

DEPARTMENT OF CHEMISTRY

Common Course Outline

CHEM 150 – Essentials of Organic and Biochemistry

Course Description

An introduction to organic chemistry emphasizing basic concepts and applications to biological systems. Course especially designed for the student needing a one-semester organic chemistry course. (NSLD)

Prerequisite: *CHEM 131 with a grade of C or better or consent of department.*

Credits: 4 semester hours; three hours lecture, four hours laboratory each week

General Education - Natural Science Laboratory Distribution (NSLD)

CHEM 150 fulfills a General Education Program Natural Science with Laboratory Distribution requirement. The General Education Program is designed to build skills, knowledge, and attitude necessary for success in work and personal life. Students have the opportunity to strengthen written and oral communication; scientific and quantitative reasoning; and critical analysis and reasoning.

Course scheduling

Sections offered at every Fall and Spring at the Rockville campus; every Fall at the Germantown campus and Spring and Summer at the Takoma Park campus.

Broad Course Outcomes

Upon successful course completion, a student will be able to:

- Describe and predict physical and chemical properties of organic compounds based on functional groups and structure.
- Write structural formulas and assign IUPAC and common names to organic compounds.
- Predict products of organic reactions and relate to biological metabolic pathways.
- Identify structural components of carbohydrates, lipids, proteins, and nucleic acids and relate structure to reactivity.
- Apply safe practices to conduct experiments using laboratory techniques related to organic and biochemistry.
- Interpret, analyze and present laboratory data through written and oral communication methods.
- Safely work in an organic laboratory environment including the proper waste disposal
- Synthesize, isolate and purify liquid and solid organic products by appropriate methods including recrystallization (solids) and distillation (liquids)
- Characterize organic compounds by physical and chemical properties and analytical methods including IR and NMR spectroscopy.

Major Lecture Topics

Detailed study of organic functional groups of alkanes, alkene, alkynes, alcohols, phenols, carboxylic acids, esters, amines and amides; Detailed study of biological molecules including carbohydrates, lipids, amino acids and proteins.

Major Laboratory Topics

Measurement of physical properties of boiling point, melting point, density and refractive index; recrystallization, acidity of monoprotic acids, stereochemistry and model building, IR spectroscopy, ¹H spectroscopy; gas chromatography, distillation, extraction of natural products

Course Requirements

Grading procedures will be determined by the individual faculty instructor of each section, but will include the following minimum criteria:

Lecture component (75% of overall course grade)

- Minimum of three examinations
- Homework, quizzes, other assignments or projects as assigned by the instructor
- Signature General Education Assignment
- Comprehensive Lecture final exam

Laboratory component (25% of overall course grade)

- Laboratory Safety assessment
- Pre-laboratory assignments
- Post-laboratory assignments/reports
- Comprehensive Laboratory final examination

Attendance in laboratory is mandatory. Unexcused absence of three or more lab meetings will result in automatic failure. Students must pass lecture and lab components separately to receive a passing final course grade.

Grading Policy

The following letter grade policy will be used to determine final course grade.

A 100 - 90% **B** 89 - 80% **C** 79 - 70% **D** 69 - 60% **F** < 60%

Required Course Materials

- Textbook – *Organic and Biochemistry for Today*, 8th ed. Seager and Slabaugh
- Laboratory safety goggles
- Laboratory notebook

Textbook Chapters covered

- Chapter 1 Organic Compounds: Alkanes
- Chapter 2 Unsaturated Hydrocarbons
- Chapter 3 Alcohols, Phenols and Ethers
- Chapter 4 Aldehydes and Ketones

- Chapter 5 Carboxylic Acids and Esters
- Chapter 6 Amines and Amides
- Chapter 7 Carbohydrates
- Chapter 8 Lipids
- Chapter 9 Proteins
- Chapter 10 Enzymes
- Chapter 11 Nucleic Acids and Protein Synthesis

Additional chapters may be included at the discretion of the individual faculty instructor.

Example Laboratory Experiments (subject to change)

1. Safety in the Chemical Laboratory
2. Physical Properties of Organic Compounds – Part 1
3. Physical Properties of Organic Compounds – Part 2
4. Introduction to Infrared (IR) Spectroscopy
5. Reactions of Aldehydes and Ketones
6. Identification of an Unknown Ketone Mixture by Gas Chromatography
7. Distillation of Ethanol and GC Analysis
8. Introduction to Stereochemistry and Optical Activity
9. Preparation and Properties of Soap
10. Lipids – Isolation of Trimyristin
11. Introduction to ^1H NMR Spectroscopy
12. Identification of an Unknown Liquid Using IR and ^1H NMR Spectroscopy
13. Synthesis of Aspirin
14. pKa of a Weak Monoprotic Acid

MC Student Code of Conduct and Academic Honesty

Montgomery College Syllabus Information