



Sophia Learning

CHEM1001: Introduction to Chemistry (3 semester credits)

COURSE DESCRIPTION

Sophia's Introduction to Chemistry course will introduce the basic principles of general chemistry for students not majoring in a STEM discipline. In this course, the chemical principles are explained using applications in our daily lives as examples. You will learn to relate the macroscopic worlds (what we see) with the microscopic world (where most chemistry takes place). You will explore many aspects of chemistry that affect our daily lives, including atmospheric chemistry, biochemistry, environmental chemistry, and organic chemistry.

COURSE EFFECTIVE DATES: December 2021 - Present

PREREQUISITES: A course in college algebra is a recommended prerequisite for CHEM1001, but not a strict requirement. Students should be familiar with evaluating algebraic expressions, operations with fractions and decimals, unit conversions, scientific notation, and properties of exponents.

LENGTH OF COURSE: This is a self-paced course. Students may use as much or as little time as needed to complete the course.

ACE CREDIT® RECOMMENDATION: In the lower-division baccalaureate/associate degree category, 3 semester hours in general chemistry (11/21).

GRADING: This is a pass/fail course. Students are required to complete all 12 formative and 4 summative assessments with an overall course average of 70% or better. The assessments for this course may require access to the periodic table of elements, a calculator, and other equations and charts provided within the tutorial associated with those questions. An accessible version of the periodic table provided by WebElements and can be accessed at <https://webelements.com/>. Desmos free online scientific calculator can be found at <https://www.desmos.com/scientific>.

LEARNING OUTCOMES

Upon completion of the course, the student will be able to:

1. Understand the history and context of chemical investigation, measurement, and problem-solving.
2. Describe the structure and properties of matter.

- Predict how chemicals behave based on how their atoms bond.
- Classify chemical reactions and quantify the chemical species involved.
- Describe the basics of energy and its relationship to matter.
- Explain nuclear radiation and its appropriate reactions and applications.
- Mathematically describe the behavior of gases.
- Distinguish the properties of and forces involved with the different states of matter.
- Characterize the properties, concentrations, and applications of solutions.
- Differentiate between acids and bases, their various definitions, and ways to measure each.
- Compare the major chemical cycles and pollutants in the atmosphere.
- Categorize common organic molecules and biomolecules based on their structure, function, properties, and applications.

OUTLINE OF MAJOR CONTENT AREAS

- Context of Chemistry and the Scientific Method
- Scientific Notation and Units of Measurement
- Dimensional Analysis and Measurement Uncertainty
- Calculations with Scientific Measurements
- History of Atomic Theory, Matter and its Properties
- The Bohr Model of the Atom
- Introduction to the Periodic Table and Subatomic Particles
- Electronic Structure of Atoms
- Introduction to Molecules and Chemical Bonding
- Lewis Structures and Nomenclature
- Molecular Geometry and Polarity
- Chemical Reactions and Equations
- Reaction Stoichiometry
- Matter and Energy
- Laws of Thermodynamics
- Calorimetry
- Introduction to Nuclear Chemistry
- Radioactive Decay and Dating
- Dangers of Radioactivity
- Gases, Gas Laws, and calculations
- Diffusion, Effusion, and Kinetic Molecular Theory
- States of Matter, Properties, and Phase Transitions
- Intermolecular Forces
- Water
- Solutions and calculations
- Solubility and Precipitation

- Colligative Properties
- Acids and Bases
- pH, pOH, and buffers
- The Atmosphere and Pollution
- Introduction to Organic Chemistry
- Biochemistry and Biomolecules
- Drugs and Medicine
- Polymers

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