	4
MATH 0031	Analytical Geometry and Calculus II	4
Total Units		**37-38**

Chemistry

AS Degree

The Chemistry major recognizes a concentration in the field of Chemistry. Successful completion of the curriculum in Chemistry and the associated electives prepare Chemistry students for transfer to four-year colleges or universities. In all cases, students should consult with a counselor for more information on university admission and transfer requirements. Students must fulfill the following major requirements with grades of "C" or better, complete a minimum of 60 degree-applicable semester units (12 of which must be completed at Sierra College) with a grade point average of at least 2.0 and complete one of the following three general education patterns:

- Sierra College Associate Degree Requirements (Local General Education) (https://catalog.sierracollege.edu/archive/2025-2026/student-resources/general-education/associate-degree-requirements/)
- (https://catalog.sierracollege.edu/archive/2025-2026/student-resources/general-education/associate-degree-requirements/)California General Education Transfer Curriculum (Cal-GETC) (https://catalog.sierracollege.edu/archive/2025-2026/student-resources/general-education/california-general-education-transfer-curriculum-cal-getc/)

Required Courses

Code	Title	Units
CHEM 0001A or CHEM 0003A & CHEM 0003B	General Chemistry I (OR) General Chemistry I - Part 1 and General Chemistry I - Part 2	5-6
CHEM 0001B	General Chemistry II	5
CHEM 0005	Chemistry - Quantitative Analysis	4
CHEM 0012A	Organic Chemistry I	5
CHEM 0012B	Organic Chemistry II	5
Total Units		**24-25**

Recommended Electives

Code	Title	Units
MATH 0030	Analytical Geometry and Calculus I	4
MATH 0031	Analytical Geometry and Calculus II	4
MATH 0032	Analytical Geometry and Calculus III	4
PHYS 0205 & 0205L	Principles of Physics: Mechanics and Principles of Physics Laboratory: Mechanics	5
PHYS 0210 & 0210L	Principles of Physics: Electricity and Magnetism and Principles of Physics Laboratory: Electricity and Magnetism	4
PHYS 0215 & 0215L	Principles of Physics: Heat, Waves and Modern Physics and Principles of Physics Laboratory: Heat, Waves and Modern Physics	4

UC Transfer Pathway (UCTP): Chemistry

AS-T Degree

The UC Transfer Pathway in Chemistry prepares students to transfer into the UC system to complete a bachelor's degree in Chemistry.

In all cases, students should consult with a counselor for more information on university admission and transfer requirements.

Students must fulfill the major requirements with grades of "C" or better, complete a minimum of 60 degree-applicable semester units (12 of which must be completed at Sierra College) with a grade point average of at least 2.0 and complete the following general education pattern:

- (https://catalog.sierracollege.edu/archive/2025-2026/student-resources/general-education/associate-degree-requirements/)California General Education Transfer Curriculum (Cal-GETC) (https://catalog.sierracollege.edu/archive/2025-2026/student-resources/general-education/california-general-education-transfer-curriculum-cal-getc/)

Required Courses:

Code	Title	Units
CHEM 0001A	General Chemistry I	5-6
or CHEM 0003A & CHEM 0003B	General Chemistry I - Part 1 and General Chemistry I - Part 2	
CHEM 0001B	General Chemistry II	5
CHEM 0012A	Organic Chemistry I	5
CHEM 0012B	Organic Chemistry II	5
ENGL 0001A		4
MATH 0030	Analytical Geometry and Calculus I	4
MATH 0031	Analytical Geometry and Calculus II	4
MATH 0032	Analytical Geometry and Calculus III	4
MATH 0033	Differential Equations and Linear Algebra	6
PHYS 0205	Principles of Physics: Mechanics	4
PHYS 0205L	Principles of Physics Laboratory: Mechanics	1
PHYS 0210	Principles of Physics: Electricity and Magnetism	3
PHYS 0210L	Principles of Physics Laboratory: Electricity and Magnetism	1
PHYS 0215	Principles of Physics: Heat, Waves and Modern Physics	3
PHYS 0215L	Principles of Physics Laboratory: Heat, Waves and Modern Physics	1
Select 3 units from the following:		**3**
ENGL 0001B	Introduction to Literature	
ENGL 0001C	Critical Thinking and Writing	
PHIL 0004	Introduction to Critical Thinking	
Select 3-4 units from the following:		**3-4**
AAD 0012	Visual Communication (Also COMM 0012)	
ARHI 0101	Art Appreciation	
ARHI 0110	Survey of Art from Prehistory to the Medieval Era	
ARHI 0120	Survey of Western Art II: Renaissance Traditions	
ARHI 0130	Survey of Western Art III: Modern through Contemporary	
ARHI 0132	History of Women in Art	
ARHI 0134	History of Photography (Also PHOT 0010)	
ARHI 0140	History of the Arts of Africa, the Americas, and Oceania	
ARHI 0150	History of Asian Art	
ARHI 0155	History of Islamic Art	
COMM 0006	Performance of Diverse Literatures	
COMM 0012	Visual Communication (Also AAD 0012)	
DFST 0003	American Sign Language III	
DFST 0004	American Sign Language IV	
DFST 0010	Introduction to Deaf Studies	
ENGL 0016	Introduction to LGBTIQ Literature	
ENGL 0024	Introduction to Literary Criticism and Critical Concepts	
ENGL 0027	Literature by Women	
ENGL 0029	Introduction to Drama as Literature	
ENGL 0030A	American Literature - Beginnings through Civil War	
ENGL 0030B	American Literature - Civil War to the Present	
ENGL 0032	Introduction to Poetry	
ENGL 0033	Introduction to Shakespeare (The Drama)	
ENGL 0034	Introduction to the Novel	
ENGL 0035	Introduction to the Short Story	
ENGL 0037	American Film Masterpieces	
ENGL 0038	International Film Masterpieces	
ENGL 0040	The Filmed Novel	
ENGL 0042	The Documentary Film	
ENGL 0045	Young Adult Literature	
ENGL 0046A	English Literature	
ENGL 0046B	English Literature	
ENGL 0047A	World Literature	
ENGL 0047B	World Literature	
ENGL 0048	Literature of Science Fiction	
ETHN 0050	Ethnic Images in Film	
FREN 0002	Elementary French - Level II	
FREN 0003	Intermediate French - Level I	
FREN 0004	Intermediate French - Level II	
HIST 0004A	Western Civilization to 1715	
HIST 0004B	Western Civilization since 1715	
HIST 0017A	United States History to 1877	
HIST 0017B	United States History since 1865	
HIST 0018A	The African American Experience in American History to 1877	
HIST 0018B	The African American Experience in American History since 1877	
HIST 0019A	History of Traditional East Asia	
HIST 0019B	History of Modern East Asia	
HIST 0020	California History	
HIST 0021	Contemporary United States History	
HIST 0022	American Military History	
HIST 0023	Chicano/Mexican American History	
HIST 0024	Russian History - 10th Century to Present	
HIST 0025	Native American History	
HIST 0027	Women in American History	

HIST 0050	World History to 1500
HIST 0051	World History since 1500
HUM 0001	Introduction to Humanities I
HUM 0002	Introduction to Humanities II
HUM 0003	Introduction to Asian Humanities
HUM 0005	Classical Roots of the Contemporary Western World
HUM 0009	Introduction to Women, Gender and Religion (Also WMST 0003)
HUM 0010	World Religions
HUM 0015	Introduction to Mythology
HUM 0017	Introduction to Atheism
HUM 0020	Introduction to the Hebrew Bible
HUM 0021	Introduction to the New Testament
JPN 0002	Elementary Japanese - Level II
LGBT 0002	Queer (LGBTIQ) Film History
PHIL 0002	Introduction to Philosophy: Ethics
PHIL 0006	Introduction to Philosophy: Knowledge and Reality
PHIL 0010	Philosophy of Religion
PHIL 0013	Introduction to Asian Philosophy
PHIL 0020	History of Ancient Greek Philosophy
PHIL 0021	History of Modern Philosophy
PHIL 0027	Introduction to Philosophy of Women in Western Cultures
PHIL 0030	Introduction to Social and Political Philosophy
PHIL 0060	Introduction to Environmental Ethics
PHIL 0065	Introduction to the Philosophy of Science
MUS 0002	Music Appreciation
MUS 0006A	Music Theory I
MUS 0009A	Music Theory III
MUS 0010	Music Fundamentals
MUS 0011	Introduction and History of Jazz
MUS 0012A	Survey of Music History and Literature to 1750
MUS 0012B	Survey of Music History and Literature from 1750 to Present
MUS 0013	Introduction to Music: History of Rock and Roll
PHOT 0010	History of Photography
SPAN 0003	Intermediate Spanish - Level I
SPAN 0004	Intermediate Spanish - Level II
THEA 0013	Introduction to Theatre
THEA 0016A	Costume History
WMST 0003	Introduction to Women, Gender and Religion (Also HUM 0009)

