Syllabus
CHEM 1090
General Chemistry I
2025

Committee Members:

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Facilitator: Dr. Aaron McLean

The Institution agrees to the contents in this syllabus including course prefix, number, course description and other contents of this syllabus.

Chief Academic Officer, Central Community College	02/17/2025	Adopt
Theresa Billiot Chief Academic Officer, Little Priest Tribal College	02/24/2025	Adopt
Tom McDonnell Chief Academic Officer, Metropolitan Community College	02/20/2025	Decline
Jody Tomanek Chief Academic Officer, Mid-Plains Community College	02/12/2025	Adopt
Chief Academic Officer, Nebraska Indian Community College	02/19/2025	Adopt
Charlene Widener Chief Academic Officer, Northeast Community College	02/12/2025	Adopt
Joel Michaelis Chief Academic Officer, Southeast Community College	02/19/2025	Adopt
Grant Wilson Chief Academic Officer, Western Nebraska Community College	02/12/2025	Adopt

I. CATALOG DESCRIPTION

Course Number: CHEM1090
Course Title: General Chemistry I
Prerequisite(s): Intermediate Algebra or Appropriate College Level Math Score

Catalog Description: This is the first course of a comprehensive chemistry sequence. Topics include nomenclature, atomic structure, chemical reactions, essentials of bonding, periodic properties, Valence Shell Electron Pair Repulsion Theory (VSEPR) theory, modern bonding theories, stoichiometry, thermochemistry, and the chemistry of solids, liquids, gases.

Credit Hours: 4 Semester; 6 Quarter
Contact Hours: 45 (lecture) / 30 (lab)

II. COURSE OBJECTIVES / COMPETENCIES

Course will:

1. Implement basic dimensional analysis.
2. Introduce basic structure of the atom.
3. Disseminate the properties of elements.
4. Describe the quantum-mechanical model of the atom.
5. Identify the properties of molecular shapes.
6. Identify inorganic compounds using correct nomenclature.
7. Describe chemical reactions by symbolic, numeric, and verbal means.
8. Introduce simple reactions.
9. Elaborate on energy transfer and basic thermodynamic relationships.
10. Delineate stoichiometric relationships.
11. Convey properties of gases and gas laws.
12. Introduce the principles of solutions and their concentrations.
13. Familiarize the student with the properties of acids and bases.
14. Delineate safe and appropriate laboratory techniques.

III. STUDENT LEARNING OUTCOMES:

Students will be able to:

1. Calculate one quantity from another by use of dimensional analysis.
2. Explain periodic trends using the structure of an atom.
3. Describe the changes as energy interacts with an atom.
4. Compare and contrast covalent and ionic bonding.
5. Draw Lewis structures for atoms, ions, and molecules and use Lewis structures to determine the shape of a molecule.
6. Determine correct International Union of Pure and Applied Chemistry (IUPAC) names and chemical formulas of compounds.
7. Describe and predict products of precipitation, acid-base, and redox reactions by symbolic, numeric, and verbal means.
8. Perform enthalpy calculations and interpret energy diagrams.
9. Perform stoichiometric calculations.

10. Perform gas law calculations.
11. Calculate solution concentrations.
12. Demonstrate the ability to perform lab experiments safely, to interpret the data collected, and to draw reasonable conclusions based on the data.

IV. COURSE CONTENT / TOPICAL OUTLINE

1. Matter and measurement
2. Atomic theory and the periodic table
3. Atoms, molecules, and ions
4. Chemical reactions
5. Mass, moles, and stoichiometric relationships
6. Gases and gas laws
7. Thermochemistry
8. Quantum theory of the atom
9. Electron configurations and periodicity
10. Chemical bonding
11. Molecular geometry and bonding theories
12. States of matter

V. INSTRUCTIONAL MATERIALS

A. Required Text(s) Suggested

1. OpenStax Chemistry or other appropriate open education resources
2. Chemistry, Burdge
3. Chemistry: A Molecular Approach, Tro
4. General Chemistry, McQuarrie
5. General Chemistry, Ebbing
6. Essentials of General Chemistry, Ebbing
7. Chemistry, Robinson et. al
8. General Chemistry: Atoms First, McMurry and Fay
9. Chemistry, Overby
10. Chemistry: The Central Science, Brown and LeMay

VI. METHOD OF PRESENTATION/INSTRUCTION

1. Lecture
2. Discussion
3. Demonstration
4. Group activity
5. Application
6. On-Line
7. Distance education
8. Laboratory activities

VII. METHODS OF EVALUATION

Course grades, at the determination of the instructor, may be based on participation, assignments, exams, projects, papers, and lab work. Instructors will distribute and discuss evaluation and his/her grading policies with students at the beginning of each term.

VIII. INSTITUTIONAL DEFINED SECTION

(*To be used at the discretion of each community college as deemed necessary)*