SCHOOL OF STEM SYLLABUS

TERM:

INSTRUCTOR:

COURSE CODE: CHP-230

OFFICE HOURS:

COURSE TITLE: Organic Chemistry II

OFFICE LOCATION:

DAY(S) AND TIME(S):

EMAIL:

LOCATION:

PHONE:

COURSE PREREQUISITE: Complete CHP-225, Organic Chemistry I

CREDITS:

COURSE DESCRIPTION:
This course is a continuation of Organic Chemistry I. The studies proceed to aromatic compounds, aldehydes, ketones, carboxylic acids and their functional derivatives, amines, phenols and arylhalides. Emphasis is placed on group functionality and reaction mechanisms. Laboratory work illustrates organic synthesis, reactions, chemical analysis, and spectroscopic identification.

STUDENT LEARNING OUTCOMES:
Upon completion of this course, student will be able to:

1. Give names and formulas of aliphatic and aromatic compounds.
2. Make clear characteristic properties of each functional group.
3. Realize that a bifunctional molecule will modify each individual functionality as well. 4. Comprehend four additional (seven learned from Organic Chemistry-I) reaction mechanisms: electrophilic aromatic substitution, nucleophilic addition, nucleophilic acyl substitution, and nucleophilic aromatic substitution.
5. Familiarize with how free-radicals, carbocations, and carbanions are stabilized by charge dispersal and molecular rearrangement.
6. Discuss how resonance dictates reaction orientations in aromatic and conjugated systems.
7. Discuss how electron withdrawing/releasing groups (de)activate aromatic substitution. 8. Apply Lewis concept of acid-base to organic reactions.
9. Apply Lowry-Bronsted concept of acid-base to equilibria between carboxylic acid, amine, and phenol with their salts.

10. Relate occurrence of reaction mechanism to functional group as follows: Free-radical substitution: alkane. Free-radical addition: alkene Electrophilic aromatic substitution: aromatic ring. Electrophilic addition: alkene, alkyne, α, β-unsaturated carbonyls. Nucleophilic substitutions, SN1/SN2: alkyl halide, alcohol, ether, amine. Nucleophilic acyl substitution: carboxylic acid, acid derivatives, amine. Nucleophilic aromatic substitution: aryl halide. Nucleophilic addition: aldehyde, ketone, α, β -unsaturated carbonyls. Eliminations, E1/E2: alkyl halide, alcohol, amine.

11. Outline steps in a possible synthesis of an organic compound. Correlate IR and NMR spectra with various changes in atom arrangements in a molecule.

13. Identify a compound and determine its structure by chemical test and spectroscopic analysis.

14. Gain more basic techniques to work on organic synthesis, reaction, and identification.

TEXTBOOK AND SUPPLEMENTAL MATERIALS:

"*Organic Chemistry"* 9th Edition, Cengage Learning Publishing

Author(s): John McMurry

ISBN-13: 978-1-305-08048-5

Lab Manual specific to CHP-230. It will be provided.

GRADING POLICY:

Three exams	75 points (25 each)
Quizzes	5 points
Lab	15 points
Homework	5 points

SAMPLE COURSE SCHEDULE:

Week 1 Introduction to the course, grading policy, course

requirements. **Safety Rules** in the laboratory, Glassware

Chapter 12: Structure Determination: Mass Spectrometry and Infrared Spectroscopy

Week 1 Chapter 12: Structure Determination: Mass Spectrometry and Infrared Spectroscopy

Lab 1: Test for Alkanes and Alkenes

Week 1 Chapter 12: Structure Determination: Mass Spectrometry and Infrared Spectroscopy

Week 2	Chapter 13: Structure Determination: Nuclear Magnetic Resonance Spectroscopy
	Lab 2: Preparation of ter-Butyl Chloride
Week 2	Chapter 13: Structure Determination: Nuclear Magnetic Resonance Spectroscopy
Week 2	Chapter 13: Structure Determination: Nuclear Magnetic Resonance Spectroscopy
	Lab 3: Preparation of 1-Bromobutane
Week 3	Chapter 14: Conjugated Compounds and Ultraviolet Spectroscopy
Week 3	Chapter 14: Conjugated Compounds and Ultraviolet Spectroscopy
	Lab 4: Cyclohexene from Cyclohexanol
Week 4	Chapter 15: Benzene and Aromaticy
Week 4	Chapter 15: Benzene and Aromaticy
Week 5	Exam 1
Week 5	Chapter 16: Chemistry of Benzene: Electrophilic Aromatic Substitution
Week 6	Chapter 16: Chemistry of Benzene: Electrophilic Aromatic Substitution
	Lab 5: Adipic Acid from Cyclohexene
Week 6	Chapter 16: Chemistry of Benzene: Electrophilic Aromatic Substitution
Week 7	Chapter 17: Alcohols and Phenols

Week 7	Chapter 17: Alcohols and Phenols
	Lab 6: Test for Aldehydes and Ketones
Week 8	Chapter 18: Ethers and Epoxides: Thiols and Sulfides
	Lab 7: Synthesis of Acetylsalicylic Acid (Aspirin)
Week 8	Chapter 18: Ethers and Epoxides: Thiols and Sulfides
Week 9	Chapter 19: Aldehydes and Ketones: Nucleophilic Addition Reactions
	Lab 8: Acetylation of Aniline
Week 9	Chapter 19: Aldehydes and Ketones: Nucleophilic Addition Reactions
Week 10	Exam 2
Week 11	Chapter 20: Carboxylic Acid and Nitriles
Week 11	Chapter 20: Carboxylic Acid and Nitriles
	Lab 9: Acid-Base Extraction
Week 12	Chapter 20: Carboxylic Acid and Nitriles
Week 12	Chapter 21: Carboxylic Acid Derivatives: Nucleophilic Acyl Substitution Reactions
	Lab 10: Nylon 6,10/Glyptah
Week 13	Chapter 21: Carboxylic Acid Derivatives: Nucleophilic Acyl Substitution Reactions

Week 13	Chapter 22: Carbonyl Alpha-Substitution Reactions
Week 14	Chapter 23: Carbonyl Condensation Reactions and Chapter 24: Amines and Heterocycles Review
Week 15	Final

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https://www.hccc.edu/administration/academic-affairs/syllabus-addendum.html