Select 3-4 units from the following: 3-4

ADMJ 0050	Introduction to Administration of Justice
AGRI 0198	Food, Society and the Environment
AGRI 0215	Introduction to Agricultural Business and Economics
ANTH 0002	Cultural Anthropology
ANTH 0004	Native Peoples of North America
ANTH 0005	Introduction to Archaeology
ANTH 0006	Introduction to Linguistic Anthropology
ANTH 0007	Native Peoples of California
ANTH 0009	Magic, Witchcraft, Ritual, Myth and Religion
ANTH 0014	Global Problems
ANTH 0027	Anthropology of Sex, Gender and Sexuality
ARHI 0132	History of Women in Art
BUS 0271	Law and Society
COMM 0007	Intercultural Communication
COMM 0008	Interpersonal Communication
COMM 0010	Communication Theory, Methods, and Practice
COMM 0070	Mass Communication: Media and Society
ECON 0001A	Principles of Macroeconomics
ECON 0001B	Principles of Microeconomics
ESS 0001	Introduction to Environmental Sciences and Sustainability
ETHN 0011	Introduction to Ethnic Studies
ETHN 0020	Introduction to African American Studies
ETHN 0045	Federal Indian Law and Policy
ETHN 0050	Ethnic Images in Film
ETHN 0053	Introduction to Native American Studies
GEOG 0002	Cultural Geography
GEOG 0003	Geography of California
GEOG 0005	World Regional Geography
HDEV 0001	Human Development Through the Lifespan
HDEV 0004	Child, Family, and Community
HDEV 0009	Child Growth and Development
HDEV 0021	Psychology of Intimate Relationships and Family (Also PSYC 0110)
HDEV 0022	The Family (Also SOC 0004)
HIST 0004A	Western Civilization to 1715
HIST 0004B	Western Civilization since 1715
HIST 0017A	United States History to 1877
HIST 0017B	United States History since 1865
HIST 0018A	The African American Experience in American History to 1877
HIST 0018B	The African American Experience in American History since 1877
HIST 0019A	History of Traditional East Asia
HIST 0019B	History of Modern East Asia
HIST 0020	California History
HIST 0021	Contemporary United States History
HIST 0022	American Military History
HIST 0023	Chicano/Mexican American History

HIST 0024	Russian History - 10th Century to Present
HIST 0025	Native American History
HIST 0027	Women in American History
HIST 0050	World History to 1500
HIST 0051	World History since 1500
HUM 0009	Introduction to Women, Gender and Religion (Also WMST 0003)
LGBT 0001	Introduction to LGBT Studies/Queer Theory (Also WMST 0002)
POLS 0001	
POLS 0002	Introduction to Comparative Government
POLS 0003	Introduction to International Relations
POLS 0004	Russian and East European Political Systems
POLS 0005	California Politics and Government
POLS 0007	Politics of the Developing World
POLS 0008	American Foreign Policy
POLS 0009	Politics of the Middle East
POLS 0012	Terrorism
POLS 0016	Introduction to Political Theory
POLS 0017	Introduction to Political Science Research Methods
POLS 0027	Women and Politics in a Global Society
PSYC 0100	Introduction to Psychology
PSYC 0103	Social Psychology
PSYC 0104	Developmental Psychology
PSYC 0105	Research Methods in Psychology
PSYC 0106	Psychology of Adjustment
PSYC 0107	Abnormal Psychology
PSYC 0108	Psychology of Death and Dying
PSYC 0110	Psychology of Intimate Relationships and Family (Also HDEV 0021)
PSYC 0127	Psychology of Women
PSYC 0130	Human Sexuality
PSYC 0160	Psychology and Film
PSYC 0180	Cultural Psychology
SOC 0001	Introduction to Sociology
SOC 0002	Social Problems
SOC 0003	Race, Ethnicity and Inequality
SOC 0004	The Family (Also HDEV 22)
SOC 0005	Sociology of Women's Health
SOC 0009	Introduction to Crime, Deviance, and Social Control
SOC 0010	Feminism and Social Action
SOC 0027	Sociology of Gender
SOC 0047	Introduction to Hip Hop and Social Justice (Also known as ETHN 0047)
SOC 0110	Introduction to Social Justice
WMST 0001	Introduction to Women's Studies
WMST 0002	Introduction to LGBT Studies/Queer Theory (Also LGBT 0001)
WMST 0003	Introduction to Women, Gender and Religion (Also HUM 0009)
WMST 0004	Feminism and Social Action (Also SOC 0010)
Select 3-5 units from the following:	**3-5**
AGRI 0156	Introduction to Plant Science (Also BIOL 0021)
AGRI 0200	Introduction to Animal Science
ANTH 0001	Biological Anthropology
ANTH 0010	Introduction to Forensic Anthropology
BIOL 0001	General Biology
BIOL 0002	Botany
BIOL 0003	General Zoology
BIOL 0004	Microbiology
BIOL 0005	Human Anatomy
BIOL 0006	Human Physiology
BIOL 0010	Introduction to Biology
BIOL 0011	Concepts of Biology
BIOL 0014	Natural History, Ecology and Conservation (Also ESS 0014)
BIOL 0015	Marine Biology
BIOL 0021	Introduction to Plant Science (Also AGRI 0156)
BIOL 0030	Introduction to Ornithology
BIOL 0035	Introduction to Entomology
BIOL 0055	General Human Anatomy and Physiology
BIOL 0056	Biology: A Human Perspective
ESS 0014	Natural History, Ecology and Conservation (Also BIOL 0014)
PSYC 0140	Introduction to Biopsychology
Select one of the following Language Other Than English options:	**0-5**
DFST 0001	American Sign Language I
DFST 0002	American Sign Language II
DFST 0003	American Sign Language III
FREN 0001	Elementary French - Level I
FREN 0002	Elementary French - Level II
FREN 0003	Intermediate French - Level I
FREN 0004	Intermediate French - Level II
GER 0001	Elementary German - Level I
GER 0002	Elementary German - Level II
ITAL 0001	Elementary Italian - Level I
ITAL 0002	Elementary Italian - Level II
JPN 0001	Elementary Japanese - Level I
JPN 0002	Elementary Japanese - Level II
SPAN 0001	Elementary Spanish - Level I
SPAN 0002	Elementary Spanish - Level II
SPAN 0003	Intermediate Spanish - Level I
SPAN 0004	Intermediate Spanish - Level II
Completion of two years of the same foreign language in high school with grades of “C” or better.	

Equivalent proficiency demonstrated by a specified minimum score on College Board SAT II tests in languages other than English; or a score of 3, 4, or 5 on any languages other than English College Board Advanced Placement (AP) Examinations; or a score of 5 or higher on any languages other than English International Baccalaureate (IB) Higher Level Examinations.	
Completion of two years of formal schooling at the sixth grade level or higher in an institution where the language of instruction is not English with grades of “C” or better.	
Total Units	**67-77**

Courses

Understanding course descriptions (https://catalog.sierracollege.edu/archive/2025-2026/student-resources/course-information/understanding-course-descriptions/)

CHEM 0000A. Preparation for College Chemistry
Units: 4
Prerequisite: Completion of first year high school algebra or MATH A with grade(s) of "C" or better
Advisory: Eligibility for ENGL C1000
Hours: 108 (54 lecture, 54 laboratory)
A nontransferable course primarily intended to prepare students for college general chemistry. Includes a brief review of math operations important in chemistry, metric system, formulas, equations, gas laws, and solutions through related lecture and laboratory exercises. (not transferable)

