

CHM 132 Organic and Biochemistry

COURSE DESCRIPTION:

Prerequisites: CHM 131 and CHM 131A, or CHM 151

Corequisites: none

Course description. This course provides a survey of major functional classes of compounds in organic and biochemistry. Topics include structure, properties, and reactions of the major organic and biological molecules and basic principles of metabolism. Upon completion, students should be able to demonstrate an understanding of fundamental chemical concepts needed to pursue studies in related professional fields *This course has been approved to satisfy the Comprehensive Articulation Agreement for transferability as a general education course in Natural Science. This course has been approved for the transfer under the ICAA as a general education course in Natural Science.*

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

LEARNING OUTCOMES:

Upon completing requirements for this course, the student will be able to:

1. Students will demonstrate knowledge of major organic molecule categories, and be able to name compounds, draw structures, and identify major functional groups and their reactions.
2. Students will demonstrate knowledge of the major biochemical molecules, their function in biological systems, and major metabolic pathways of biochemistry.

OUTLINE OF INSTRUCTION:

- I. Introduction to organic chemistry and hydrocarbons
 - A. Define organic compounds
 - B. Alkanes, alkenes, and alkynes
 - C. Cis-trans isomers
 - D. Expanded, condensed, and skeletal structures
 - E. Addition reactions for alkenes
 - F. Aromatic compounds
- II. Alcohols, phenols, Thiols, and Ethers
 - A. Physical properties
 - B. Reactions of alcohols and thiols
- III. Aldehydes and ketones
 - A. Physical properties
 - B. Oxidation and reduction
- IV. Carbohydrates
 - A. Chirality
 - B. Structures
 - C. Chemical properties
 - D. Di- and polysaccharides

- V. Carboxylic acids and esters
 - A. Descriptions and properties

- VI. Lipids
 - A. Fatty acids
 - B. Waxes and triacylglycerols
 - C. Properties of triacylglycerols
 - D. Phospholipids
 - E. Steroids
 - F. Cell membranes

- VII. Amines and amides
 - A. Properties
 - B. Heterocyclic amines
 - C. neurotransmitters
 - D. hydrolysis of amides

- VIII. Amino acids and proteins
 - A. How proteins are formed from amino acids.
 - B. Protein structure
 - C. Protein hydrolysis and denaturation

- IX. Enzymes and vitamins
 - A. Enzyme action
 - B. Enzyme classification
 - C. Factors affecting enzyme activity
 - D. Enzyme regulation
 - E. Cofactors and vitamins

- X. Nucleic acids
 - A. Components
 - B. Structure
 - C. Replication
 - D. Basics of transcription and translation

- XI. Metabolic Pathways for Carbohydrates
 - A. Digestion of Carbohydrates
 - B. Glycolysis and pathways for pyruvate
 - C. Glycogen synthesis and degradation
 - D. Gluconeogenesis

- XII. Metabolism and Energy Production
 - A. Citric acid cycle
 - B. Electron transport and ATP
 - C. ATP energy from glucose

XIII. Metabolic pathways for lipids and amino acids

- A. Digestion of triacylglycerols
- B. Oxidation of fatty acids
- C. ATP and fatty acid oxidation
- D. Ketogenesis and ketone bodies
- E. Fatty acid synthesis
- F. Degradation of proteins and amino acids
- G. Urea cycle
- H. Synthesis of amino acids

REQUIRED TEXTBOOK AND MATERIAL:

The textbook and other instructional material will be determined by the instructor.