CHEM 131
General Chemistry I

4 Credits (3 hours lecture, 1 hour recitation, 3 hours laboratory)

Community College of Baltimore County
Common Course Outline

Description

CHEM 131 – General Chemistry I: includes the study of atomic structure, nomenclature, chemical reactions and equations, stoichiometry, thermochemistry, chemical bonds, and chemical structures. The laboratory experience in this course develops knowledge of chemical concepts, experimentation, and laboratory instruments and techniques.

Pre-requisites: a) CHEM 107 and CHEM 108 with a grade of C or better in both; or b) a passing grade on the chemistry placement test and ACLT 053 or (ESOL 052 and ESOL 054) and MATH 082; or c) permission of the Dean's designee.

Overall Course Objectives

Upon completion of this course, students will be able to:

1. describe the process of science including the scientific method;
2. find, evaluate, use, and cite appropriate academic resources to present chemical information using effective written and/or oral communications;
3. apply the rules of nomenclature to construct proper inorganic compounds, ions, and chemical equations;
4. solve problems using stoichiometry;
5. describe the physical behavior of gases, the gas laws, and the kinetic molecular theory of gases;
6. illustrate mathematically the first law of thermodynamics, Hess's law, and enthalpies of formation and reaction;
7. determine the electronic structure of atoms and the organization of the periodic table;
8. determine the structure of covalent molecules and polyatomic ions using Lewis structures;
9. apply the Valence Shell Electron Pair Repulsion (VSEPR) theory and orbital hybridization to determine geometry of molecular compounds and polyatomic ions;
10. record data and observations of chemical experiments in a manner consistent with academic standards and ethics in chemistry;
11. present chemistry information in writing, by writing formal laboratory reports displaying ethics and academic integrity;
12. complete calculations with data obtained from experiments correctly;
13. determine the physical properties of inorganic compounds;
14. apply quantitative chemistry to synthesize, identify, and analyze inorganic compounds; and
15. evaluate how chemical processes can influence individuals and/or local and global societies.

Major Topics

I. Nomenclature
   a. Atoms
   b. Ions
   c. Compounds
II. Stoichiometry
III. Reactions
   a. Classification
   b. Oxidation-Reduction
IV. Physical Properties
   a. Gases
   b. Liquids
   c. Solids
V. Thermochemistry
VI. Gas Laws
VII. The Periodic Table
VIII. Atomic Structure
IX. Electronic Structure
   a. Bohr Model
   b. Quantum Theory
X. Bonding Theories
   a. VSEPR
   b. Valence Bond
   c. Molecular Orbital
XI. Chemical Bonding
   a. Ionic
   b. Covalent
   c. Lewis Structures
XII. Molecular Geometry
XIII. Writing Scientific Reports
   a. Observations
   b. Data Collection
   c. Reporting Results
XIV. Synthesis, Identification, and Analysis of Chemicals
XV. Titration
XVI. Spectroscopy
XVII. Application of Scientific Principles

Course Requirements

Grading will be determined by the individual faculty member, but shall include the following, at minimum:

- three unit examinations (at least 35% of overall grade)
- comprehensive final examination (15% of the overall grade)
- five quizzes (at least 5% of overall grade)
- one written assignment consistent with CCBC General Education Program objectives (at least 10% of the overall grade)

- electronic homework (at least 5% of the overall grade)
- nine Informal Laboratory Reports (at least 10% of the overall grade)
- nine Pre-Lab Assignments (at least 5% of the overall grade)
- Formal Laboratory Reports (at least 5% of the overall grade)
- Laboratory Final Exam in a closed book format (at least 5% of the overall grade)

Written assignments and research projects: Students are required to use appropriate academic resources in their research and cite sources according to the style selected by their professor.

Other Course Information

This course is an approved 4–credit General Education course in the Biological and Physical Sciences and fulfills the laboratory requirement.

One or more assignments will infuse CCBC General Education Program outcomes and will account for a minimum of 10% of the total course grade. The assignment(s) will allow students to demonstrate at least 5 of the 7 General Education program outcomes.

Date Revised: 12/6/2022