CHEM 0001A. General Chemistry I
Units: 5
Prerequisite: Completion of CHEM A or equivalent with grade of "C" or better; and completion of MATH D or MATH G with grade of "C" or better, or placement by matriculation assessment process, or equivalent; and satisfactory score on the Chemistry Placement Examination
Advisory: Eligibility for ENGL C1000 strongly recommended
Hours: 162 (54 lecture, 108 laboratory)
Introduction to the general principles of chemistry with emphasis upon quantitative relationships. Properties of matter related whenever possible to present concepts of atomic structure and to the periodic table. Includes atomic structure, the mole concept, gas laws, stoichiometry, redox, states of matter, solutions, and an introduction to modern theories of chemical bonding through related lecture and laboratory exercises. Students enrolling in CHEM 1A after having completed CHEM 3A will lose credit for CHEM 3A. Note: Not open to students who have completed CHEM 3B. CHEM 1A/1B sequence may be started any semester. (C-ID CHEM 110) (combined with CHEM 1B, C-ID CHEM 120S) (CSU, UC-with unit limitation)

CHEM 0001B. General Chemistry II
Units: 5
Prerequisite: Completion of CHEM 1A or 3B with grade of "C" or better
Advisory: Eligibility for ENGL C1000 strongly recommended
Hours: 162 (54 lecture, 108 laboratory)
A continuation of CHEM 1A. Includes chemical kinetics, equilibrium, acid-base theory, thermodynamics, electro-chemistry, modern theories of bonding, and nuclear chemistry through related lecture and laboratory exercises. Note: CHEM 1A/1B sequence may be started any semester. (combined with CHEM 1A or CHEM 3A/3B, C-ID CHEM 120S) (CSU, UC-with unit limitation)

CHEM 0001X. Problem Solving for Chemistry 1A
Unit: 1
Prerequisite: Completion of CHEM A or equivalent with grade of "C" or better; and completion of MATH D or MATH G with grade of "C" or better, or placement by matriculation assessment process, or equivalent; and satisfactory score on the Chemistry Placement Examination
Corequisite: Concurrent enrollment in CHEM 1A
Advisory: Eligibility for ENGL C1000 strongly recommended
Hours: 18 lecture
Optional problem solving course to accompany CHEM 1A. Students use critical thinking and problem solving strategies to solve general chemistry problems in topics that include atomic structure, the mole concept, gas laws, stoichiometry, redox, intermolecular forces, solid state chemistry, solution chemistry, and chemical bonding. (CSU)

CHEM 0001Y. Problem Solving for Chemistry 1B
Unit: 1
Prerequisite: Completion of CHEM 1A or 3B with grade of "C" or better
Corequisite: Concurrent enrollment in CHEM 1B
Advisory: Eligibility for ENGL C1000 strongly recommended
Hours: 18 lecture
Optional problem solving course to accompany CHEM 1B. Students use critical thinking and problem solving strategies to solve general chemistry problems in topics that include equilibrium, chemical kinetics, acid-base theory, thermodynamics, electro-chemistry, and nuclear chemistry. (CSU)

CHEM 0002A. Introduction to Chemistry I
Units: 5
Prerequisite: Completion of MATH A with grade of "C" or better, or placement by matriculation assessment process, or equivalent
Advisory: Eligibility for ENGL C1000; completion of CHEM A with grade of "C" or better or equivalent; completion of MATH D with grade of "C" or better or equivalent
Hours: 126 (72 lecture, 54 laboratory)
Designed to meet the requirements for certain nursing, dental hygiene, physical therapy, agriculture, and forestry programs (Inorganic Chemistry). An introduction to the fundamental principles of general inorganic chemistry through related lecture and laboratory exercises. (C-ID CHEM 101) (CSU, UC-with unit limitation)

CHEM 0002B. Introduction to Chemistry II
Units: 5
Prerequisite: Completion of CHEM 2A with grade of "C" or better
Advisory: Eligibility for ENGL C1000
Hours: 126 (72 lecture, 54 laboratory)
Designed to meet the requirements for certain nursing, dental hygiene, physical therapy, agriculture, and forestry programs (Organic and Biochemistry). A study of the major classes of organic compounds, including nomenclature structure, properties, and isomerism. Emphasizes the chemistry and metabolism of carbohydrates, lipids, and proteins, including nucleo-protein and enzymes through related lecture and laboratory exercises. (C-ID CHEM 102) (CSU, UC-with unit limitation)

