Northwest Arkansas Community College
Division of Science & Mathematics

CHEM 1124 College Chemistry II

Catalog Description: The continuation of Chemistry 1104 with lab. Emphasis on introductory qualitative analysis. Three hours of lecture and three hours of lab weekly.

Prerequisite: CHEM 1104 with a grade of C or better (or equivalent).

Credit hours/ Contact hours/ Load hours: 4/ 6/ 5

Target Audience/Transferability: Designed for students majoring in a science field and has been approved by ADHE to satisfy 4 hours in the Laboratory Science division of the 35-hour core requirements that is transferable between state institutions which will apply toward the general education core curriculum requirements for baccalaureate degrees at state supported institutions of higher education. This course will transfer directly to the University of Arkansas as CHEM 1123 (University Chemistry II) and CHEM 1121L (University Chemistry II Laboratory).

Student Learning Outcomes: Students completing this course will:

- Understand molecular geometry using valence shell electron pair repulsion theory, hybridization, and molecular orbital theory and how it influences intermolecular forces in liquid and solid solutions.
- Explain the relationships and laws that govern chemical reactions including chemical kinetics and rate laws.
- Discuss different types of equilibrium reactions (gas, acid-base, solubility), the meaning of the equilibrium constant, and the factors that disrupt a system at equilibrium.
- Define acids and bases and apply the concepts of pH, ionization, and buffer action to acid-base equilibria.
- Demonstrate proper techniques in the laboratory utilizing appropriate instrumentation, collect data, construct graphs and interpret outcomes.

Required Texts:

- Chang, Chemistry, 10th edition, 2010
- Slowinski, Wolsey, Masterton, NWACC CHEM 1104/1124 College Chemistry 1 and 2, Custom Lab Manual, Updated 2010

Required equipment: Scientific calculator

Optional Texts: Chang, Student Solutions Manual, 10th edition, 2010

Topics:

Chapter	Concepts
7-9	Review First Day of Class
10	Chemical Bonding II: Molecular Geometry and Hybridization
11	Intermolecular Forces and Liquids and Solids
12	Physical Properties of Solutions
13	Chemical Kinetics

14	Chemical Equilibria
15	Acids and Bases
16	Acid-Base Equilibria and Solubility Equilibria
17	Chemistry in the Atmosphere
18	Entropy, Free Energy, and Equilibrium (Thermodynamics)
19	Electrochemistry and Oxidation-Reduction Reactions

Required Instructional Activities: This course includes a required laboratory component.

- **Sample Laboratory Experiments**
    - Safety in the Laboratory (Video, Lecture, Quiz)
    - The Geometrical Structure of Molecules
    - Molar Mass Determination by Depression of Freezing Point
    - Rates of Chemical Reactions, I. The Iodination of Acetone
    - Rates of Chemical Reactions, II. A Clock Reaction
    - Properties of Systems in Chemical Equilibrium—LeChatelier's Principle
    - Determination of the Equilibrium Constant for a Chemical Reaction
    - pH Measurements—Buffers and Their Properties
    - Determination of the Solubility Product of PbI_2
    - Development of a Scheme for Qualitative Analysis
    - Qualitative Analysis of Group I Cations
    - Preparation of Aspirin
    - Rate Studies on the Decomposition of Aspirin

Forms of Assessment: None

Resources:

- OnlineLearning Center: www.mhhe.com/physsci/chemistry/chang9
- Essential Study Partner: www.mhhe.com/physsci/chemistry/chang9/student/olc/esp.mhtml
- Learning Lab Tutors