

# CHEMISTRY (CHEM)

## CHEM 105 Elements of General Chemistry 4 Credit Hour(s)

A study of the basic areas of general chemistry at an introductory level for the non-science major, including atomic and molecular structure; bonding, stoichiometry; and acids, bases and salts.

**Note:** 3 hours lecture; 2 hours lab

**Offered:** Resident

## CHEM 107 Essentials of General and Organic Chemistry 4 Credit Hour(s)

**Resident Prerequisite:** MATH 110 (may be taken concurrently) or MATH 201 (may be taken concurrently) or BUSI 230 or ACT Math with a score of 20 or (pre2016 post1995)SAT Math with a score of 550 or SAT Section Math with a score of 570 or MATH 108 (may be taken concurrently) or Assessment - Mathematics II with a score of 15 or MATH 121 (may be taken concurrently) or MATH 131 (may be taken concurrently) or MATH 132 (may be taken concurrently) or MATH 126 (may be taken concurrently) or Placement Score-Math with a score of 070  
A study of the basics of general and organic chemistry at an introductory level, including atomic structure, bonding, acids and bases, organic functional groups and selected organic reactions.

**Note:** 3 hours lecture; 2 hours lab

**Offered:** Resident

## CHEM 107L Essentials of General and Organic Chemistry Lab 0 Credit Hour(s)

**Prerequisite:** CHEM 107 (may be taken concurrently)

**Note:** CHEM 107 taken concurrently

**Offered:** Resident

## CHEM 108 Chemistry for Health Science Professionals 4 Credit Hour(s)

**Resident Prerequisite:** MATH 110 (may be taken concurrently) or MATH 201 (may be taken concurrently) or MATH 202 (may be taken concurrently) or BUSI 230 or (pre2016 post1995)SAT Math with a score of 550 or SAT Section Math with a score of 570 or ACT Math with a score of 20

A study of the basics of general and organic chemistry at an introductory level, including atomic structure, bonding, acids and bases, organic functional groups and selected organic reactions, with an emphasis on health science professional applications. This course includes an independent hands-on microscale laboratory experience.

**Offered:** Online

## CHEM 115 Essentials of General Chemistry 4 Credit Hour(s)

**Online Prerequisite:** ACT Composite with a score of 20 or SAT Section Math with a score of 530 or (pre2016 post1995)SAT Math with a score of 500 or Placement Score-Math with a score of 75 or MATH 121 or MATH 126 or MATH 131 or MATH 132

This course examines the fundamental concepts of chemistry: scientific measurements, atomic structure, chemical bonding and reactivity, molecular geometry, stoichiometry, energy, phases of matter, chemistry of solutions, and quantum mechanics. Laboratory experiments will provide hands-on reinforcement of these concepts. Restricted to online students pursuing a BS in Civil Engineering.

**Note:** This course does not substitute for CHEM 121, 131, or 135.

**Offered:** Online

## CHEM 121 General Chemistry I 4 Credit Hour(s)

**Resident Prerequisite:** MATH 121 or MATH 126 or MATH 131 or MATH 132 or ACT Composite with a score of 20 or SAT Section Math with a score of 530 or (pre2016 post1995)SAT Math with a score of 500 or Placement Score-Math with a score of 75

A study of the foundations of chemistry including: stoichiometry; atomic structure; chemical periodicity; covalent and ionic bonding; inorganic nomenclature; chemical reactions including aqueous precipitation, acid-base, and redox; basic thermodynamics in physical and chemical matter changes; electronic structure; molecular structure and polarity; gas laws.

**Note:** 3 hours lecture; 2 hours lab

**Offered:** Resident

## CHEM 121L General Chemistry I Lab 0 Credit Hour(s)

**Prerequisite:** CHEM 121 (may be taken concurrently)

**Note:** CHEM 121 taken concurrently

**Offered:** Resident

## CHEM 122 General Chemistry II 4 Credit Hour(s)

**Resident Prerequisite:** CHEM 121 and CHEM 122L (may be taken concurrently)

A study of chemical topics including: behavior and properties of liquids, colligative properties of solutions; and properties of solids; kinetics; equilibrium; acids, bases, and other aqueous equilibria; entropy and free energy in chemical reactions; electrochemistry; nuclear chemistry; introductory organic and biochemistry.

