Course Information Form (CIF)

Course Code: CHE 205 (IAI CHM 914)
Course Title: Organic Chemistry II

Department: Natural Sciences
Effective Date: Summer 2026
PCS Code: 1.1 - Baccalaureate/Transfer
CIP Code: 40.0504
Repeatability: 0

Credit Hours

Catalog Notation: 3-0-3
Credit Hour Distribution:

Lecture: 3	Lab: 0	Clinical: 0	**Total: 3**

General Course Information

Catalog Description

Properties, preparations, reactions, reaction mechanisms for additional organic functional groups. Spectroscopy.

General Course Objectives

- To explore properties and behavior of selected functional groups in depth.
- To provide a basis for prediction of reaction products based on mechanisms.
- To become acquainted with biomolecules.

Minimum Placement Levels

English	Reading	Math
None	Placement out of CCS 098	None

Prerequisites

Credit in CHE 203 with a grade of C or higher

Methods of Evaluation

Quizzes (weekly), 3-4 hour exams, project (researching and writing about an organic chemistry topic), comprehensive final.

Instructional Materials and Additional Supplies

Organic Chemistry, current edition; Joel M. Karty, Norton.
Organic Chemistry Study Guide, current edition; Study Guide to accompany textbook, Norton.
SmartWork5, online homework system.

Course Content

General Learning Outcomes (GLOs)

- Reasoning and Inquiry: Students will demonstrate the ability to solve problems using deductive reasoning and logic, quantitative reasoning, or the scientific method.

Course Segments and Student Learning Outcomes

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Spectroscopy	1. Determine structure by spectroscopic methods including mass spectrometry, UV-Visible spectroscopy, nuclear magnetic resonance (carbon and proton), and infrared spectroscopy.	12	0	0
Nucleophilic Addition to Polar pi-Bonds	1. Recognize functional groups and predict physical properties. 2. Demonstrate understanding of strong base addition to aldehydes, ketones, imines, and nitriles. Strong bases include, but not are limited to: hydride reducing agents and organometallic reagents. 3. Draw and name aldehydes and ketones. 4. Discuss relative reactivity. 5. Perform complex syntheses. 6. Predict whether direct or conjugate addition will be favored and predict the product from conjugate addition reactions, including the Michael reaction. 7. Demonstrate understanding of the Aldol and Robinson Annulation reactions. 8. Prepare and react enols and enolates from carbonyl compounds. 9. Demonstrate understanding of the Witting reaction. 10. Demonstrate understanding of weak base addition to aldehydes, ketones, imines and nitriles. Weak bases include, but not are limited to: water, alcohols, amines, cyanide, and enolates.	9	0	0
Organometallic and Redox Reactions	1. Identify reactions as oxidation-reduction reactions. 2. Demonstrate understanding of reduction reactions of alkenes, alkynes, ketones, and aldehydes. 3. Perform complex syntheses. 4. Demonstrate understanding of oxidation reactions of alcohols and aldehydes. 5. Demonstrate understanding organometallic reagent preparation. 6. Demonstrate understanding of protecting groups. Be able to determine when and how to use them in synthesis.	3	0	0
Nucleophilic Addition-Elimination Reactions	1. Prepare and react enols and enolates from carbonyl compounds. 2. Demonstrate understanding of the Claisen, Hell-Volhard-Zelinsky, and Baeyer-Villiger oxidation reactions. 3. Perform complex syntheses. 4. Perform malonic ester and acetoacetic ester syntheses. 5. Demonstrate understanding of strong base addition to carboxylic acids and carboxylic acid derivatives. Strong bases include, but not are limited to: alkoxides, hydroxide, hydride reducing agents, and organometallic reagents. 6. Draw and name carboxylic acids and derivatives. 7. Demonstrate understanding of weak base addition to carboxylic acids and carboxylic acid derivatives. Weak bases include, but not are limited to: water, alcohols, amines, and enolates. 8. Demonstrate understanding of the carboxylic acid derivative stability ladder and how it affects what reactions are possible. 9. Discuss relative reactivity.	6	0	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Conjugation and Aromaticity	1. Define aromaticity. 2. Predict if a compound is aromatic using molecular orbital theory and Huckel's rule. 3. Draw molecular orbitals of cyclically conjugated systems. 4. Draw molecular orbitals for linear conjugated systems. 5. Demonstrate understanding of the effect of conjugation on the stability of a compound.	3	0	0
Electrophilic Aromatic Substitution	1. Complete reaction equations for electrophilic aromatic substitution reactions. 2. Use the mechanism to predict products. 3. Define electron withdrawing group and electron donating group. 4. Use substituents to predict product. 5. Perform complex syntheses. 6. Draw and name arenes. 7. Complete reaction equations for arene reactions; use the mechanism to predict products. 8. Perform nucleophilic aromatic substitution. 9. Prepare and react diazonium compounds.	6	0	0
Diels-Alder Reaction, Syn Dihydroxylation, and Oxidative Cleavage	1. Demonstrate understanding of the effect of substituents in Diels-Alder reactions, including their effect on the rate of reaction and the regiochemistry and stereochemistry of the products. 2. Complete reaction equations for Diels-Alder reactions, and use the mechanism to predict products. 3. Be able to determine if a cycloaddition reaction is favored based on MO Theory principles. 4. Demonstrate understanding of the syn dihydroxylation and oxidative cleavage reactions of alkenes and alkynes. 5. Perform complex synthesis.	3	0	0
Radical Reactions	1. Demonstrate understanding of radical stability and preparation. 2. Be able to draw and understand the common elementary mechanism steps of radical reactions. 3. Demonstrate understanding of the radical halogenation of alkanes and radical addition of HBr to alkene reactions. 4. Demonstrate understanding of dissolving metal reduction reactions. 5. Perform complex syntheses.	3	0	0

Total Contact Hours

Lecture Hours	Lab Hours	Clinical Hours
45	0	0