

CHEMISTRY (CHEM/CHEM&)

Please see corrections page (<https://catalog.clark.edu/corrections/course-corrections/>) for update to CHEM& 105

Small World Antibiotics Research 2a
CHEM 106 5 Credits/Units

3 hours of lecture / 4 hours of lab

Prerequisite: BIOL 105 (grade of "C" or higher)

Investigates authentic research to discover potentially new antibiotics. Overview of basic chemical concepts including a chemical history of antibiotics, their sources and discovery, and modes of action in bacteria. Strong emphasis on scientific inquiry including critical thinking, laboratory research methodology, and communication abilities. [GE, NS, NS-LAB, SE][PNP]

Cooperative Work Experience
CHEM 199 1-5 Credits/Units

15 hours of clinical

Supervised work experience in an approved job. Completion of specific learning objectives and employer evaluation. [GE]

Selected Topics
CHEM 280 1-5 Credits/Units

5 hours of lecture

Special Projects
CHEM 290 1-6 Credits/Units

6 hours of lecture

Opportunity to plan, organize and complete special projects approved by the department. [GE]

Chemical Concepts: Your Intricate Environment
CHEM& 105 5 Credits/Units

5 hours of lecture

Designed to increase scientific literacy in non-science majors, with little or no scientific background. Together we will explore your world through the lens of chemistry. You will be introduced to basic chemical concepts, the laws that govern them, and use that foundation to explore the connection between human actions and the state of the environment. This course is distinct from CHEM& 110 in both content and practice; since it uses a relatively non-mathematical approach it does not serve as a prerequisite to other CHEM courses. [GE, NS, SE]

Chemical Concepts W/Lab
CHEM& 110 5 Credits/Units

4 hours of lecture / 2 hours of lab

Introductory chemistry course to fulfill the General Education Science with Laboratory requirement, intended for non-science majors who will not take additional chemistry. Focus on unit factor and equation problem solving skills as related to chemical concepts, also stoichiometry and stoichiometric problem solving skills. Topics include the structure of the atom, chemical reactions, and chemical and physical properties to describe matter. [GE, NS, NS-LAB, SE]

Intro to Chemistry: Pre-Health
CHEM& 121 5 Credits/Units

4 hours of lecture / 2 hours of lab

Prerequisite: MATH 96 (grade of "C" or higher), placement into Math level 45, or concurrent enrollment in MATH 6.

Topics in general chemistry applicable to students seeking a 2-year degree in the health-occupations fields. Unit-factor method is applied to problem solving. Topics covered include units of measurement, atomic structure, chemical bonding, energy, the mole concept, nomenclature of inorganic compounds, writing and balancing equations, properties of gases, solutions and colloids, reaction rates and equilibrium, acids, bases and salts, radiation and health. Completion of elementary algebra recommended. [GE, NS, NS-LAB, SE]

Intro to Organic/Biochem
CHEM& 131 5 Credits/Units

4 hours of lecture / 2 hours of lab

Prerequisite: CHEM& 121 (grade of "C" or higher)

Aspects of organic and biochemistry emphasizing how chemicals affect functioning of the human body. Applicable to students seeking a 2-year degree in the health-occupations fields. Topics covered include aliphatic and aromatic compounds, alcohols, ethers, amines, aldehydes, ketones, carboxylic acids and their derivatives, carbohydrates and carbohydrate metabolism, lipids and lipid metabolism, proteins and protein metabolism, enzymes and hormones, nucleic acids and the chemistry of heredity, body fluids and the human circulation system and nutrition. [GE, NS, NS-LAB, SE]

General Chemistry Preparation
CHEM& 139 4 Credits/Units

4 hours of lecture

Prerequisite: MATH 96 (grade of "C" or higher) or placement into Math level 50.

