Syllabus
CHEM 2510
Organic Chemistry I
2021

Committee Members:

Mark Boatright, Central Community College
John Masters, Metropolitan Community College
Aaron McLean, Mid-Plains Community College
Irina Weitzman, Northeast Community College
Lisa Malmgren, Southeast Community College
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No Representative, Little Priest Tribal College
Dasha Weatherman, Nebraska Indian Community College
Facilitator: Aaron McLean

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

08/01/2022		Adopt
Chief Academic Officer, Central Community College		
Loretta Broberg	07/25/2022	Adopt
Chief Academic Officer, Little Priest Tribal College		
Tom McDonnell	07/25/2022	Decline
Chief Academic Officer, Metropolitan Community College		
Jody Tomanek	07/25/2022	Adopt
Chief Academic Officer, Mid-Plains Community College		
	07/25/2022	Adopt
Chief Academic Officer, Nebraska Indian Community College		
Michele Gill	07/25/2022	Adopt
Chief Academic Officer, Northeast Community College		
Joel Michaelis	08/01/2022	Adopt
Chief Academic Officer, Southeast Community College		
Grant Wilson	07/25/2022	Adopt
Chief Academic Officer, Western Nebraska Community College		

COURSE SYLLABUS OUTLINE

CATALOG DESCRIPTION: 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.

I. Organic Chemistry I & Organic Chemistry I Laboratory

Course Number: **CHEM 2510 and CHEM 2511 (lab)**
Course Name: **Organic Chemistry I**
Pre-Requisites/Co-Requisites: **General Chemistry I with a C or higher.**
Description: **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, addition, 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/Contact Hour Designation
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. 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 and propose workable reaction mechanisms.
2. Remember the nomenclature, physical properties, structural theory and chemical behavior of organic compounds.
3. 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.
4. Understand the basic mechanistic steps involving organic reactions.
5. Application of principles in the preparation of organic compounds.
6. Display knowledge of conformational analysis of acyclic and cyclic organic compounds (includes Fischer, Haworth, and chair projections.)
7. Illustrate the mechanism for SN1, SN2, E1, and E2 reactions (includes discussion of stereochemistry for SN2/E2 reactions).
8. Relate the factors that affect the competitions between SN1, SN2, E1 and E2 reactions.
9. Understand a chiral object, an asymmetric center, enantiomers, diastereomers, and meso compounds.
10. Use R, S nomenclature to describe absolute stereochemistry.
11. Understand the relationship of stereochemistry to the products of organic reactions, including when reactions will be enantioselective, enantiospecific, diastereoselective, or diastereospecific.
12. Use cis/trans and/or E/Z nomenclature to describe relative stereochemistry.
13. Demonstrate 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. Know the order of the stabilities of carbocations, carbanions and radicals.
14. Demonstrate safe laboratory techniques.

IV. CONTENT/TOPICAL OUTLINE

- **A.** Structure & Bonding
- **B.** Acids & Bases
- **C.** Functional Groups

- **D.** Stereochemistry
- **E.** Spectroscopy
- **F.** Substitution & Elimination Reactions
- **G.** Radical Reactions
- **H.** Alkanes & Cycloalkanes
- **I.** Alkyl Halides
- **J.** Alkenes
- **K.** Alkynes
- **L.** Alcohols

V. INSTRUCTIONAL MATERIALS:

- **A.** Organic Chemistry with a Biological Emphasis (current edition) by Timothy Soderberg (Chemistry Publications)
- **B.** Organic Chemistry (current edition) by Solomons, Fryhle, & Snyder (Wiley)
- **C.** Organic Chemistry (current edition) by Wade & Simek (Pearson)
- **D.** Organic Chemistry (current edition) by Carey (McGraw Hill)
- **E.** Organic Chemistry (current edition) by Smith (McGraw-Hill)
- **F.** Organic Chemistry (current edition) by Bruice (Pearson)
- **G.** Open Stax-Organic Chemistry (current edition)

VI. METHOD OF PRESENTATION

- **A.** Lecture
- **B.** Discussion
- **C.** Demonstration
- **D.** Group Activity
- **E.** Application
- **F.** On-Line
- **G.** Distance Education
- **H.** Laboratory Activities

VII. METHOD OF EVALUATION

A. Methods of evaluation typically include a combination of the following:

1. 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)