**Note:** 3 hours lecture; 2 hours lab

**Offered:** Resident

## CHEM 122L General Chemistry II Lab 0 Credit Hour(s)

**Prerequisite:** CHEM 121

**Note:** CHEM 122 taken concurrently

**Offered:** Resident

## CHEM 131 Advanced General Chemistry I 3 Credit Hour(s)

**Prerequisite:** MATH 121 or MATH 125 or MATH 130 or MATH 131 or MATH 132 or MATH 201 or MATH 217 or MATH 1XX or MATH 2XX or MATH 3XX or MATH 4XX or ACT Math with a score of 25 or MATH SECTION SCORE with a score of 580 or Placement Score-Math with a score of 75

An in-depth study of the fundamental principles of chemistry including: stoichiometry; atomic theory, atomic structure, chemical periodicity; nature of covalent and ionic bonding; inorganic nomenclature; chemical reactions including aqueous precipitation, acid-base, and redox; basic thermodynamics in physical and chemical matter changes; electronic structure; molecular structure and polarity; gas laws. Examples are drawn from chemical, biological and materials systems.

**Note:** Take concurrent with CHEM 135

**Offered:** Resident

## CHEM 132 Advanced General Chemistry II 3 Credit Hour(s)

**Prerequisite:** CHEM 121 or CHEM 131

An advanced undergraduate study of chemical topics including: behavior and properties of liquids, colligative properties of solutions; and properties of solids; kinetics; equilibrium; acids, bases and other aqueous equilibria; entropy and free energy in chemical reactions; electrochemistry; nuclear chemistry; introductory organic and biochemistry.

**Offered:** Resident

**CHEM 135 Advanced General Chemistry Lab 1 Credit Hour(s)****Prerequisite:** (CHEM 131)

Laboratory experiments are drawn from chemical and material systems which reflect the topics of the lecture course which is an in-depth experimental study of the fundamental principles of chemistry including: stoichiometry; atomic theory; atomic structure; chemical periodicity; nature of covalent and ionic bonding; inorganic nomenclature; chemical reactions including aqueous precipitation, acid-base, and redox; basic thermodynamics in physical and chemical matter changes; electronic structure; molecular structure and polarity; gas laws.

**Note:** Take concurrent with CHEM 131**Offered:** Resident**CHEM 136 Advanced General Chemistry II Lab 1 Credit Hour(s)****Prerequisite:** CHEM 121 or (CHEM 131 and CHEM 135) and CHEM 132 (may be taken concurrently)

Advanced first year undergraduate laboratory experiments are drawn from chemical and material systems which reflect the topics of the lecture course which is an in-depth experimental study of the fundamental principles of chemistry including: behavior and properties of liquids, colligative properties of solutions; and properties of solids; kinetics; equilibrium; acids, bases, and other aqueous equilibria; entropy and free energy in chemical reactions; electrochemistry; nuclear chemistry; introductory organic and biochemistry.

**Offered:** Resident**CHEM 301 Organic Chemistry I 4 Credit Hour(s)****Resident Prerequisite:** CHEM 122 or (CHEM 132 and CHEM 136)

A study of alkanes, alkenes, and alkynes, including nomenclature; optical activity; stereochemistry; substitution and elimination reactions; and ring systems.

**Note:** 3 hours lecture; 3 hours lab**Offered:** Resident**CHEM 301L Organic Chemistry I Lab 0 Credit Hour(s)****Prerequisite:** (CHEM 121 and CHEM 122) or (CHEM 132 and CHEM 136)**Offered:** Resident**CHEM 302 Organic Chemistry II 4 Credit Hour(s)****Resident Prerequisite:** CHEM 301

A study of the nomenclature and reactions of alcohols, ethers, epoxides, ketones, aldehydes, esters and acids, aromatic systems; and numerous name reactions in synthesis.

**Note:** 3 hours lecture; 3 hours lab**Offered:** Resident**CHEM 302L Organic Chemistry II Lab 0 Credit Hour(s)****Prerequisite:** CHEM 301 and CHEM 302 (may be taken concurrently)**Offered:** Resident**CHEM 321 Analytical Chemistry 4 Credit Hour(s)****Prerequisite:** CHEM 122 or (CHEM 132 and CHEM 136)

An introduction to analytical chemistry. Evaluation of data, gravimetric and titrimetric analysis, and an introduction to instrumental methods. These include spectrophotometry, chromatography, and potentiometric methods. (Formerly CHEM 221)

**Note:** 3 hours lecture; 3 hours lab**Offered:** Resident**CHEM 322 Instrumental Analysis 4 Credit Hour(s)****Prerequisite:** CHEM 321 and (RSCH 201 or Inquiry Research with a score of 80 or Research Assessment with a score of 80 or Research (prior to 2017-2018) with a score of 80)

Theory and practice of instrument-based chemical analyses. The course emphasizes the principles of analytical instruments and their applications in chemical sciences.

