

A. CATALOG DESCRIPTION (include prerequisites)

Course Title: Survey of Organic Chemistry
Credits: 4
Hours/Week: 4 hours lecture per week
Semester Offered: Fall, Spring
Prerequisites: CHEM 1117 or Mayo MLT

This course meets the Minnesota Transfer Curriculum in NS (Natural Science) and CT (Critical Thinking).

This course is for all students interested in a semester survey of organic chemistry. Students will get an overview of atoms, molecules, structures, bonding, nomenclature and study simulated lab data in organic chemistry based on functional group classification. Functional groups to be covered include alkanes, alkenes, alkynes, aromatics, alcohols, phenols, ethers, amines, carbonyl compounds and their derivatives.

B. DATE LAST REVISED (use current date): March 2002**C. RECOMMENDED ENTRY SKILLS/KNOWLEDGE:**

College-level reading and writing skills and working knowledge of intermediate algebra

D. OUTLINE OF MAJOR CONTENT AREAS:

1. Structure and Bonding in Organic Chemistry
 - a. Formal charge
 - b. Structural formulas
 - c. Isomers and Isomerism
 - d. Resonance
2. Alkanes and Cycloalkanes
 - a. Nomenclature of alkanes and cycloalkanes
 - b. Physical properties of alkanes and cycloalkanes
 - c. Chemical properties of alkanes and cycloalkanes
 - d. Reactions of alkanes and cycloalkanes
3. Alcohols
 - a. Nomenclature of alcohols
 - b. Physical properties of alcohols
 - c. Chemical properties of alcohols
 - d. Reactions of alcohols
4. Alkyl halides
 - a. Nomenclature of alkyl halides
 - b. Physical properties of alkyl halides
 - c. Chemical properties of alkyl halides
 - d. Reactions of alkyl halides

D. OUTLINE OF MAJOR CONTENT AREAS (continued):

5. Alkenes
 - a. Nomenclature of alkenes
 - b. Physical properties of alkenes
 - c. Chemical properties of alkenes
 - d. Reactions of alkenes

6. Alkynes
 - a. Nomenclature of alkynes
 - b. Physical properties of alkynes
 - c. Chemical properties of alkynes
 - d. Reactions of alkynes

7. Ethers
 - a. Nomenclature of ethers
 - b. Physical properties of ethers
 - c. Chemical properties of ethers
 - d. Reactions of ethers

8. Aromatic Compounds
 - a. Nomenclature of aromatic compounds
 - b. Physical properties of aromatic compounds
 - c. Chemical properties of aromatic compounds
 - d. Reactions of aromatic compounds

9. Aldehydes
 - a. Nomenclature of aldehydes
 - b. Physical properties of aldehydes
 - c. Chemical properties of aldehydes
 - d. Reactions of aldehydes

10. Ketones
 - a. Nomenclature of ketones
 - b. Physical properties of ketones
 - c. Chemical properties of ketones
 - d. Reactions of ketones

11. Carboxylic Acids and Derivatives of Carboxylic Acids
 - a. Nomenclature of carboxylic acids and their derivatives
 - b. Physical properties of carboxylic acids and their derivatives
 - c. Chemical properties of carboxylic acids and their derivatives
 - d. Reactions of carboxylic acids and their derivatives

D. OUTLINE OF MAJOR CONTENT AREAS (continued):

12. Amines
 - a. Nomenclature of amines
 - b. Physical properties of amines
 - c. Chemical properties of amines
 - d. Reactions of amines

13. Stereochemistry
 - a. Chirality and stereocenters
 - b. Nomenclature of stereoisomers and assignment of R.S. configuration

14. Understanding Reaction Pathways
 - a. Organic compounds as electrophiles and nucleophiles
 - b. Nucleophilic substitution reactions
 - c. Electrophilic addition reactions
 - d. Leaving groups
 - e. Elimination reactions

E. LEARNING OUTCOMES (GENERAL):

1. Basic organic nomenclature and terminology
2. Recognition of organic functional groups
3. Problem solving in organic chemistry
 - a. Predicting products in organic reactions
 - b. Determining reagents necessary for simple synthesis
 - c. Determining strategies for simple synthesis
4. Using experimental evidence to validate simple reaction mechanisms
5. Understanding chemistry in three-dimensional space including stereochemistry and optical activity
6. Perception of how organic chemistry is integrated into everyday life
7. Understanding of reaction mechanisms
 - a. Nucleophilic substitution reactions
 - b. Electrophilic addition reactions
8. Basic knowledge in the preparation and reactions of alkanes, alkenes, alkynes, alcohols, aldehydes, ketones, carboxylic acids, carboxylic acid derivatives and amine compounds

F. LEARNING OUTCOMES (MNTC):

Critical Thinking

- a. Gather factual information and apply it to a given problem in a manner that is relevant, clear, comprehensive and conscious of the bias in the information selected.
- b. Be able to imagine and seek out a variety of possible goals, assumptions, interpretations or perspectives which can give alternative meaning to a given problem.
- c. Analyze the logical connections between facts, goals and implicit assumptions relevant to a problem and evaluate claims which may be said to follow from them.
- d. Describe and improve their own critical thinking and problem solving procedures.

F. LEARNING OUTCOMES (MNTC) (continued):

Natural Science

- a. Demonstrate understanding of scientific theories and the ways in which scientists develop, express and question theories in the field of organic chemistry.
- b. Formulate hypotheses when presented with experimental data based on concepts learned.
- c. Evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about organic chemistry-related topics and policies.

G. METHODS FOR EVALUATION OF STUDENT LEARNING:

1. Weekly quizzes based on current concepts covered in lecture.
2. Problem solving tests given approximately five times during the semester.
3. Group activities and in-class problem solving sessions.

H. SPECIAL INFORMATION (fees, directives on hazardous materials, etc.):

None