

COURSE OUTLINE

CHEM-201

Organic Chemistry I

4 Credits

Science Core Course

HOWARD COMMUNITY COLLEGE

Description

Chemistry 201, a course designed mainly for science majors and pre-professional students, will enable the student to answer questions and solve problems involving nomenclature, physical properties and synthesis of aliphatic compounds, such as alkanes, alcohols, carboxylic acids, aldehydes and ketones. In the lab program, the student will acquire skills in laboratory techniques, prepare organic compounds, study their properties, and interpret data collected to identify unknowns. Prerequisite: CHEM-101. (3 hours lecture, 3 hours lab)

Statement on General Education and Liberal Learning

A liberal education prepares students to lead ethical, productive, and creative lives and to understand how the pursuit of lifelong learning and critical thinking fosters good citizenship. General education courses form the core of a liberal education within the higher education curriculum and provide a coherent intellectual experience for all students by introducing the fundamental concepts and methods of inquiry in the areas of mathematics, the physical and natural sciences, the social sciences, the arts and the humanities, and composition. This course is part of the general education core experience at Howard Community College.

Overall Course Objectives

Upon completion of this course, the student will be able to:

1. Demonstrate an appreciation for scientific inquiry.
2. Apply chemical principles in explaining practical chemistry applications.
3. Write, using data collection and analysis techniques, a complete formal laboratory report.
4. Write condensed chemical formulas which represent functional groups in organic chemistry.
5. Write names of the compounds using the IUPAC System.
6. Identify functional groups and understand their chemistry.
7. Determine methods of synthesis for aliphatic compounds and understand their reaction mechanisms.
8. Apply basic rules to predict reaction mechanisms.
9. Write equations for the formation of products for nucleophilic substitution reactions.
10. Differentiate aliphatic compounds from other types of compounds by qualitative analysis.
11. Apply organic synthetic skills and identify the compounds synthesized.
12. Organize a record notebook which would contain a collection of all scientific laboratory data obtained in each lab.
13. Apply problem-solving skills which would provide the proper framework to begin the study of organic chemistry.

Major Topics

- I. Bonding, Structure and Isomerism
 - A. Geometry and Hybridization
 - B. Chemical Formulas of Specific Molecules
 - C. General Formulas for the Various Classes of Compounds
 - D. Structural Isomerism

- II. Alkanes, Alkyl Halides and Stereochemistry
 - A. Alkyl Structural Groups and Their Names
 - B. Optical Activity and Stereochemistry
 - C. Nucleophilic Substitution Reactions

- III. Alkenes and Alkynes
 - A. Relative Stabilities of Alkene Isomers
 - B. Zaitsev's Rule for the Elimination Reactions of Alkyl Halides to Predict the Product Formation
 - C. Markonikov's Rule for Addition to Double Bond

- IV. Alcohols, Ethers and Epoxides
 - A. Synthetic Reactions to Prepare Alcohols, Ethers and Epoxides
 - B. Qualitative Analysis of an Unknown Organic Molecule

- V. Aldehydes, Ketones, Carboxylic Acids and Biochemical Molecules
 - A. Synthesis and Properties of Aldehydes and Ketones
 - B. Structures of Carboxylic Acids
 - C. Structures and Properties of Carbohydrates, Proteins and Fats

Course Requirements

Grading/exams: Grading procedures will be determined by the individual faculty member but will be based upon exams, final exam, lab work, unknown evaluations, lab notebook and quizzes. Written formal lab reports will be required.

Writing: Specific writing assignments will be determined by the individual faculty member but will include formal lab reports.

Other Course Information

This course is a Science core course, Science elective and an Arts and Science elective.