

# CHE 1011 Topical Outline and Learning Outcomes

## REQUIRED COURSE LEARNING OUTCOMES

1. Apply significant figures correctly in measurements and calculations.
2. Use dimensional analysis to solve a variety of problems.
3. Use the periodic table to assist in explaining chemical bonding, polarity, and physical and chemical properties of elements.
4. Write and/or give orally the corresponding formula and name of a compound when given only the formula or name.
5. Calculate the mathematical relationship between variables after graphing the experimental data.
6. Apply knowledge of chemistry principles to real world situations.
7. Apply knowledge to solve mathematical problems related to chemistry principles.
8. Read, analyze and apply written material to new situations.
9. Write and speak clearly and logically in scientific presentations and/or essays.
10. Apply appropriate forms of technology to solve problems or compile information.

## REQUIRED TOPICAL OUTLINE

- A. Introduction Terminology
  1. Classification of matter
  2. Physical and chemical properties and changes of matter
  3. Measurement including significant figures
  4. Introduction to dimensional analysis
  5. Atomic theories and periodic table
- B. Atomic theories and structure of the atom
  1. Relative mass and the mole
  2. Electronic configuration and the periodic table
  3. Electron configuration
    - a. Orbital notation
    - b. Classification of the elements
    - c. Property trends
- C. Chemical bonding and molecules
  1. Types of chemical bonding

2. Noble gas configuration and chemical bonding
    - a. Ionic
    - b. Covalent
    - c. Polar covalent
  3. Lewis structures
  4. Polyatomic ions
  5. Valence Shell Electron Pair Repulsion Theory (VSEPR)
  6. Polarity
- D. Nomenclature and formulas of compounds
1. Ionic compounds
  2. Covalent compounds
- E. Chemical reactions
1. Chemical equations and terminology
  2. Types of chemical reactions
  3. Energy and reactions
  4. Stoichiometry
    - a. Limiting reagent
    - b. Percent yield
- F. States of matter
1. Gas state
    - a. Pressure
    - b. Gas laws (Boyles', Charles', Ideal Gas, Dalton's)
    - c. Stoichiometry
  2. Condensed states
    - a. Liquid state
    - b. Solid state
    - c. Intermolecular forces
  3. Changes in states of matter
- G. Solutions
1. Terminology
  2. Concentration units
  3. Preparation and dilution
  4. Colligative properties
- H. Reaction rates and equilibrium
1. Rates
  2. Factors that influence rate
  3. Chemical equilibrium
  4. Le Chatelier`s principle

- I. Acid/Base Chemistry
  1. Acid/base definitions
  2. Nomenclature
  3. pH
  4. Strengths of acids and bases
  5. Titration and stoichiometry
  6. Buffers

## **RECOMMENDED TOPICAL OUTLINE**

- A. Nuclear Chemistry
  1. Radioactivity
  2. Nuclear equations
  3. Detection
  4. Half-life
  5. Fission and fusion
  6. Applications