Virginia Western Community College
CHM 101
Introductory Chemistry I

Prerequisites

MTE 1, MTE 2, MTE 3, MTE 4 and MTE 5; and a placement recommendation for ENG 111, co-enrollment in ENF 3/ENG 111, or successful completion of all developmental English requirements. Part I of II

Course Description

Emphasizes experimental and theoretical aspects of inorganic, organic, and biological chemistry. Discusses general chemistry concepts as they apply to issues within our society and environment. Designed for the non-science major. Part I of II.

Semester Credits: 4 **Lecture Hours: 3** **Laboratory Hours: 3**

Required Materials

Textbook: Timberlake, General, Organic, and Biological Chemistry, Structures of Life, Volume One (Third Custom Edition for NVCC)
Pearson Publishing. ISBN: 9781323138045

Lab: In-home kit purchased from eScience Labs (can be purchased through bookstore; sent to student in mail)

Lab notebook, 100 carbonless copy sets, Hayden. ISBN: 9781930882744

Course Outcomes

At the completion of this course, the student should be able to:

- Define and apply basic terminology
- Balance simple chemical equations
- Apply principles of scientific method and measurement
- Use symbols, formulas, and nomenclature correctly
- Perform simple stoichiometric calculations
- Explain the principles of atomic structure and predict trends in periodic table
- Solve simple gas law problems
- Determine the type of bonding, shape and polarity of simple compounds
- Determine solution concentration and pH
- Relate concentration and temperature of reaction rate
- Demonstrate proper handling of chemicals and glassware in a safe manner

Topical Description

A. Introduction to scientific measurement
    1. SI units
    2. Scientific notation
    3. Significant figures
    4. Accuracy and precision
B. Matter and energy
    1. Nature of matter
    2. States of matter
    3. Properties of matter
    3. Identification of matter
    4. Types of energy
C. Heat and calorimetry
    1. Energy (enthalpy) relations in chemical processes
    2. Calorimetry
D. Atomic structure and the periodic table
    1. Development of modern theory of atomic structure
    2. Nuclear and electronic structure
    3. Relation between electronic structure and chemical properties
E. Chemical nomenclature
    1. Naming compounds
    2. Writing formulas for compounds
F. Chemical bonding
    1. Ionic bonding
    2. Covalent bonding
    3. Electronegativity and polarity
G. Stoichiometry
    1. Balancing chemical equations
    2. Types of chemical reactions
    2. Mass and mole calculations based on chemical equation
H. Chemical dynamics
    1. Relation of concentration and temperature to reaction rate
    2. Catalysts
I. Gases
    1. Gas Laws
    2. Ideal gas equation (PV=nRT)
    3. STP Conditions Mixture of gases (Dalton's Law)
J. Aqueous solutions
    1. Solubility of solids, liquids, and gases
    2. Solution concentration calculations
    3. Colligative properties
    4. Electrolytes and non-electrolytes

5. Reactions in aqueous solutions

K. Acids and bases
1. Definitions
2. Neutralization and titration
3. Equilibrium
4. Le Chatelier's principle
5. pH
6. Buffers

Laboratory Topics

Experiments are performed at home with kits purchased from Hands-On Labs. Information regarding the kits are available from the bookstore or the instructor.
Kit ID code: LP-3062-CK-01 (CHM 101 only)

Experiments:
Math and Graphing Prep
Laboratory Techniques & Measurements
Observations of Physical and Chemical Changes
Separation of a Mixture of Solids
Introduction to the Periodic Table
Atoms, Isotopes, and Atomic Mass
Naming Ionic and Molecular Compounds
Molecular Modeling and Lewis Structures
Stoichiometry of a Precipitation Reaction
Boyle's Law
Molarity: Conversions and Mass Determination
Solubility and Solubility Curves
Water, pH and Buffers

Notes to Instructors

1. Participation for laboratory experiments is mandatory. Approved safety glasses must be worn during the performance of laboratory experiments ***over the eyes*** as required.
2. Laboratory reports are due when requested. The report consists of the data and analysis as requested by the instructor. To aid not only the instructor but also especially the students, reports will not be accepted two weeks after the lab due date. Completion of the lab experiment followed by submission of the data and calculations on the due date with appropriate write-up contributes toward a good grade. Grading scales for laboratory reports are at the professor's discretion, but will count towards the overall grade for the course.