

Chemistry

**CHEMISTRY – CHEM**

Charles Ramos, Dean  
 Sciences Division  
 Physical Sciences Building, Room 263

**Possible career opportunities**

Chemists identify and solve problems by applying logic, scientific thinking, and knowledge of natural laws. Chemistry majors work in educational settings and in government, non-profit charities, or research foundations. Chemists work in manufacturing companies, cosmetic companies, environmental assessment firms, medical laboratories, petroleum companies and pharmaceutical companies. They also can become health administrators, and physicians (all specialties). Many careers require more than two years of college study.

**Certificate of achievement  
 Chemistry**

Students completing the program will be able to...

- A. apply the basic concepts of chemistry to predict chemical structure and trends in reactivity.
- B. analyze and solve quantitative and qualitative problems in chemistry and explain results verbally or in writing.
- C. integrate chemical principles into reaction mechanisms.
- D. apply basic laboratory skills and techniques in general and organic chemistry to collect data and synthesize compounds.
- E. analyze data and evaluate laboratory experimental results.
- F. maintain a laboratory notebook.

Completion of the chemistry program prepares students for advanced study leading to careers in government, industry, or secondary-school teaching. The program also partially satisfies the entrance requirements for medical and dental schools. Careers include researcher, educator, laboratory technician, or chemical engineer.

This certificate includes the coursework that will prepare students who intend to transfer with a chemistry or related interdisciplinary major to a four-year institution. This certificate includes the General Chemistry and Organic Chemistry sequences.

To earn a certificate of achievement, students must complete the required courses with a "C" grade or higher. Course requirements are typically available in the day and evening for the General Chemistry sequence. For the Organic Chemistry sequence, CHEM 226 is only offered in fall terms, and CHEM 227 is only offered in spring term.

Students who intend to transfer to a four-year program should consult with a counselor regarding course and program requirements.

<i>required courses:</i>	<i>units</i>
CHEM-120 General College Chemistry I.....	5
CHEM-121 General College Chemistry II.....	5
CHEM-226 Organic Chemistry I.....	5
CHEM-227 Organic Chemistry II.....	5
<b>total minimum required units</b>	<b>20</b>

Students who intend to transfer to a four-year program in chemistry should consult with a counselor regarding mathematics and science requirements listed below.

<i>plus 0-8 units from:</i>	<i>units</i>
PHYS-130 Physics for Scientists and Engineers A: Mechanics and Wave Motion.....	4
PHYS-230 Physics for Scientists and Engineers B: Heat and Electromagnetism.....	4
<i>plus 0-10 units from:</i>	<i>units</i>
MATH-192 Analytic Geometry and Calculus I.....	5
MATH-193 Analytic Geometry and Calculus II.....	5

**CHEM-106 Chemistry for Non-Science Majors**

- 4 units SC
- IGETC: 5A, 5C; CSU GE: B1, B3; DVC GE: II
  - 54 hours lecture/54 hours laboratory per term
  - Prerequisite: Placement into MATH-121 or higher or MATH 085 or MATH-085SP or beginning algebra or equivalent
  - Advisory: College-level reading and writing are expected.
  - Note: This is not a preparatory course for other chemistry courses

This course is designed to develop scientific literacy for non-science majors and to meet the general education requirement for physical science with laboratory. The course places chemistry concepts in a practical context using qualitative and quantitative examples that are encountered in everyday life. Laboratory exercises include hands-on experiments related to concepts covered in lecture. C-ID CHEM 100, CSU, UC (credit limits may apply to UC - see counselor)

**CHEM-107 Integrated Inorganic, Organic, and Biological Chemistry**

- 5 units SC
- IGETC: 5A, 5C; CSU GE: B1, B3; DVC GE: II
  - 72 hours lecture/54 hours laboratory per term
  - Prerequisite: Placement into MATH-121 or higher or MATH 085 or MATH-085SP or beginning algebra or equivalent
  - Advisory: College-level reading and writing are expected.
  - Note: This course does not fulfill the prerequisite to CHEM-120.

This course is an intensive survey of the fundamentals of chemistry, which explores and applies the topics of inorganic and organic chemistry to biochemistry. This course satisfies the requirements of nursing and other health-career programs that require one term of chemistry. CSU, UC (credit limits may apply to UC - see counselor)

## Chemistry

**CHEM-108 Introductory Chemistry**

4 units SC

- *IGETC: 5A, 5C; CSU GE: B1, B3; DVC GE: II*
- *54 hours lecture/54 hours laboratory per term*
- *Prerequisite: Placement into MATH-121 or higher or MATH 085 or MATH-085SP or beginning algebra or equivalent*
- *Advisory: College-level reading and writing are expected.*

This course is an introduction to the experimental science of chemistry. Using mathematical word problems and chemical terms, the student will have an overview of inorganic chemistry. This course is appropriate for those that have no high school chemistry experience. This course serves as preparation for General Chemistry (CHEM-120/121) or the first course of a two-semester sequence (with CHEM-109) that satisfies the requirements of allied health programs such as nursing and dental hygiene that require one year of chemistry. C-ID CHEM 101, CSU, UC (credit limits may apply to UC - see counselor)

