

# CHM 252 ORGANIC CHEMISTRY II

## COURSE DESCRIPTION:

Prerequisites: CHM 251 with a C or better

Corequisites: None

This course continues the systematic study of the theories, principles, and techniques of organic chemistry. Topics include nomenclature, structure, properties, reactions, and mechanisms of aromatics, aldehydes, ketones, carboxylic acids and derivatives, amines and heterocyclics. Multi-step synthesis is emphasized. Upon completion, students should be able to demonstrate an understanding of organic concepts as needed to pursue further study in chemistry and related professional fields. Laboratory experiments, including spectroscopy and chromatography, and computer-based exercises augment and reinforce the basic principles discussed in lecture as well as provide practical examples.

Course Hours Per Week: Class, 3. Lab, 3. Semester Hours Credit, 4.

## LEARNING OUTCOMES:

Upon completion of this course, students will be able to:

- a. Explain aliphatic nucleophilic substitution reactions.
- b. Explain unimolecular reactions and bimolecular reactions.
- c. Describe chirality, enantiomers and diastereoisomers.
- d. Explain SN1 and SN2 reactions.
- e. Understand aldehydes and ketones.
- f. Identify the oxidation state of organic functional groups.
- g. Describe reduction of carbonyl groups.
- h. Explain Grignard reactions.
- i. Describe carboxylic acids and derivatives.
- j. Explain the correlation between pKa and leaving group ability, and pKa and nucleophilicity.
- k. Describe phenols.
- l. Understand enolates and carbanions.
- m. Understand the reactions of amines.
- n. Explain aldol reactions.
- o. Explain tautomerism.
- p. Describe elimination reactions.
- q. Describe amino acids and proteins
- r. Describe polycyclic and heterocyclic compounds.
- s. Describe carbohydrates and their stereochemistry.
- t. Explain the structure and component molecules of nucleic acids.
- u. Understand the organic mechanisms related to the biogenesis of natural products.
- v. Describe concerted and pericyclic reactions.

## OUTLINE OF INSTRUCTION

- I. Alkyl halides
  - A. Nucleophiles
  - B. Bases
  - C. Leaving groups
  - D. Structure and mechanism
  - E. Stereochemistry



- B. Primary { 1° }, Secondary { 2° }, Tertiary { 3° }
  - C. Base character
  - D. Stereochemistry
  - E. Diazotization
  - F. A Synthesis - sulfanilamide
    - 1) Sulfa drugs
    - 2) Nitration - electrophilic substitution
    - 3) Acylation - amide formation
    - 4) Sulfonation - electrophilic substitution, directors
    - 5) Amide preparation - from an acid chloride
    - 6) Amide hydrolysis
  - G. Introduction to amino acids
    - 1) Sulfanilic acid
    - 2)  $\alpha$ -amino acids
    - 3)  $\alpha$ -amino acid synthesis
  - H. Nitrogen heterocycles
    - 1) Pyridine
    - 2) Pyrrole
- X. Carbohydrates I
- A.  $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{C} (\text{H}_2\text{O}) + \text{O}_2$
  - B. Kiliani - Fisher synthesis
  - C.
  - D.

- B. Receptor sites
- XV. Terpenes
- A. Acetyl Co-enzyme A
  - B. Condensation reactions
  - C. Steroids

**REQUIRED TEXTBOOK AND MATERIALS:**

To be selected by Instructor/Discipline Chair.