**Note:** 3 hours lecture; 3 hours lab**Offered:** Resident**CHEM 357 Forensic Chemistry 4 Credit Hour(s)****Prerequisite:** CHEM 302

Forensic Chemistry builds on the material taught in General Chemistry (CHEM 121/CHEM 122) and Organic Chemistry (CHEM 301/ CHEM 302) but with special focus on solving issues and challenges facing forensic science. Poisons, drugs, and medicines are analyzed and classified.

Illegal drug synthesis, combustion and arson chemistry, explosives, and firearms are also covered. Quantitative reasoning is utilized in the form of scientific units (e.g. dosage) and in oxygen balance calculations (i.e. explosives). Documented case studies re-enforce the course material.

Labs will reinforce lecture material.

**Offered:** Resident**CHEM 400 Chemistry Seminar 1 Credit Hour(s)****Prerequisite:** CHEM 302

The preparation and presentation of a paper, discussion of presentations and/or the discussion of articles in the scientific literature. This course can be repeated, and up to four hours can be applied toward the major. Restricted to Chemistry majors and minors.

**Offered:** Resident**CHEM 461 Physical Chemistry I 3 Credit Hour(s)****Prerequisite:** CHEM 122 or (CHEM 132 and CHEM 136) and (MATH 126 or MATH 131)

This course is an in-depth study of the properties of real and ideal gases, thermodynamics, kinetics, changes of state, solutions, phase equilibria, chemical equilibria, and electrochemistry.

**Offered:** Resident**CHEM 462 Physical Chemistry II 3 Credit Hour(s)****Prerequisite:** CHEM 461

This course is a study of the foundational principles of quantum mechanics in atoms and molecules, molecular structure, spectroscopy, and statistical mechanics.

**Offered:** Resident**CHEM 465 Physical Chemistry I Lab 1 Credit Hour(s)****Prerequisite:** CHEM 461 (may be taken concurrently)

This course is an in-depth study of laboratory techniques and the written expression in lab reports that follow the style of papers in chemistry periodicals for the properties of real and ideal gases, thermodynamics, kinetics, changes of state, solutions, phase equilibria, chemical equilibria, and electrochemistry.

**Note:** 3 hours lab; concurrent with CHEM 461**Offered:** Resident**CHEM 466 Physical Chemistry II Lab 1 Credit Hour(s)****Prerequisite:** CHEM 462 (may be taken concurrently)

This course is a study of the lab skills associated with the foundational principles of quantum mechanics in atoms and molecules, molecular structure, spectroscopy, and statistical mechanics.

**Note:** 3 hours lab; concurrent with CHEM 462**Offered:** Resident

**CHEM 471 Inorganic Chemistry 4 Credit Hour(s)**

**Prerequisite:** CHEM 302

A study of inorganic chemistry, including symmetry, structure, and bonding, as well as a survey of the descriptive chemistry of the elements.

**Note:** 3 hours lecture; 3 hours lab

**Offered:** Resident

**CHEM 495 Supervised Research in Chemistry 1-3 Credit Hour(s)**

Original research carried out under the direct supervision of faculty.

**Registration Restrictions:** A minimum of 24 hours of chemistry

**Offered:** Resident

**CHEM 497 Special Topics in Chemistry 1-3 Credit Hour(s)**

**Offered:** Resident

**CHEM 499 Internship 1-6 Credit Hour(s)**

A directed practical work experience under the supervision of the Chemistry Faculty Intern Advisor, in the student's area of career interest. Applications are processed through the Chemistry Faculty Intern Advisor. Applicants must apply the semester prior to starting the internship.

**Registration Restrictions:** 3.00 GPA and Junior or Senior Standing and 20 hours completed in Chemistry (including 12 hours upper level Chemistry) and a declared major in the Biology and Chemistry department; not more than one CSER behind

**Offered:** Resident