

**College of San Mateo**  
**Official Course Outline**

1. **COURSE ID:** CHEM 420    **TITLE:** Health Science Chemistry II  
**Units:** 4.0 units    **Hours/Semester:** 48.0-54.0 Lecture hours; 48.0-54.0 Lab hours; and 96.0-108.0 Homework hours  
**Method of Grading:** Letter Grade Only  
**Prerequisite:** CHEM 410
  
2. **COURSE DESIGNATION:**  
**Degree Credit**  
**Transfer credit:** CSU  
**AA/AS Degree Requirements:**  
    CSM - GENERAL EDUCATION REQUIREMENTS: E5a. Natural Science  
**CSU GE:**  
    CSU GE Area B: SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING: B1 - Physical Science  
    CSU GE Area B: SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING: B3 - Laboratory Activity
  
3. **COURSE DESCRIPTIONS:**  
**Catalog Description:**  
    Completes the sequence, focusing on organic and biochemistry with special emphasis on the chemistry of carbohydrates, lipids, proteins, nucleic acids, and vitamins and their respective metabolism. Students who complete CHEM 210-220 and CHEM 410-420 will receive credit for CHEM 210-220 only.
  
4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**  
    Upon successful completion of this course, a student will meet the following outcomes:
  1. At the introductory level, students will become familiar with organic functional groups and their reactive behaviors as well as more complex biologically relevant chemical systems.
  2. Represent the chemical reactions and biochemical mechanisms.
  3. Solve elementary quantitative problems involving behavior and reactions of various chemical substances. Special emphasis will often be given to examples that directly relate to biology, health, and medical sciences.
  
5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**  
    Upon successful completion of this course, a student will be able to:
  1. At the introductory level, students will become familiar with organic functional groups and their reactive behaviors as well as more complex biologically relevant chemical systems.
  2. Represent the chemical reactions and biochemical mechanisms.
  3. Solve elementary quantitative problems involving behavior and reactions of various chemical substances. Special emphasis will often be given to examples that directly relate to biology, health, and medical sciences.
  
6. **COURSE CONTENT:**  
**Lecture Content:**
  - CHEM 420 is comprised effectively of two parts, the first half of the class will focus upon Organic Chemistry and the second half on Biochemistry. Both portions of the course will have materials that are focused on the health sciences field.
  - Organic chemistry is needed in order to get students familiar with functional groups and their properties. The functional groups that will be studied in detail are: saturated and unsaturated hydrocarbons, alcohols, ethers, aldehydes, ketones, carboxylic acids, amines, amides, and stereochemistry. Students exposed to these functional groups will learn: proper naming, structure elucidation, how to properly draw/represent, chemical reactivity, and how to perform multistep synthesis between each of these functional groups. A student will be able to take the materials learned in this portion of the course, and at the introductory level understand how this information relates to more complex biologically relevant chemical systems found in the human body.
  - An understanding of these organic chemistry building blocks will be expanded upon in the biochemistry portion of the course. This introduction to organic chemistry will be applied to large, complex chemical reactions. A student will learn how to properly represent chemical reactions, balance equations, and

understand how to approach these types of problems. After an understanding of chemical reactions, the student will use this information in the exploration of biochemical mechanisms that are found in the health sciences field.

- The course also covers in detail how to solve quantitative problems of chemical systems and understanding their behavior. This will involve understanding how functional groups interconvert between themselves, as well as how these can be used to create large scale molecules that are biologically important. This includes an understanding of polymers and their chemistries.

**Lab Content:**

1. Demonstrate the basic laboratory safety procedures and the proper use of personal laboratory protective equipment.
2. Introduce the basic laboratory glassware and equipment found in general chemistry laboratories.
3. Measure mass and volume of solids and liquids to calculate derived quantities such as density.
4. Perform chemical reactivity tests to be used in the identification of an unknown by comparison.
5. Synthesis biologically important chemical compounds.
6. Determine the pH of unknown samples, and work with buffer solutions.
7. Experimentally create and work with polymers.
8. Determine the chemical and physical differences between proteins, lipids, and carbohydrates.

**7. REPRESENTATIVE METHODS OF INSTRUCTION:**

Typical methods of instruction may include:

- A. Lecture
- B. Other (Specify): Some but not necessarily all of the following methods are employed when teaching this course to assist students in achieving the course objectives. • Students will be required to have an appropriate textbook and approved laboratory manual for this course. • Lecture style presentation of materials • Computer and video programs. • In class exams and a comprehensive final • Group work on problems in lecture and experimental procedures in lab. • The use of assigned homework. • In class presentation of a topic that fits in the domain of modern science. • Instructional materials that will be integrated in this class will include a textbook, outside electronic media (such as videos of chemistry related movies), three dimensional computer simulations of chemical compounds, and physical model kits.

**8. REPRESENTATIVE ASSIGNMENTS**

Representative assignments in this course may include, but are not limited to the following:

**Writing Assignments:**

Weekly 3-5 pages laboratory reports

**Reading Assignments:**

One chapter per week in college textbook or approximately 20-25 pages depending on the chapter

One experiment's background and procedure per week or approximately 4-8 pages depending on the experiment

**Other Outside Assignments:**

10-15 homework problems per chapter

**9. REPRESENTATIVE METHODS OF EVALUATION**

Representative methods of evaluation may include:

- A. Exams/Tests
- B. Lab Activities
- C. Quizzes
- D. Some but not necessarily all of the following methods are employed when teaching this course to assist the students in achieving the course objectives. Exams, quizzes, laboratory work, written and oral reports, and assigned exercises will be used to learn and evaluate in an on-going manner students' knowledge acquisition. Furthermore, students may be required to give a class presentation of a modern topic in the sciences.

**10. REPRESENTATIVE TEXT(S):**

Possible textbooks include:

- A. Timberlake, Karen. *General, Organic and Biological Chemistry*, 6th ed. Pearson, 2018

**Origination Date:** September 2020

**Curriculum Committee Approval Date:** October 2020

**Effective Term:** Fall 2021

**Course Originator:** Jefferson Flowers

