J. Sargeant Reynolds Community College
Course Content Summary

Course Prefix and Number: CHM 241 Credits: 3

Course Title: Organic Chemistry I

Course Description:

Introduces fundamental chemistry of carbon compounds, including structures, physical properties, syntheses and typical reactions. Emphasizes reaction mechanisms. Part I of II. Prerequisite: CHM 112 with grade C or higher. Lecture 3 hours. Total contact 3 hours per week. 3 credits

General Course Purpose:

The general purpose of this course is to prepare the student for advanced study in organic chemistry through development of: skills in synthetic organic problem solving and in critical thinking, an understanding of the methods of organic chemistry, understanding of the general concepts and principles of organic chemistry.

Course Prerequisites/Corequisites:

CHM 112 with a grade of C or higher.

Course Objectives:
Upon completing the course, the student will be able to:

Structure and Bonding, Polar Bonds and Their Consequences, Organic Compounds: Alkanes and Cycloalkanes, Stereochemistry of Alkanes and Cycloalkanes

- Predict and explain patterns in structure, geometry, bonding, hybridization, formal charge, stability, acidity, basicity, and polarity of organic molecules.
- Describe the trends in solubility, melting points, boiling points and other physical properties of organic molecules based on intermolecular forces and presence of specific functional groups.
- Classify organic molecules by their functional groups and provide correct IUPAC names for alkanes, alkenes, alkynes, alkyl halides, and other optional functional groups, including cyclic molecules and stereochemistry. Draw Lewis condensed and line structures.
- Classify molecules as structural isomers, resonance structures, conformers, chiral or achiral, identify chiral carbons as (R) or (S), and, describe stereoisomers and optical activity.

Alkenes and Alkynes: Structure, Reactivity, Reactions, and Synthesis, Alkyl Halides, Reactions of Alkyl Halides: Nucleophilic Substitutions and Eliminations, Structure Determination: Infrared Spectroscopy and Nuclear Magnetic Resonance Spectroscopy

- Explain and draw detailed mechanism, and predict the products of alkane free radical halogenation.

- Explain and draw detailed mechanism, and predict the products of the alkyl halide S_N2, S_N1, E2, E1 reactions. Describe the reagents and solvent properties that promote each mechanism.
- Explain electrophilic addition of alkenes and alkynes, which may include oxymercuration, halogenation, hydration, reduction, hydroboration, epoxidation and other addition reactions. Predict the structure of the intermediates and products, including stereoisomers(cis, trans, E, and Z).
- Use retrosynthetic analysis to design efficient syntheses involving alkanes, alkenes, alkyl halides, and/or alcohols as starting materials, intermediates or final products.
- Predict the structure of organic molecules by calculating degrees of unsaturation and/or interpretation of infrared spectra, mass spectrometry, and NMR for appropriate families.
- Predict the products of the reduction of alkenes and oxidation of alcohols.

Major Topics to be Included:

- Structure and Bonding
- Polar Bonds and Their Consequences
- Organic Compounds: Alkanes and Cycloalkanes
- Stereochemistry of Alkanes and Cycloalkanes
- Alkenes and Alkynes: Structure, Reactivity, Reactions, and Synthesis
- Alkyl Halides
- Reactions of Alkyl Halides: Nucleophilic Substitutions and Eliminations
- Structure Determination: Infrared Spectroscopy and Nuclear Magnetic Resonance Spectroscopy

Effective Date/Updated: August 1, 2023