College of San Mateo
Official Course Outline

1. **COURSE ID:** CHEM 410 **TITLE:** Health Science Chemistry I
   Units: 4.0 units **Hours/Semester:** 48.0-54.0 Lecture hours; 48.0-54.0 Lab hours; 96.0-108.0 Homework hours; 192.0-216.0 Total Student Learning hours
   Method of Grading: Letter Grade Only
   Prerequisite: Successful completion of Elementary Algebra or equivalent, or placement by other measures as applicable.

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:
   Introduction to chemistry for the health sciences, beginning with scientific measurement and the metric system, followed by chemical bonding, solution chemistry, acids and bases, redox reactions, gases and general aspects of stoichiometry. 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, become familiar with the nanoscale particle nature of matter including atoms, molecules and ions and the various states they exist in.
   2. Represent the chemical elements and simple chemical compounds, and begin the process of depicting a variety of chemical reactions involving elements, compounds and ions.
   3. Solve elementary quantitative problems involving concentrations, 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, become familiar with the nanoscale particle nature of matter including atoms, molecules and ions and the various states they exist in.
   2. Represent the chemical elements and simple chemical compounds, and begin the process of depicting a variety of chemical reactions involving elements, compounds and ions.
   3. Solve elementary quantitative problems involving concentrations, behavior and reactions of various chemical substances. Special emphasis will often be given to examples that directly relate to the human body.

6. **COURSE CONTENT:**
   Lecture Content:
   - Introduction to scientific methodology, scientific notation, metric units, errors, significant figures and dimensional analysis.
   - Presentation of basic chemical concepts, properties, chemical and physical changes, pure substances and mixtures.
   - Concepts of heat, temperature and energy.
   - Introduction to atomic theory. The student will understand modern atomic theory with regard to the major subatomic particles. Basic properties of atoms, ions, and isotopes will be presented.
   - Chemical bonding and resulting chemical structures will be studied. Types of bonds with their properties will be discussed.
   - Gas laws and calculations using these laws will be understood.

- Solution chemistry will be presented.
- Chemical equilibrium.
- Acid and base chemistry with a special emphasis upon buffers will be explored. Buffer chemistry will be highlighted due to its critical nature in the human body.

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. Experimentally demonstrate the law of conservation of mass in open and closed systems.
6. Determine the specific heat of unknown metal samples by calorimetry.
7. Experimentally determine the percent composition of an unknown salt by gravimetry.
8. Collect pressure and volume data to graphically derive the pressure-volume relationship of gases (Boyle's Law).
9. Experimentally determine the effect of temperature on the solubility of salts in water.

7. **REPRESENTATIVE METHODS OF INSTRUCTION:**

Typical methods of instruction may include:

A. Lecture

B. Other (Specify): • 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. Homework

C. Lab Activities

D. Quizzes

E. 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

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Course Originator: Jefferson Flowers