For students who need additional background in applied mathematics and chemistry to enroll in the CHEM& 141-142-143 sequence for science and engineering majors. Topics include scientific methods of measurement, significant figures, nomenclature, properties of elements, compounds, and solutions, the periodic table, writing and balancing chemical equations, and focused (extensive) practice on stoichiometric problem solving. [GE, SE]

General Chemistry I
CHEM& 141 4 Credits/Units

4 hours of lecture

Prerequisite: Both CHEM& 141 and CHEM& 151 must be in your shopping cart to register. (Eligibility for College Algebra (Math Level 50)) and (CHEM& 139 (grade of "C" or higher) or rec. score on chem placement test), and (concurrent enrollment in CHEM&141 and CHEM&151).

First of a 3-term sequence designed for science and engineering majors. Applications of the scientific method by correlating theory with experimental observation. Topics include systems of measurement, atomic structure, chemical bonding and shape, stoichiometric calculations, properties of gases, nomenclature of inorganic compounds, and writing and balancing equations. [GE, NS, SE]

General Chemistry II
CHEM& 142 4 Credits/Units
4 hours of lecture

Prerequisite: CHEM& 141 and CHEM& 151 (grades of "C" or higher), and concurrent enrollment in CHEM& 142 and CHEM& 152
Second of a 3-term sequence designed for science and engineering majors. Applications of the scientific method by correlating theory with experimental observation. Topics include properties of liquids and solids, solutions, equilibria, reaction kinetics, acid-base theories, ionic equilibria and an introduction to organic chemistry. [GE, NS, SE]

General Chemistry III
CHEM& 143 4 Credits/Units
4 hours of lecture

Prerequisite: CHEM& 142 and CHEM& 152 (grades of "C" or higher). Concurrent enrollment in CHEM& 153 is recommended.
Third of a three-term sequence designed for science and engineering majors. Applications of the scientific method by correlating theory with experimental observation. Topics include ionic equilibria, thermodynamics, nuclear chemistry, electrochemistry, transition metal chemistry, and applications of all chemical concepts to the elements on the periodic table. [GE, NS, SE]

General Chemistry Laboratory I
CHEM& 151 1 Credit/Unit
2 hours of lab

Prerequisite: Both CHEM& 141 and CHEM& 151 must be in your shopping cart to register. (Eligibility for College Algebra (Math Level 50)) and (CHEM& 139 (grade of "C" or higher) or rec. score on chem placement test), and (concurrent enrollment in CHEM&141 and CHEM&151).
First of a 3-term lab sequence designed for science and engineering majors, to coincide with CHEM& 141 General Chemistry I. Applications of the scientific method by correlating theory with experimental observation. Topics include systems of measurement, observing and affecting chemical reactions, energy considerations, chemical behavior of aqueous systems, the nature of chemical bonding, gas laws, graphing techniques, using technological interfaces to collect and manipulate data, and mathematical calculations to support chemical observations. Students must register for CHEM& 141, or consent of Instructional Unit. [GE, NS, NS-LAB, SE]

General Chemistry Laboratory II
CHEM& 152 1 Credit/Unit
2 hours of lab

Prerequisite: CHEM& 141 and CHEM& 151 (grades of "C" or higher), and concurrent enrollment in CHEM& 142 and CHEM& 152
Second of a 3-term lab sequence designed for science and engineering majors, to coincide with CHEM& 142 General Chemistry II. Applications of the scientific method by correlating theory with experimental observation. Topics include phenomena of solid and liquid states, colligative properties of aqueous and non-aqueous systems, reaction kinetics, general equilibria, acid/base equilibria, graphing techniques, using technological interfaces to collect and manipulate data, and mathematical calculations to support chemical observations. [GE, NS, NS-LAB, SE]

General Chemistry Laboratory III
CHEM& 153 2 Credits/Units
1 hours of lecture / 2 hours of lab

