

SOUTHEAST COMMUNITY COLLEGE
DIVISION OF ARTS AND SCIENCES
Sciences
Revision Date: 01-01-21

I. CATALOG DESCRIPTION

Course Number: CHEM2550
Course Title: Biological Organic Chemistry
Prerequisite(s): MATH1100 or MATH1103 or higher.
Catalog Description: Introductory organic chemistry course that focuses on biological molecules and biochemical reactions. Prepares students for more advanced courses in biology, chemistry, and biochemistry.
Credit Hours: 3.0
Class Hours: 45
Total Contact Hours: 45

II. COURSE OBJECTIVES: *Course will:*

- A. Discuss the structure and nomenclature of alkanes.
- B. Discuss the properties and reactions of alkanes.
- C. Discuss the structure and nomenclature of alkenes and alkynes.
- D. Discuss the reactions of alkenes and alkynes.
- E. Discuss the structure and nomenclature of alcohols, thiols, ethers, aldehydes, and ketones.
- F. Discuss the study of carbohydrates.
- G. Discuss the study of carboxylic acids, esters, amines, and amides.
- H. Discuss the study of lipids.
- I. Discuss the study of amino acids, proteins, and enzymes.
- J. Discuss the study of nucleic acids and protein synthesis.
- K. Discuss the metabolic pathways and energy production.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES

- A. Student Learning Outcomes: *Students will be able to:*
 - 1. Demonstrate the nomenclature of organic molecules.
 - 2. Demonstrate the knowledge of organic reactions.
 - 3. Demonstrate the knowledge of biological molecules.
 - 4. Understanding the structure, properties, and reactions of biological molecules.
 - 5. Demonstrate the knowledge of the various metabolic pathways and energy production.
- B. General Education Learning Outcomes
 - 1. GELO #3: Critical Thinking & Problem Solving
 - Outcome: Collect, identify, interpret and analyze data.
 - Outcome: Synthesize information to arrive at reasoned solutions to problems.
 - Outcome: Evaluate the validity of arguments, alternatives, data, outcomes, and/or impacts of actions.
 - 2. GELO #5: Analytical, Quantitative, and Scientific Reasoning
 - Outcome: Apply mathematical and scientific methods to solve problems from an array of contexts and everyday situations.
 - Outcome: Manipulate formulas, data sets, graphs, tables, etc. in a way to produce a meaningful outcome.

IV. CONTENT/TOPICAL OUTLINE (course outline may provide more detailed information)

- A.** The Study of Organic Chemistry - Alkanes:
 - 1. Understand the structure of alkanes.
 - 2. Understand the nomenclature of alkanes.
 - 3. Understand the structure and naming of alkanes with substituents.
 - 4. Understand the properties of alkanes.
 - 5. Understand the structure and function of functional groups.
 - 6. Understand the characteristics of alkanes, alkenes, and alkynes.
- B.** The Study of Organic Chemistry-Unsaturated Hydrocarbons-Alkenes and Alkynes
 - 1. Understand the structure and naming of alkenes and alkynes
 - 2. Understand the structure and identification of cis-trans isomers
 - 3. Understand addition reactions
 - 4. Understand the structure of aromatic compounds – compounds
- C.** The Study of Alcohols, Thiols, Ethers, Aldehydes, and Ketones:
 - 1. Understand the structures of alcohols, thiols, ethers, aldehydes, and ketones.
 - 2. Understand the nomenclature of alcohols, thiols, ethers, aldehydes, and ketones.
 - 3. Understand the properties of alcohols.
 - 4. Understand the properties of aldehydes and ketones.
 - 5. Understand the reactions of alcohols, thiols, aldehydes, and ketones.
- D.** The Study of Carbohydrates:
 - 1. Understand the structure of carbohydrates.
 - 2. Understand the structure of chiral molecules.
 - 3. Understand Fischer projections of monosaccharides.
 - 4. Understand the chemical properties of monosaccharides.
 - 5. Understand the structures of disaccharides and polysaccharides.
- E.** The Study of Carboxylic Acids, Esters, Amines, and Amides:
 - 1. Understand the structure and nomenclature of carboxylic acids.
 - 2. Understand the properties of carboxylic acids.
 - 3. Understand the structure and nomenclature of esters
 - 4. Understand the hydrolysis of esters
 - 5. Understand the structure and nomenclature of amines and amides
- F.** The Study of Lipids:
 - 1. Understand the structure of lipids.
 - 2. Understand the structure of waxes and triacylglycerols
 - 3. Understand the structure of phospholipids
 - 4. Understand steroids: cholesterol, bile salts, and steroid hormones
 - 5. Understand the structure of cell membranes
- G.** The Study of Amino Acids, Proteins, and Enzymes:
 - 1. Understand the structure of proteins and amino acids
 - 2. Understand the function of amino acids as acids and bases
 - 3. Understand the structure of proteins: primary structure
 - 4. Understand the structure of proteins: secondary, tertiary, and quaternary structures
 - 5. Understand the structure of enzymes
 - 6. Understand the function of the factors affecting enzyme activity
- H.** The Study of Nucleic Acids and Protein Synthesis:
 - 1. Understand the components of nucleic acids
 - 2. Understand the primary structure of nucleic acids
 - 3. Understand DNA double helix
 - 4. Understand RNA and the genetic code
 - 5. Understand protein synthesis
 - 6. Understand genetic mutations
 - 7. Understand viruses

- I. The Study of Metabolic Pathways and Energy Production:**
1. Understand metabolism and ATP energy
 2. Understand digestion of foods
 3. Understand coenzymes in metabolic pathways
 4. Understand glycolysis: oxidation of glucose
 5. Understand the citric acid cycle
 6. Understand electron transport and oxidative phosphorylation
 7. Understand oxidation of fatty acids
 8. Understand the degradation of amino acids

V. INSTRUCTIONAL MATERIALS

- A. Required Text(s):**
1. Timberlake, *Chemistry: An Introduction to General, Organic and Biological Chemistry*. 12th Edition, Prentice Hall, 2014. ISBN: 978-0321908445.

VI. METHODS OF PRESENTATION/INSTRUCTION

- A. Methods of presentation typically include a combination of the following:**
1. Lecture
 2. Group work
 3. Online supplementary materials
 4. Demonstrations

VII. METHODS OF EVALUATION

- A. Methods of evaluation typically include a combination of the following:**
1. Exams/Quizzes
 2. Reports/Papers
 3. Lecture Homework

B. SCC GRADING SCALE

A+	95-100	C+	75-79	F	59 or less
A	90-94	C	70-74		
B+	85-89	D+	65-69		
B	80-84	D	60-64		

VIII. SPECIFIC COURSE REQUIREMENTS

- A. A minimum grade of "C" or better is required to qualify for transfer to a four-year college.**