

COMMON COURSE OUTLINE: CHEM 1061: Principles of Chemistry I

A. Catalog Description

- 5 credits
- Hours/Week: 4
- Lab Hours/Week: 3
- Prerequisites: CHEM 1020 (C or higher) or high school chemistry with lab within the past 2 academic years, **and** Math 0700 proficiency or concurrent registration, or the high school equivalent.
- Co-Requisites: None
- MnTC Goals (if any): Goal 3 – Natural Sciences,

Basic concepts of chemistry: atomic theory, stoichiometry, thermochemistry, chemical bonding, molecular structure, properties and behavior of the physical states reaction types.

B. Date Last Reviewed: Spring 2018

C. Outline for major content areas:

- Matter and measurements
- Atoms, molecules and ions
- Calculations with chemical formulas and equations
- Chemical reactions in solution
- Types of chemical reactions
- Oxidation-reduction reactions
- Thermochemistry
- Quantum theory, atomic and electronic structure
- Chemical bonding
- Properties of gases
- Properties of condensed states: solids and liquids
- Optional: Basics of Organic Chemistry*

D. Course Learning Outcomes

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

- Discuss the principles and concepts of chemistry. (Goal 3)
- Describe the structure of substances and its relationship to physical properties. (Goal 3)
- Explain how the atomic and molecular structure of matter relates to its chemical reactivity (Goal 3)
- Solve quantitative problems involving physical processes and substances in chemical reactions. (Goal 3)
- Perform required lab techniques correctly using appropriate safety procedures. (Goal 3)
- Communicate lab results and analysis. (Goal 3)
- Interpret the role of energy in physical and chemical processes. (Goal 3)
- Relate chemistry to the environment and everyday life. (Goal 3)

E. Methods for Assessing Student Learning:

- a. Minimum of four one-hour exams
- b. Methods of evaluation may include quizzes and homework
- c. Laboratory experiments (12 lab sessions)
 - i. Exercise in lab safety
 - ii. Densities of liquids and solids
 - iii. Fractional crystallization
 - iv. Solutions and Conductivity
 - v. Properties of hydrates
 - vi. Physical properties of substances
 - vii. Calorimetry
 - viii. Hess' law
 - ix. Synthesis of Copper(I) Chloride
 - x. Molecular geometry
 - xi. Molar volume of gas
 - xii. Redox Titration
- d. Lab Practical Exam
- e. Comprehensive final exam

Statement of Departmental Policy:

The use of graphing calculators will not be allowed during quizzes or exams.

F. Special information

- a. Requirements
 - i. Reading assignments, questions and problems from the textbook:
Chemistry, 12th Edition, by Raymond Chang or "Chemistry" OpenStax.
 - ii. Completion of all laboratory experiments, with the following exception:
 1. One lab may be missed. This will result in a reduction of one full letter grade for the course.
 2. Atomic spectrum of Hydrogen – from course lab manual, to be completed as calculations only.
- b. Grades
 - i. A – 90%
 - ii. B – 80%
 - iii. C – 70%
 - iv. D – 55%