CHEM 8 Course Outline as of Fall 2019

CATALOG INFORMATION

Dept and Nbr: CHEM 8 Title: INTRO ORGANIC CHEMISTRY
Full Title: Introductory Organic Chemistry
Last Reviewed: 11/26/2018

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	5.00	Lecture Scheduled	4.00	17.5	Lecture Scheduled	70.00
Minimum	5.00	Lab Scheduled	3.00	17.5	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	7.00		Contact Total	122.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 140.00 Total Student Learning Hours: 262.50

Title 5 Category:	AA Degree Applicable
Grading:	Grade Only
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	

Catalog Description:
An introduction to the principles, nomenclature, structure, and reaction mechanisms of organic chemistry.

Prerequisites/Corequisites:
Course Completion of CHEM 1A OR Course Completion of CHEM 42

Recommended Preparation:
Course Completion of ENGL 1A

Limits on Enrollment:

Schedule of Classes Information:
Description: An introduction to the principles, nomenclature, structure, and reaction mechanisms of organic chemistry. (Grade Only)
Prerequisites/Corequisites: Course Completion of CHEM 1A OR Course Completion of CHEM 42
Recommended: Course Completion of ENGL 1A
Limits on Enrollment:
Transfer Credit: CSU;UC.

Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**		Effective:	Inactive:
CSU GE:	**Transfer Area**		Effective:	Inactive:
	B1	Physical Science	Fall 1981	
	B3	Laboratory Activity		
IGETC:	**Transfer Area**		Effective:	Inactive:
	5A	Physical Sciences	Fall 1981	
	5C	Fulfills Lab Requirement		

CSU Transfer:	Transferable	Effective:	Fall 1981	Inactive:
UC Transfer:	Transferable	Effective:	Fall 1981	Inactive:

CID:

Certificate/Major Applicable:
Major Applicable Course

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Identify and explain the basic concepts, terminology, and theories of organic chemistry and biochemistry.
2. Relate the molecular level structures of organic and biological compounds to their physical and chemical properties.
3. Explain and predict reactivity of organic compounds using reaction mechanisms.
4. Investigate concepts in the laboratory through analysis of experimental observations.

Objectives:
During the course students will:
1. Predict and explain three-dimensional structure and conformational changes for organic compounds.
2. Apply rules of nomenclature for naming organic compounds.
3. Deduce the structures for products of organic reactions.
4. Predict and explain relative physical properties of organic compounds.
5. Predict and explain relative reactivities of organic compounds.
6. Suggest appropriate methods for the synthesis of organic compounds.
7. Propose mechanisms for organic reactions.
8. Compare and contrast both structures and properties of biologically important compounds.
9. Apply selected organic and biological chemistry concepts and theories to contemporary issues such as health, nutrition, or the environment.
10. Make observations and apply chemical concepts in the laboratory.
11. Analyze compounds by instrumental methods.

Topics and Scope:

I. Bonding and Structure of Organic Compounds

- A. Lewis Structures
- B. Valence Shell Electron Pair Repulsion (VSEPR) Theory
- C. Resonance and Formal Charge
- D. Hybridization
- E. Functional Groups
- F. Curved Arrow Formalism

II. Acid-Base Chemistry
- A. Definitions of Acids and Bases
- B. Acidity and pKa

III. Alkanes and Cycloalkanes
- A. Physical Properties
- B. Nomenclature
- C. Constitutional Isomers
- D. Conformations and Newman Projections

IV. Alkenes and Alkynes
- A. Nomenclature
- B. Geometric (cis-trans) Isomerism
- C. Electrophilic Addition
- D. Mechanism of Electrophilic Additions
- E. Hydrogenation

V. Stereochemistry
- A. Enantiomers and Diastereomers
- B. Properties of Chiral and Achiral Compounds
- C. Meso Compounds and Racemates

VI. Aromatic Compounds

VII. Alcohols, Ethers and Sulfur Compounds
- A. Structure
- B. Elimination Reactions of Alcohols
- C. Oxidation Reactions

VIII. Substitution and Elimination Reactions
- A. Nucleophilic Substitution Reactions: SN1 and SN2
- B. Elimination Reactions: E1 and E2
- C. Factors Influencing the Occurrence of Each Mechanism

IX. Aldehydes and Ketones
- A. Structure
- B. Nucleophilic Addition
- C. Multistep Syntheses

X. Carboxylic Acids and Derivatives
- A. Structure and Physical Properties
- B. Acid-Base Properties
- C. Nucleophilic Substitution

XI. Amines
- A. Structure
- B. Acid-Base Properties
- C. Reactions

XII. Carbohydrates
- A. Monosaccharides
- B. Stereochemistry and Mutarotation
- C. Disaccharides
- D. Polysaccharides

XIII. Amino Acids and Proteins
- A. Structure and Classification

B. Levels of Organization
C. Biochemical Significance
XIV. Nucleic Acids

All topics are covered in lecture and lab portions of the course.

Assignment:

Lecture-Related Assignments:
1. Specific reading and study assignments, 30-45 pages per week
2. Homework exercises, 15-20 problems per week
3. Comprehensive final exam

Lab-Related Assignments:
1. Lab Skill Demonstrations

Lecture- and Lab-Related Assignments:
1. Written laboratory reports, 10-15, including a discussion of each experiment
2. Lecture and laboratory exams (3 - 6)

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Lab reports	Writing 20 - 35%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework exercises	Problem solving 0 - 10%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Lab skills	Skill Demonstrations 0 - 2%

Exams: All forms of formal testing, other than skill performance exams.

Lecture and lab exams, final exam	Exams 65 - 75%

Other: Includes any assessment tools that do not logically fit into the above categories.

None	Other Category 0 - 0%

Representative Textbooks and Materials:

Introduction to Organic Chemistry. 6th ed. Brown, William and Poon, Thomas. Wiley. 2016
The Organic Chem Lab Survival Manual: A Student's Guide to Techniques. 10th ed. Zubrick, James. Wiley. 2016
Essential Organic Chemistry. 3rd ed. Bruice, Paula. Pearson. 2016
Fundamentals of Organic Chemistry. 9th ed. McMurry, John. Cengage Learning. 2016
Microscale and Macroscale Techniques for the Organic Laboratory. Pavia, Donald and Lampman, Gary and Kriz, George. Cengage Learning. 2006 (classic)
Organic Chemistry. 3rd ed. Hill, Richard and Barbaro, John. Contempory Publishing Company of Raleigh, 2004 (classic)