C-ID Descriptor
Organic Chemistry for Science Majors I, with Lab

Descriptor Details

- **Descriptor Title**: Organic Chemistry for Science Majors I, with Lab
- **C-ID Number**: 150
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General Description

This is the first semester of a one-year course in organic chemistry intended for majors in the natural sciences (chemistry, biochemistry, biology, physics, and pre-medicine).

Prerequisites

CHEM 120S

Corequisites

None

Advisories

It is strongly recommended that CHEM 150 and 160S be completed at a single institution before transfer.

Content

Content for the first semester of the Organic Chemistry sequence is listed below. It is understood that one or two of these may be omitted or interchanged with second semester topics listed in CHEM 160S as needed in order to best fit program requirements.

First semester:

- Nomenclature and Functional Groups, including alkanes, alkenes, alkynes, alkyl halides
- Structure, Hybridization, Bonding, Resonance
- Acids and Bases
- Stereoisomerism and Conformational Analysis
- Addition, Elimination, Substitution and Rearrangement Mechanisms and reactive intermediates including Organometallics
- Regio- and Stereo-selectivity
- Oxidations and Reductions
- Free Radical Substitutions and Additions
- Alcohols, Phenols, and Ethers
- Infrared spectroscopy
- Organic Synthesis, including Retrosynthetic Analysis of Target Molecules

Lab Activities

The laboratory sequence will support the above topics including primarily hands-on (? 80%) qualitative and quantitative experiments that incorporate data analysis. Laboratory activities should include Chemical Safety along with the preparation, isolation, purification and characterization of Organic compounds. Techniques employed for this purpose include reflux, extraction, distillation, recrystallization, chromatography (TLC, Column, GC), melting point, Spectroscopy (IR, NMR) and Mass Spectrometry (MS). One or more of these activities may occur during the second semester of the course.

Objectives

At the conclusion of this course, the student should be able to:

Course Objectives may be reported in a wide variety of valid ways. Learning Outcomes should be aimed at preparation for higher-level course work and include statements related to the following:

(Note these are illustrative outcomes adapted from ACS and are not intended to be prescriptive nor are they necessarily comprehensive)

Students will:

- Demonstrate an understanding of course content including functional group transformations, three-dimensional structure, acid-base chemistry, nucleophilic substitution and elimination reactions, addition reactions involving alkenes and alkynes, and infrared spectroscopy
- Understand that our only way to molecular knowledge is through experimentation
- Apply bonding models to interpret molecular structure and reactivity
- Evaluate the interplay between electronic, steric, and orbital interactions as they relate to the behavior and properties of molecules
- Recognize the importance of solvent effects on chemical reactivity
- Draw reaction mechanisms using curved-arrow formalism.
- Apply principles of thermodynamic and kinetic theory to characterize organic chemical reactions and mechanisms
- Apply chemical techniques to prepare, isolate and purify organic products
- Anticipate, recognize, and respond properly to hazards in laboratory procedures and manage chemical waste
- Recognize and evaluate elements of experimental design
- Report accurate and complete experimental records
- Interpret experimental results and draw reasonable conclusions
- Communicate experimental results in written form(These are adapted from the ACS Curriculum Organic Chemistry Supplement: link to acs resource)

Evaluation Methods

A variety of assessment techniques that include examinations and written responses to lab activities and may also include active learning activities, projects, portfolios, homework problems, and laboratory practicals.

Textbooks

Organic Chemistry, Klein, Wiley

Organic Chemistry, Bruice, Pearson

Organic Chemistry, Smith, McGraw-Hill

Organic Chemistry, McMurry, Cengage

Organic Chemistry, Solomons, Wiley

Organic Chemistry, Wade, Pearsons

Introduction to Organic Laboratory Techniques: A Microscale Approach, Pavia, Cengage.

Microscale Organic Laboratory: with Multistep and Multiscale Syntheses, Mayo, Wiley

Laboratory Techniques in Organic Chemistry, Mohrig, MacMillan Learning