

CHM 132
ORGANIC AND BIOCHEMISTRY

COURSE DESCRIPTION:

Prerequisites: CHM 131 or CHM 151

Corequisites: None

This course provides a survey of major functional classes of compounds in organic biochemistry. Topics include the structure, properties, and reactions of the major organic and biological molecules as well as basic principles of metabolism. Upon completion, students should be able to demonstrate a basic 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 the general education core requirement in natural sciences/mathematics.* Course Hours Per Week: Class, 3; Lab, 3, Semester Hours Credit: 4.

LEARNING OUTCOMES:

Upon completion of this course, the student will demonstrate basic knowledge of the following:

- a. Names and structures of the functional groups of hydrocarbons.
- b. Some of the reactions of organic molecules.
- c. To understand the nature of polymers.
- d. Stereoisomerism
- e. Polymerization.
- f. Structures, names, and biological importance of a variety of carbohydrates.
- g. Structures, names, and biological importance of a variety of lipids.
- h. Amino acid and protein structure and function.
- i. Enzyme function.
- j. DNA and RNA structure and function.
- k. Metabolism and energy production

OUTLINE OF INSTRUCTION:

- I. Introduction to Organic Chemistry
 - A. Organic Compounds
 - B. Carbon
 - C. Polarity of Organic Molecules
 - D. Isomers
 - E. Functional Groups

- II. Alkanes
 - A. Common and IUPAC Names
 - B. Drawing structural formula
 - C. Cycloalkanes and haloalkanes
 - D. Physical and chemical properties of alkanes

III. Unsaturated hydrocarbons

- A. Alkenes and alkynes.
- B. Naming Alkenes and Alkynes
- C. *cis- trans* – isomerism.
- D. Addition reactions – Hydrogenation of fats
- E. Polymerization
- F. Aromatic compounds

IV. Alcohols, phenols, ethers, and thiols

- A. Structure and classification of alcohols
- B. Naming alcohols, phenols, and thiols
- C. Ethers
- D. Physical properties of alcohols, phenols, and ethers.
- E. Reactions of alcohols.

V. Aldehydes and Ketones

- A. Naming aldehydes and ketones.
- B. Chirality
- C. Redox and addition reactions.

VI. Carbohydrates

- A. Types of carbohydrates
- B. Classification, structures, and sources of some important monosaccharides.
- C. Dissacharides
- D. Polysaccharides

VII. Carboxylic Acids and Esters

- A. Physical and chemical properties of carboxylic acids
- B. Esters of carboxylic acids
- C. Naming esters

VIII. Lipids

- A. Solubility and polarity
- B. Fatty acids
- C. Waxes, fats, and oils,
- D. Chemical properties of triglycerides
- E. Phospholipids, steroids, and other lipids
- F. The cell membrane

IX. Amines and Amides

- A. Names, structures, and physical properties of amines
- B. Amines as bases
- C. Amides

X. Amino acids and proteins

- A. Functions of proteins
- B. Amino acids and protein structure
- C. Levels of protein structure

XI. Nucleic acids and protein synthesis

- A. Nucleosides and nucleotides
- B. The DNA double helix
- C. DNA replication
- D. Transcription and Translation
- E. Genetic Mutation
- F. Recombinant DNA

XII. Metabolism and energy production

- A. ATP and energy
- B. Glycolysis
- C. Citric Acid Cycle
- D. Oxidative phosphorylation and ATP
- E. Metabolic pathways for carbohydrates
- F. Metabolic pathways for lipids and amino acids

REQUIRED TEXTBOOKS:

To be selected by the Instructor/Discipline Chair.

STATEMENT FOR STUDENTS WITH DISABILITIES:

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 686-3652 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1309.