**CHEM-109 Introduction to Organic and Biochemistry**

4 units SC

- *IGETC: 5A, 5C; CSU GE: B1, B3; DVC GE: II*
- *54 hours lecture/54 hours laboratory per term*
- *Prerequisite: CHEM-107 or CHEM-108 or CHEM-120 or equivalent*
- *Note: This is the second course of a two-semester sequence (with CHEM-108) that satisfies the requirements of allied health programs such as nursing and dental hygiene that require one year of chemistry.*

This course provides a focused introduction to the chemistry of living things. Organic Chemistry is the study of carbon compounds that is linked to biochemistry, the chemical basis of life, through the relationship of molecular structure and function. C-ID CHEM 102, CSU, UC (credit limits may apply to UC - see counselor)

**CHEM-120 General College Chemistry I**

5 units LR

- *IGETC: 5A, 5C; CSU GE: B1, B3; DVC GE: II*
- *54 hours lecture/108 hours laboratory per term*
- *Prerequisite: CHEM-108 or score of 3, 4 or 5 on AP Chemistry Test or appropriate chemistry skill level demonstrated through Chemistry Diagnostic Test or equivalents; Placement into MATH-121 or higher; or MATH-119 or MATH 119SP or intermediate algebra or equivalent*
- *Advisory: College-level reading and writing are expected.*

This course is the first semester of a two-semester sequence (CHEM-120 and CHEM-121) that covers the fundamentals of chemistry including atomic theory, chemical reactions, bonding, structure, stoichiometry, gases, solutions, thermochemistry, and chemical kinetics. Basic laboratory techniques are introduced including the preparation of standard solutions, titration, and the generation of calibration curves used in qualitative and quantitative analysis. Students will perform experiments safely, keep a laboratory notebook, and complete laboratory reports. C-ID CHEM 110, CHEM-120+121=C-ID CHEM 120S, CSU, UC

**CHEM-121 General College Chemistry II**

5 units LR

- *IGETC: 5A, 5C; CSU GE: B1, B3; DVC GE: II*
- *54 hours lecture/108 hours laboratory per term*
- *Prerequisite: CHEM-120 or equivalent*

This course is the second semester of a two-semester sequence (CHEM-120 and CHEM-121) that covers gaseous and acid base equilibria, buffers, titration curves, solubility products, thermodynamics, electrochemistry, coordination complexes, nuclear chemistry, as well as qualitative and quantitative experiments. Laboratory work in this course will build upon techniques used in CHEM-120 and includes some independent experimental design. CHEM-120+121=C-ID CHEM 120S, CSU, UC

**CHEM-150 Topics in Chemistry**

.3-4 units SC

- *Variable hours*

A supplemental course in Chemistry to provide a study of current concepts and problems in Chemistry. Specific topics will be announced in the schedule of classes. CSU

**CHEM-226 Organic Chemistry I**

5 units LR

- *IGETC: 5A, 5C; CSU GE: B1, B3; DVC GE: II*
- *54 hours lecture/108 hours laboratory per term*
- *Prerequisite: CHEM-121 or equivalent*

This course is the first semester of a two-semester sequence (CHEM-226 and CHEM-227) that covers structure and bonding, stereochemistry, conformational analysis, reaction mechanisms, and the nomenclature, physical properties, and reactions of various classes of organic compounds (alkanes, alkenes, alkynes, alkyl halides, alcohols, and ethers). Basic organic laboratory techniques are introduced and used in syntheses or other projects. Chemical safety, information retrieval and good lab practices are emphasized. A variety of laboratory instrumentation skills are developed including data collection and analysis using GC, IR and UV-Visible spectroscopy. C-ID CHEM 150, CHEM-226 + CHEM-227 = C-ID CHEM 160S, CSU, UC

## Chemistry

**CHEM-227 Organic Chemistry II**

5 units LR

- IGETC: 5A, 5C; CSU GE: B1, B3; DVC GE: II
- 54 hours lecture/108 hours laboratory per term
- Prerequisite: CHEM-121 and CHEM-226 or equivalents

This course is a continuation of Chemistry 226. Topics include spectroscopy, additional reaction mechanisms, the nomenclature, physical properties, and reactions of other basic classes of compounds (aromatics, organometallics, aldehydes, ketones, carboxylic acids and their derivatives, and amines). The nature and reactions of multifunctional compounds and the structure and reactions of biochemical molecules (carbohydrates, lipids, amino acids, proteins and nucleic acids) are also discussed. Laboratory work includes hands-on spectroscopic techniques (i.e., NMR, IR), qualitative organic analysis, more advanced projects involving synthesis, and a literature research project using university-level chemical literature resources. CHEM-226 + CHEM-227 = C-ID 160S, CSU, UC

**CHEM-298 Independent Study**

.5-3 units SC

- Variable hours
- Note: Submission of acceptable educational contract to department and Instruction Office is required.

This course is designed for advanced students who wish to conduct additional research, a special project, or learning activities in a specific discipline/subject area and is not intended to replace an existing course. The student and instructor develop a written contract that includes objectives to be achieved, activities and procedures to accomplish the study project, and the means by which the supervising instructor may assess accomplishment. CSU

**CHEM-299 Student Instructional Assistant**

.5-3 units SC

- Variable hours
- Note: Applications must be approved through the Instruction Office. Students must be supervised by a DVC instructor.

Students work as instructional assistants, lab assistants and research assistants in this department. The instructional assistants function as group discussion leaders, meet and assist students with problems and projects, or help instructors by setting up laboratory or demonstration apparatus. Students may not assist in course sections in which they are currently enrolled. CSU