Prerequisite: CHEM& 142 and CHEM& 152 (grades of "C" or higher), and concurrent enrollment in CHEM& 143 and CHEM& 153
Third of a 3-term lab sequence to coincide with CHEM& 143 General Chemistry III for science and engineering majors. Applications of the scientific method by correlating theory with experimental observation. Topics include chemical and ionic equilibria, acid-base theories of aqueous solutions and selected principles of electrochemistry, gravimetric analysis, coordination chemistry, volumetric analysis, inorganic synthesis, and the statistical handling of data. [GE, NS, NS-LAB, SE]

Organic Chemistry I
CHEM& 241 4 Credits/Units
4 hours of lecture

Prerequisite: CHEM& 143 and CHEM& 153 (grades of "C" or higher) and concurrent enrollment in CHEM& 241 and CHEM& 251
First of a 3-term sequence designed for science and engineering majors, or students seeking a career in the health professions. Topics include mechanistic approach applied to hydrocarbons and alkenes, spectroscopic methods, molecular orbitals, hybridization, resonance, acid/base theory, nomenclature, structure and reactivity, kinetic and thermodynamic theories of reactions. [GE, NS, SE]

Organic Chemistry II
CHEM& 242 4 Credits/Units
4 hours of lecture

Prerequisite: CHEM& 241 and CHEM& 251 (grades of "C" or higher) and concurrent enrollment in CHEM& 242 and CHEM& 252
Second of a 3-term sequence designed for science and engineering majors, or students seeking careers in the health professions. Topics include organic synthesis and mechanistic approach applied to polar molecules; topics may include alcohols, ethers, organometallic compounds, aromatic systems, aldehydes and ketones. [GE, NS, SE]

Organic Chemistry III
CHEM& 243 4 Credits/Units
4 hours of lecture

Prerequisite: CHEM& 242 and CHEM& 252 (grades of "C" or higher) and concurrent enrollment in CHEM& 243 and CHEM& 253
Third of a 3-term sequence designed for science and engineering majors, or students seeking careers in the health professions. Topics include mechanistic and synthetic approach applied to polar molecules; topics may include reactions of carboxylic acids and derivatives, dicarbonyl compounds, amines, conjugated systems, polymer systems and an introduction to biomolecules. [GE, NS, SE]

Organic Chemistry Laboratory I
CHEM& 251 1 Credit/Unit
4 hours of lab

Prerequisite: CHEM& 143 and CHEM& 153 (grades of "C" or higher) and concurrent enrollment in CHEM& 241 and CHEM& 251
First of a 3-term laboratory sequence designed for science and engineering majors, or students seeking a career in the health professions. Focus on basic organic laboratory techniques such as recrystallizations, melting points, distillations, reflux, extractions, chromatography, and spectroscopy; laboratory notebook-keeping skills and scientific writing methods. [GE, NS, NS-LAB, SE]

Organic Chemistry Laboratory II
CHEM& 252 1 Credit/Unit

4 hours of lab

Concurrent enrollment in CHEM& 242, or consent of Instructional Unit.

Prerequisite: CHEM& 241 and CHEM& 251 (grades of "C" or higher) and concurrent enrollment in CHEM& 242 and CHEM& 252

Second of a 3-term laboratory sequence designed for science and engineering majors, or students seeking a career in the health professions. Focus on organic laboratory techniques, spectroscopic characterization of molecules, and introduction to synthetic techniques, including multi-step syntheses and handling moisture- or air-sensitive compounds. [GE, NS, NS-LAB, SE]

Organic Chemistry Laboratory III
CHEM& 253 2 Credits/Units

1 hours of lecture / 4 hours of lab

Prerequisite: CHEM& 242 and CHEM& 252 (grades of "C" or higher) and concurrent enrollment in CHEM& 243 and CHEM& 253

Third of a 3-term sequence designed for science and engineering majors, or students seeking careers in the health professions. Advanced synthetic techniques, project-based experiments and identification. CHEM& 253 replaces CHEM 214. [GE, NS, NS-LAB, SE]