CHEM 0002X. Problem Solving for Chemistry 2A
Unit: 1
Prerequisite: Completion of MATH A with grade of "C" or better, or placement by matriculation assessment process, or equivalent
Corequisite: Concurrent enrollment in CHEM 2A
Advisory: Eligibility for ENGL C1000; completion of CHEM A with grade of "C" or better or equivalent; completion of MATH G with grade of "C" or better or equivalent
Hours: 18 lecture
Optional problem solving course to accompany CHEM 2A. Students use critical thinking and problem solving strategies to solve chemistry problems in topics that include atomic structure, the mole concept, gas laws, stoichiometry, redox, acid-base theory, equilibrium, nuclear chemistry, and chemical bonding. (CSU)

CHEM 0002Y. Problem Solving for Chemistry 2B
Unit: 1
Prerequisite: Completion of CHEM 2A with grade of "C" or better
Corequisite: Concurrent enrollment in CHEM 2B
Advisory: Eligibility for ENGL C1000
Hours: 18 lecture
Optional problem solving course to accompany CHEM 2B. Students use critical thinking and problem solving strategies to solve organic and biochemistry problems. Both lecture and discussion groups utilized. (CSU)

CHEM 0003A. General Chemistry I - Part 1
Units: 3
Prerequisite: Completion of MATH D or MATH G with grade of "C" or better, or placement by matriculation assessment process, or equivalent
Corequisite: Concurrent enrollment in CHEM 3X
Advisory: Eligibility for ENGL C1000 strongly recommended
Hours: 90 (36 lecture, 54 laboratory)
The first semester of a two-semester course in general chemistry consisting of that material normally included in one semester of CHEM 1A. Topics covered include the mole concept, chemical nomenclature, gas laws, and stoichiometry. This sequence fulfills the prerequisite for CHEM 1B. Students enrolling in CHEM 1A after having taken CHEM 3A will lose credit for CHEM 3A. (combined with CHEM 3B, C-ID CHEM 110) (combined with CHEM 3B and 1B, C-ID CHEM 120S) (CSU, UC-with unit limitation)

CHEM 0003B. General Chemistry I - Part 2
Units: 3
Prerequisite: Completion of CHEM 3A with grade of "C" or better
Corequisite: Concurrent enrollment in CHEM 3Y
Advisory: Eligibility for ENGL C1000 strongly recommended
Hours: 90 (36 lecture, 54 laboratory)
The second semester of a two-semester course in general chemistry consisting of that material normally included in one semester of CHEM 1A. Topics include atomic structure, states of matter, solutions, and chemical bonding. This sequence fulfills the prerequisite for CHEM 1B. (combined with CHEM 3A, C-ID CHEM 110) (combined with CHEM 3A and 1B, C-ID CHEM 120S) (CSU, UC-with unit limitation)

CHEM 0003X. Problem Solving for Chemistry 3A
Units: 2
Prerequisite: Completion of MATH D or MATH G with grade of "C" or better, or placement by matriculation assessment process, or equivalent
Corequisite: Concurrent enrollment in CHEM 3A
Advisory: Eligibility for ENGL C1000 strongly recommended
Hours: 36 lecture
Problem solving course to accompany CHEM 3A. Students use critical thinking and problem solving strategies to solve general chemistry problems in topics that include the mole concept, chemical nomenclature, gas laws, and stoichiometry. (pass/no pass grading) (not transferable)

CHEM 0003Y. Problem Solving for Chemistry 3B
Units: 2
Prerequisite: Completion of CHEM 3A with grade of "C" or better
Corequisite: Concurrent enrollment in CHEM 3B
Advisory: Eligibility for ENGL C1000 strongly recommended
Hours: 36 lecture
Problem solving course to accompany CHEM 3B. Students use critical thinking and problem solving strategies to solve general chemistry problems in topics that include atomic structure, chemical bonding, states of matter, and solutions. (pass/no pass grading) (not transferable)

