

# Minnesota State College Southeast

## CHEM 1431: Principles of Chemistry II

### A. COURSE DESCRIPTION

Credits: 4

Lecture Hours/Week: 3

Lab Hours/Week: 2

OJT Hours/Week: \*.\*

Prerequisites:

This course requires either of these prerequisites

CHEM 1430 - Principles of Chemistry I

CHEM 2530 - Principles of Chemistry I

Corequisites: None

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

This is the second semester of an in-depth study of general chemistry. Topics covered include solubility, acids and bases, chemical kinetics and equilibria, thermochemistry and oxidation reduction. Lab is practical applications of topics covered in class, emphasizing collection, reporting, and interpretation of data. (Fulfills MnTC Goals 2 and 3) (Prerequisite: CHEM1430 Principles of Chemistry I) (4 credits: 3 lecture/1 lab)

**B. COURSE EFFECTIVE DATES:** 07/20/2016 - Present

### C. OUTLINE OF MAJOR CONTENT AREAS

1. Atomic theory, quantum mechanics, and chemical bonding
2. Changes in matter on a molecular/atomic scale including thermodynamics and equilibrium
3. Apply chemical principles and theories to problems
4. Communicate and relate chemical principles to everyday life using a chemical vocabulary
5. Collect, organize, and analyze scientific data in laboratory

### D. LEARNING OUTCOMES (General)

1. Relate intermolecular forces to phase diagrams and changes of state
2. Predict solubility including the common ion effect
3. Predict the relationship between colligative properties and solutes
4. Relate collision theory to chemical kinetics
5. Determine rate laws, half-lives and reaction order
6. Relate entropy, Gibbs free energy, and Le Chatlier's principle to reaction equilibrium
7. Differentiate between Arrhenius, Brønsted-Lowry and Lewis acids and bases
8. Relate  $K_a$ ,  $K_b$  to pH in buffered and non-buffered solutions
9. Recognize and balance oxidation/reduction reactions
10. Calculate cell potentials using the Nernst equation
11. Describe nuclear fission and fusion reactions

## **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. Imagine and seek out a variety of possible goals, assumptions, interpretations, or perspectives which can give alternative meanings or solutions to given situations or problems.
3. 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.

## **F. LEARNER OUTCOMES ASSESSMENT**

As noted on course syllabus

## **G. SPECIAL INFORMATION**

This course was previously CHEM 2531.