CHEM C220: ORGANIC CHEMISTRY A

Item	Value
Curriculum Committee Approval Date	10/17/2008
Top Code	190500 - Chemistry, General
Units	3 Total Units
Hours	54 Total Hours (Lecture Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S)
Local General Education (GE)	• CL Option 1 Natural Sciences (CB1)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 5A Physical Science (5A)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 5A Physical Science (5A)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B1 Physical Science (B1)

Course Description

This course is the first semester of Organic Chemistry, a two-semester course, which includes topics on the properties and reactions of aliphatic and aromatic organic compounds. Emphasis is placed on the reaction mechanisms, fundamental principles, and modern instrumental methods. PREREQUISITE: CHEM C185. Transfer Credit: CSU; UC: Credit Limitations: no credit for CHEM C110 if taken after CHEM C180 or CHEM C220; no credit for CHEM C130 if taken after CHEM C180 or CHEM C220; no credit for CHEM C140, PHYS C140 if taken after CHEM C180 or CHEM C220. C-ID: CHEM 150, CHEM 160 S.**C-ID:** CHEM 150, CHEM 160 S.

Course Level Student Learning Outcome(s)

1. Deduce the structure of organic molecules using infrared and NMR spectroscopy
2. Apply Lewis structural theory, VSEPR theory, molecular orbital theory, resonance structures, and polarity to represent organic molecules.
3. Use IUPAC nomenclature rules to provide a systematic name for a chemical structure or derive chemical structure from the systematic name for alkanes, alkyl halides, alkenes, alkynes, alcohols, and esters.
4. Identify the anticipated products of substitution (SN1 and SN2) and elimination reactions (E1 and E2) and the factors that influence them
5. Explain the stereochemistry for reactions, including nucleophilic substitution, elimination, alkene additions, alkyne additions, and free-radical halogenations.
6. Use Fischer projections to represent chiral centers and apply the R/S system to name enantiomers.

Course Objectives

- 1. Apply principles of electron configurations, Lewis structural theory, VSEPR Theory, and molecular orbital theory to predict the structure, bonding, and three-dimensional shapes of organic molecules.
- 2. Use IUPAC nomenclature rules to provide systematic names for chemical structures or sketch the appropriate chemical structure from a systematic name for organic molecules
- 3. Illustrate reaction mechanisms using curved-arrow notation and predict the expected products, including stereoisomers, for common organic reactions, including nucleophilic substitution, elimination, addition, oxidation, and reduction reactions.
- 4. Interpret infrared, 1H and 13C NMR spectra of organic compounds.

Lecture Content

Review of structure and bonding Electron configurations, Lewis dot structures, VSEPR, hybrid orbitals Bronsted-Lowry acids and bases; Lewis acids and bases Functional Groups Infrared Spectroscopy Alkanes and Cycloalkanes Nomenclature Conformational Analysis Stability Chirality Optical activity, R/S configurations, Enantiomers and diastereomers; racemic mixtures Stereospecific chemical reactions Alkyl Halides Nomenclature and reaction chemistry Nucleophilic Substitution Reactions SN1 vs. SN2 Effects of Solvent, nucleophile, leaving group, alkyl substitution Elimination Reactions E1 vs. E2 Stereochemical considerations Alkenes Nomenclature, isomerism Addition Reactions Alkynes Nomenclature Addition reactions; acidity NMR Spectroscopy Chemical shift, integration, splitting patterns Mass Spectrometry Fragmentation patterns Alcohols and Ethers Reaction Chemistry

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)

Instructional Techniques

Lecture Group Problem-solving exercises Computer-generated molecular modeling

Reading Assignments

Reading textbook selections prior to lectures Conducting literature research to gather information about spectroscopic data

Writing Assignments

Weekly Homework exercises including detailed explanations of reaction pathways

Out-of-class Assignments

Internet research for applications of lecture topics

Demonstration of Critical Thinking

Problem-solving exercises

Required Writing, Problem Solving, Skills Demonstration

Homework assignments, quizzes and exams consist of problem-solving exercises

Eligible Disciplines

Chemistry: Masters degree in chemistry OR bachelors degree in chemistry or biochemistry AND masters degree in biochemistry,

chemical engineering, chemical physics, physics, molecular biology, or geochemistry OR the equivalent. Masters degree required.

Textbooks Resources

1. Required Wade, Leory G. Organic Chemistry, 9th ed. Upper Saddle River: Pearson , 2017 Rationale: -

Other Resources

1. Coastline Library