CHEM 0005. Chemistry - Quantitative Analysis
Units: 4
Prerequisite: Completion of CHEM 1B with grade of "C" or better
Advisory: Eligibility for ENGL 11 strongly recommended
Hours: 144 (36 lecture, 108 laboratory)
Theory and techniques of quantitative chemical measurement, including gravimetric, volumetric, and introductory instrumental analysis. Required for all chemistry, chemical engineering, medicine, dentistry, veterinary medicine, and related majors. (CSU, UC)

CHEM 0012A. Organic Chemistry I
Units: 5
Prerequisite: Completion of CHEM 1B with grade of "C" or better
Advisory: Eligibility for ENGL C1000 strongly recommended
Hours: 162 (54 lecture, 108 laboratory)
An extensive course in the chemistry of the compounds of carbon, which emphasizes structure, kinetics, thermodynamics, spectroscopy, and synthesis. The laboratory provides direct experience with the reaction, synthesis, purification, identification, and characterization (IR, GC, TLC, bp, mp, chemical tests) of organic compounds. Discussions about the emerging field of "Green Chemistry" and performance of Green Chemistry experiments in the laboratory. Required for majors in chemistry as well as many other related fields. (C-ID CHEM 150; and, combined with CHEM 12B, C-ID CHEM 160S) (CSU, UC)

CHEM 0012B. Organic Chemistry II
Units: 5
Prerequisite: Completion of CHEM 12A with grade of "C" or better
Advisory: Eligibility for ENGL C1000 strongly recommended
Hours: 162 (54 lecture, 108 laboratory)
Focuses on carbon based molecules and emphasizes structure, kinetics, thermodynamics, spectroscopy, and synthesis. Includes the emerging field of "Green Chemistry." Required for majors in Chemistry as well as many other related fields. (combined with CHEM 12A, C-ID CHEM 160S) (CSU, UC)

CHEM 0012X. Problem Solving for Chemistry 12A
Unit: 1
Corequisite: Concurrent enrollment in CHEM 12A
Hours: 18 lecture
Optional problem solving course to accompany CHEM 12A. Students use critical thinking and problem solving strategies to solve organic chemistry problems in topics that include nomenclature, alkane, alkene, alcohols, stereochemistry, spectroscopy, and Newman projections. (CSU)

CHEM 0012Y. Problem Solving for Chemistry 12B
Unit: 1
Corequisite: Concurrent enrollment in CHEM 12B
Hours: 18 lecture
Optional problem solving course to accompany CHEM 12B. Students use critical thinking and problem solving strategies to solve organic chemistry problems in topics that include nomenclature, alkynes, benzene, esters, amides, and amines. (CSU)

CHEM 0028. Independent Study
Units: 1-3
Designed for students interested in furthering their knowledge at an independent study level in an area where no specific curriculum offering is currently available. Independent study might include, but is not limited to, research papers, special subject area projects, and research projects. See Independent Study page in catalog. (CSU, UC-with unit limitation)

CHEM 0095. Internship in Chemistry
Units: 0.5-4
Designed for advanced students to work in an area related to their educational or occupational goal. Provides new on-the-job technical training under the direction of a worksite supervisor, allowing students to expand knowledge and skills in the chosen field. Mandatory orientation session and faculty approval to determine eligibility. One unit of credit is equal to 54 hours of work. Students may earn up to a total of 16 units in internship courses (any course numbered 95 and PDEV 94). (CSU-with unit limitation)

CHEM 0140. Survey of Chemistry and Physics
Units: 4
Also known as PHYS 140
Prerequisite: Completion of MATH D with grade of "C" or better, or placement by matriculation assessment process
Hours: 108 (54 lecture, 54 laboratory)
A conceptual introduction to the basic principles of physics and chemistry including matter, physical and chemical properties, forces and motion, energy, electromagnetism, electromagnetic waves, atomic structure, bonding, solutions and chemical reactions. The inter-dependence of chemistry and physics will be emphasized. This course is intended for non-science majors. (C-ID CHEM/PHYS 140) (CSU, UC)

Program Student Learning Outcomes (PSLOs)

- Demonstrate proficiency in chemistry concepts by scoring above the national median in the subject matter ACS (American Chemical Society) exams.
- Demonstrate proficiency in scientific communication.
- Apply critical thinking skills to problem solving.