

**LAST REVIEW: 2008-2009**

**NEXT REVIEW: 2013-2014**

**STATUS: A**

**COURSE TITLE: Organic Chemistry I**

**COMMON COURSE NUMBER: CHM 2210**

**CREDIT HOURS: 3**

**CONTACT HOUR BREAKDOWN**

*(per 16 week term)*

**CLOCK HOURS:**

*(Voc. Course ONLY)*

**Lecture: 48**

**Lab:**

**Clinic:**

**Other:**

**PREREQUISITE(S): CHM 1046 and CHM 1046L with a minimum grade of C**

**COREQUISITE(S): CHM 2210L**

**PRE/COREQUISITE(S):**

**COURSE DESCRIPTION** *(750 characters, maximum):*

First part of a two-course sequence presenting the structure, preparation, reaction and nomenclature of various classes of organic compounds and their derivatives. Reaction electronic mechanisms are interpreted and unified in the light of modern theory.

General Education Requirements – Associate of Arts Degree (AA), meets Area(s):

Area

General Education Requirements – Associate in Science Degree (AS), meets Area(s):

Area

General Education Requirements – Associate in Applied Science Degree (AAS), meets Area(s):

Area

## **UNIT TITLES**

- 1. Introduction to the Structure and Properties of Organic Compounds**
- 2. Alkanes, Alkyl Halides and Nucleophilic Substitution Reactions**
- 3. Alkenes, Alkynes, Conjugated Systems, and Elimination Reactions**
- 4. Stereochemistry**
- 5. Alcohols and Ethers**

## EVALUATION:

Please provide a brief description (250 characters maximum) that details how students will be evaluated on the course outcomes.

**The students will be evaluated through a combination of the following: exams, quizzes, worksheets, and/or final.**

*\*\*\* Complete the following only if course is seeking general education status \*\*\**

## GENERAL EDUCATION Competencies and Skills \*:

Please highlight in green font all Competencies/Skills from the list below that apply to this course. In the box to the right of the Competency/Skill, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 5.12) that apply.

1. Read with critical comprehension	
2. Speak and listen effectively	
3. Write clearly and coherently	
4. Think creatively, logically, critically, and reflectively (analyze, synthesize, apply, and evaluate)	1.1, 2.2, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 3.2, 3.3, 4.1, 4.5, 4.6, 5.2, 5.3
5. Demonstrate and apply literacy in its various forms: (highlight in green ALL that apply) (1. technological, 2. informational, 3. mathematical, 4. scientific, 5. cultural, 6. historical, 7. aesthetic and/or 8. environmental)	1. Technological: 4.2 2. Informational: 5.5 3. Mathematical: 4.2 4. Scientific: All outcomes.
6. Apply problem solving techniques to real-world experiences	
7. Apply methods of scientific inquiry	
8. Demonstrate an understanding of the physical and biological environment and how it is impacted by human beings	
9. Demonstrate an understanding of and appreciation for human diversities and commonalities	
10. Collaborate with others to achieve common goals.	
11. Research, synthesize and produce original work	
12. Practice ethical behavior	
13. Demonstrate self-direction and self motivation	
14. Assume responsibility for and understand the impact of personal behaviors on self and society	
15. Contribute to the welfare of the community	

*\* General Education Competencies and Skills endorsed by '05-'06 General Education Task Force*

## **UNITS**

### **Unit 1. Introduction to the Structure and Properties of Organic Compounds**

#### **General Outcome:**

- 1.0 The student shall: be able to apply information from general chemistry that is relevant to organic chemistry, as well as to recognize the concepts of structure and functional groups in organic chemistry.**

#### **Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 1.1 Apply the following general chemistry concepts to organic chemistry: chemical bonding, hybrid orbitals, molecular geometry, bond energies, polarity, the relationship between structure and physical properties, and acid/base theories.**
- 1.2 Recognize, draw and identify examples of each of the major functional groups and classes of organic compounds.**

**Common Course Number:** CHM 2210

**Unit 2 Alkanes, Alkyl Halides and Nucleophilic Substitution Reactions**

**General Outcome:**

- 2.0 The student shall: be able to name, detail the structure, properties and reactions of alkanes and alkyl halides and demonstrate an understanding of the characteristics of the nucleophilic substitution reaction.**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 2.1 Name and draw structural formulas of the first 10 straight chain alkanes, branched alkanes and alkyl halides and relate these structures to their physical properties.**
- 2.2 Recognize the relative energies involved in various conformations and single bond rotations.**
- 2.3 Detail the major preparations of alkanes and alkyl halides.**
- 2.4 Detail the mechanism for a free radical substitution reaction and the factors which control it.**
- 2.5 Discuss the differences between the two nucleophilic substitution mechanisms SN1 versus SN2.**
- 2.6 Recognize experimental factors which would make either the SN1 or SN2 mechanism predominate (e.g., alkyl group structure, nature and concentration of the nucleophile or polarity of the solvent).**
- 2.7 Make predictions of stereochemical fates for chiral alkyl halides undergoing either SN1 or SN2 reactions.**
- 2.8 Write detailed mechanisms for SN1, SN2, E1 and E2 reactions (including those involving rearrangement).**
- 2.9 Discuss and weigh factors which would make the competing reaction of elimination predominate over either unimolecular or bimolecular substitution such as the nature of the base/nucleophile, the alkyl group structure, the temperature or the solvent polarity.**

**Common Course Number:** CHM 2210

**Unit 3 Alkenes, Alkynes, Conjugated Systems, and Elimination Reactions**

**General Outcome:**

- 3.0 The student shall: be able to demonstrate an understanding of the structure, nomenclature, physical properties, preparation and major reactions of unsaturated hydrocarbons.**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 3.1 Name unsaturated hydrocarbons and detail the structures and properties of selected alkenes, polyenes and alkynes.**
- 3.2 Outline the preparations of alkenes and alkynes and the mechanisms involved.**
- 3.3 Discuss the structure, stability and reaction of carbocations.**
- 3.4 Discuss the oxidative cleavage, substitution and addition reactions of alkenes (including Diels-Alder), and dienes and alkynes.**
- 3.5 Write equations to demonstrate the acidity of alkynes.**
- 3.6 Define and recognize tautomerism.**
- 3.7 Detail the differences between conjugated, isolated and cumulative double bonds.**

Common Course Number: CHM 2210

**Unit 4 Stereochemistry**

**General Outcome:**

- 4.0 The student shall: be able to describe the importance of the three dimensional structure of molecules and the effect of this on physical and chemical properties.**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 4.1 Recognize which molecules will and which will not exhibit stereoisomerism.**
- 4.2 Explain the workings of a polarimeter and the meanings of optical rotation and plane polarized light and calculate specific rotation.**
- 4.3 Identify meso, chiral and achiral molecules and centers of chirality.**
- 4.4 Define and give examples of the common terms associated with stereochemistry.**
- 4.5 Use the sequence rules to denote R or S configurations and draw stereostructures and Fischer projections for R and S configurations.**
- 4.6 Predict the stereochemistry of the product of reaction of compounds with or without chiral carbons.**

**Common Course Number:** CHM 2210

**Unit 5 Alcohols and Ethers**

**General Outcome:**

- 5.0 The student shall: be able to name alcohols and ethers, demonstrate an understanding of the methods of preparation, and the major reactions of the alcohols and ethers including their use as solvents and special reactivity of epoxides.**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 5.1 Assign IUPAC and common names to alcohols and ethers.**
- 5.2 Describe methods - with mechanisms and equations - for the preparation of alcohols and ethers.**
- 5.3 Describe and write equations for reactions involving the chemical properties of alcohols and plan multi-step synthesis problems involving the building up of large molecules by way of alcohol chemistry.**
- 5.4 Describe simple tests by which alcohols may be characterized or classified.**
- 5.5 Describe the special uses of ethers as solvents and list the major hazards associated with their use.**
- 5.6 Describe the reactions of ethers and epoxides, especially with nucleophilic reagents.**
- 5.7 Discuss the importance and limitations of the Grignard synthesis.**