

Inver Hills Community College

CHEM 1061: Principles of Chemistry I

A. COURSE DESCRIPTION

Credits: 5

Lecture Hours/Week: 4

Lab Hours/Week: 3

OJT Hours/Week: *.*

Prerequisites:

This course requires any of these six prerequisite categories

1. MATH 0940 - Intermediate Algebra (Minimum grade: 2.0 GPA Equivalent and Number of Years Valid: 2)

Or

2. A score of 50 on test Accuplacer College Level Math

Or

3. A score of 22 on test ACT Math

Or

4. A score of 250 on test Accuplacer NG Advanced Algebra Functions

Or

5. A score of 250 on test Accuplacer NG COMP Advanced Algebra Func

Or

6. A score of 1158 on test MN Comprehensive Assessment Math

Corequisites: None

MnTC Goals: Goal 02 - Critical Thinking, Goal 03 - Natural Science

Includes study of basic chemical theory and application with emphasis upon atomic theory and structure, chemical bonding, inorganic chemical nomenclature, chemical reactions, reaction stoichiometry, periodic relationships, molecular structure, properties of gases and the kinetic molecular theory. The lab component of this course provides the student with the opportunity to apply chemical concepts through observation, data collection, quantitative measurement, problem analysis, and mathematical applications to chemistry. Approved safety goggles and a lab apron are required. Prerequisites: MATH 0940 with a grade of "C" or higher OR higher level placement, either within the last 2 years. Recommended: CHEM 1010 or a full year of advanced high school chemistry within the last 2 years and with a grade of "C" or higher.

B. COURSE EFFECTIVE DATES: 01/01/1998 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

1. Measurement, significant figures, precision of measurement 5%
2. Atomic theory and atomic structure including atoms, molecules and ions 5%
3. Types of chemical reactions and balancing chemical equations 10%
4. The Mole concept, empirical formulas, and molecular formulas 15%
5. Chemical, solution and gas stoichiometry 10%
6. Quantum Mechanics foundations: quantum numbers and periodic relationships 5%
7. Chemical bonding foundations: molecular geometry, polarity, VSEPR and Valence Bond Theory 15%
8. Chemical nomenclature and formulas 10%
9. Properties of gases and the Kinetic Molecular Theory 10%
10. Thermochemistry: laws, enthalpy and enthalpy change in chemical systems 15%

D. LEARNING OUTCOMES (General)

1. Investigate matter and its interactions using the Scientific Method.
2. Obtain observations, collect data and make measurements on chemical systems with correct precision in terms of significant figures and apply their rules in calculations for results.
3. Understand atomic theory including atomic structure and isotope.
4. Name polyatomic ions, ionic and binary compounds.
5. Calculate masses/moles and percent composition of compounds by combustion analysis (empirical and molecular formula) and use stoichiometry to calculate the amounts of reactant and product and percent yield in a variety of chemical reactions.
6. Identify different reaction types including precipitation, acid-base and redox reactions and be able to write molecular and ionic equations.
7. Perform calculations involving solution molarity, dilution, gravimetric analysis and titration.
8. Understand gas behaviors using Kinetic Molecular Theory and apply gas laws in calculations including partial pressures and gas stoichiometry.
9. Understand quantum theory including dual property of light and electron, quantum numbers, atomic orbitals, electron configurations and periodicity.
10. Understand basic concepts of thermochemistry including First Law of Thermodynamics, enthalpy, Hess's Law and calculate enthalpy change of chemical reactions.
11. Write Lewis structure, determine molecular geometry, polarity, bonding and hybridization using VSEPR and Valence Bond theory.
12. Use basic laboratory equipment properly and recognize characteristics of hazardous wastes, handle and dispose chemicals appropriately.

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

Goal 02 - Critical Thinking

1. Gather factual information and apply it to a given problem in a manner that is relevant, clear, comprehensive, and conscious of possible bias in the information selected.
2. Analyze the logical connections among the facts, goals, and implicit assumptions relevant to a problem or claim; generate and evaluate implications that follow from them.

Goal 03 - Natural Science

1. Demonstrate understanding of scientific theories.
2. Formulate and test hypotheses by performing laboratory, simulation, or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, students' laboratory experience in the collection of data, its statistical and graphical analysis, and an appreciation of its sources of error and uncertainty.
3. Communicate their experimental findings, analyses, and interpretations both orally and in writing.
4. Evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies.

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted