Syllabus

CHEM 2510

Organic Chemistry I

2024

Committee Members:

Rhett Psota, Central Community College
John Masters, Metropolitan Community College
Dr. Aaron McLean, Mid-Plains Community College
Irina Weitzmann, Northeast Community College
Lisa Malmgren, Southeast Community College
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Facilitator: Dr. Aaron McLean

The Institution agrees to the contents in this syllabus including course prefix, number, course description and other contents of this syllabus.

Chief Academic Officer, Central Community College	05/13/2024	Adopt
Chief Academic Officer, Little Priest Tribal College	05/02/2024	Adopt
Tom McDonnell Chief Academic Officer, Metropolitan Community College	05/09/2024	Decline
Jody Tomanek Chief Academic Officer, Mid-Plains Community College	05/03/2024	Adopt
Chief Academic Officer, Nebraska Indian Community College	05/23/2024	Adopt
Charlene Widener Chief Academic Officer, Northeast Community College	05/03/2024	Adopt
Joel Michaelis Chief Academic Officer, Southeast Community College	05/14/2024	Adopt
Grant Wilson Chief Academic Officer, Western Nebraska Community College	05/02/2024	Adopt

I. CATALOG DESCRIPTION

CHEM 2510 and CHEM 2511 (lab)
Organic Chemistry I & Organic Chemistry I Laboratory
Pre-Requisites/Co-Requisites: General Chemistry I with a C or higher.

Topics in this course include the structure and properties of carbon compounds; including acid-based chemistry as it relates to organic chemistry, the classification of organic molecules by functional groups, structure, nomenclature, properties, stereochemistry, radicals, substitution, and elimination reactions. Topics may also include spectroscopy.

Students registering for this course must also register for the laboratory component of the course.

Credit Hours: 4 Semester, 6 Quarter
Contact Hours: 45 (Lecture)/ 30 (Laboratory)

II. COURSE OBJECTIVES:

Course will cover:

1. Structure, properties, conformational analysis, synthesis, and nomenclature of alkanes, alkenes, alkynes, alkyl halides and alcohols.
2. Nature of Stereochemistry and optically active compounds.
3. Acid-Base Reactions
4. Illustration of reaction mechanisms.
5. Synthesis (includes simple/beginning and some multi-step)
6. Free-radical reactions.
7. Substitution and Elimination reactions.
8. Addition reactions.
9. Spectroscopy and Spectroscopic principles (include topics of chemical shift, splitting pattern, integration, and structure elucidation based on spectroscopic data.) This includes direct or virtual use of IR and ^{1}H-NMR instrumentation and/or software.
10. Gain understanding in laboratory techniques, safety, and laboratory experiments in the preparations, separation, purification, and identifications of organic compounds.

III. STUDENT LEARNING OUTCOMES:

Students will be able to:

1. Demonstrate the ability to draw valid chemical structures using correct nomenclature and propose workable reaction mechanisms based on the physical properties and chemical behaviors of organic compounds.
2. Display a conceptual and mechanistic understanding of the fundamental principles of organic bonding, structure and reactions and apply this knowledge to the designed synthesis of organic compounds.

3. Utilize and illustrate the basic mechanistic steps involving organic reactions, such as SN1, SN2, E1, and E2 reactions (includes discussion of stereochemistry for SN2/E2 reactions).
4. Relate the factors that affect the competitions between SN1, SN2, E1 and E2 reactions.
5. Apply principles in the preparation of organic compounds.
6. Display knowledge of conformational analysis of acyclic and cyclic organic compounds (includes Newman, Fischer, Haworth, and chair projections.)
7. Define a chiral object, an asymmetric center, enantiomers, diastereomers, and meso compounds.
8. Use R, S nomenclature to describe absolute stereochemistry, and use cis/trans and/or E/Z nomenclature to describe relative stereochemistry.
9. Explain the relationship of stereochemistry to the products of organic reactions, including when reactions will be enantioselective, enantiospecific, diastereoselective, or diastereospecific.
10. Display the ability to generate Lewis structures illustrating bonding and electron distribution in organic molecules and simple inorganic molecules; and understand how to draw and evaluate the contribution of different resonance structures to the properties and reactivity of a molecule.
11. Delineate the order of the stabilities of carbocations, carbanions and radicals.
12. Demonstrate safe laboratory techniques in the preparation of organic compound.

IV. CONTENT/TOPICAL OUTLINE

1. Structure & Bonding
2. Acids & Bases
3. Functional Groups
4. Stereochemistry
5. Spectroscopy
6. Substitution & Elimination Reactions
7. Radical Reactions
8. Alkanes & Cycloalkanes
9. Alkyl Halides
10. Alkenes
11. Alkynes
12. Alcohols

V. INSTRUCTIONAL MATERIALS:

1. Organic Chemistry with a Biological Emphasis (current edition) by Timothy Soderberg (Chemistry Publications)

2. Organic Chemistry (current edition) by Solomons, Fryhle, & Snyder (Wiley)
3. Organic Chemistry (current edition) by Wade & Simek (Pearson)
4. Organic Chemistry (current edition) by Carey (McGraw Hill)
5. Organic Chemistry (current edition) by Smith (McGraw-Hill)
6. Organic Chemistry (current edition) by Bruice (Pearson)
7. Organic Chemistry (current edition) by Klein (Wiley)
8. Open Stax-Organic Chemistry (current edition)

VI. METHOD OF PRESENTATION

1. Lecture
2. Discussion
3. Demonstration
4. Group Activity
5. Application
6. On-Line
7. Distance Education
8. Laboratory Activities

VII. METHOD OF EVALUATION

1. Methods of evaluation typically include a combination of the following:
    a. Course grades, at the determination of the instructor, may be based on Participation, In-class assessments, assignments, Exams, Projects, Papers and Lab work.

VIII. INSTITUTIONAL DEFINED SECTION

(to be used at the discretion of each community college as deemed necessary)