

# Minnesota State College Southeast

## CHEM 2518: General, Organic & Biochemistry I

### A. COURSE DESCRIPTION

Credits: 4

Lecture Hours/Week: 3

Lab Hours/Week: 2

OJT Hours/Week: \*.\*

Prerequisites:

This course requires either of these prerequisite categories

1. CHEM 0510 - Fundamentals of Chemistry

Or

2. CHEM 1010 - Fundamentals of Chemistry

Corequisites: None

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

This course is intended as a broad introduction to the basic principles of general, organic, and biochemistry. Atomic structure, radioactivity, ionic and covalent compounds, reactions, oxidation-reduction, solutions, acids and bases are covered through descriptive, theoretical, and laboratory topics. These principles are related to organic and biological chemistry throughout the course as it is a foundational course for students enrolled in the health related programs. However, this course is open to all students enrolled in any program. (Fulfills MnTC Goal 2 & 3) (Prerequisite: Successful completion of CHEM1010 Fundamentals of Chemistry or permission from the instructor) (4 credits: 3 lecture/1 lab)

**B. COURSE EFFECTIVE DATES:** 02/06/2006 - Present

### C. OUTLINE OF MAJOR CONTENT AREAS

1. General chemistry: gas laws, acid/base chemistry, stoichiometry and solutions
2. Organic chemistry: saturated and unsaturated hydrocarbons and oxygen derivatives
3. Nuclear chemistry: equations, half-lives and applications
4. Biochemistry: carbohydrates, lipids, proteins and enzymes
5. Laboratory techniques

## **D. LEARNING OUTCOMES (General)**

1. Able to measure in US and metric systems and convert between while using significant figures
2. Understand electronic configuration and how it relates to ionic and covalent bonding
3. Use stoichiometric principles to calculate chemical quantities
4. Use kinetic molecular theory to relate intermolecular forces to the states of matter, and describe gases with common gas laws
5. Understand solutions on a molecular level, and calculate concentrations
6. Identify common types of chemical reactions
7. Calculate pH of solutions including buffers and identify common acids and bases
8. Identify and balance nuclear reactions and understand the applications of nuclear reactions in medical treatment
9. Draw structures of, identify isomers of and name alkanes, alkenes and alkynes while predicting products for common reactions involving these organic compounds
10. Draw structures of, identify isomers of and name alcohols, phenols and ethers while predicting products for common reactions involving these organic compounds
11. Identify and draw carbohydrate structures, describe the importance of monosaccharides and predict products of common reactions of monosaccharides
12. Relate fatty acids to their physical properties in biological systems, and identify common chemical reactions of fatty acids
13. Identify proteins and enzymes based on structure and describe primary, secondary, tertiary and quaternary structure in proteins
14. Understand nucleotide components and structure including base pairing
15. Use the scientific method to collect and analyze data including graphical representations

## **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.
4. Evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies.

## **F. LEARNER OUTCOMES ASSESSMENT**

As noted on course syllabus

## **G. SPECIAL INFORMATION**

None noted