



CHEM 2135: Organic Chemistry I with Lab

2023 Summer Session	
Total Class Sessions: 25 Class Sessions Per Week: 5 Total Weeks: 5 Class Session Length (Minutes): 145 Credit Hours: 4	Instructor: Staff Classroom: TBA Office Hours: TBA Language: English

Course Description:

This course is the first half study of the two semester modern organic chemistry. Students will examine the general principles of organic chemistry, with emphasis on the preparation, properties, and reactions of organic compounds. Topics discussed cover: structure, stereochemistry, nomenclature, synthesis, uses, and reactions of alcohols, ethers and aliphatic hydrocarbons; Alkanes, alkynes, alkenes, Cycloalkanes. Meanwhile, topics related to spectroscopy will also be introduced. Laboratory experimentation will enhance students' understanding of course material.

Laboratory Safety:

During this class we will work with a range of solvents, organic materials, acids, and bases which could be harmful if you were to splash them into your eye or onto your skin. For your own protection, we must require you to wear laboratory goggles.

Laboratory Instructions and Materials:

The laboratory portion will consist of 6 laboratory experiments; students will participate laboratory experiment and individually write a lab report for each experiment.

The lab report should be submitted as a Word document (as an assignment called Lab 1, Lab 2, Lab 3, Lab 4, Lab 5 and Lab 6). More info about specific labs will be posted by the instructor.

Lab manual: "Organic Chemistry Lab Manual" Third Edition, by P. A. Wade & V. Braz

Course Materials:

Required Textbook:

Organic Chemistry, 8th Edition, William H. Brown (Author), Brent L. Iverson (Author), Eric Anslyn (Author), Christopher S. Foote (Author)

Publisher: Brooks Cole; 8 (January 1st, 2017)

Language: English

ISBN-10:1305580354



ISBN-13:978-1305580350

Earlier edition is also accepted

Optional Textbook:

Organic Chemistry, 10th Edition, Francis A Carey Dr. (Author), Robert M. Giuliano (Author)

Publisher: McGraw-Hill Education; 10 (January 7, 2016)

Language: English

ISBN-10: 0073511218

ISBN-13: 978-0073511214

Recommended: Lecture Notes provided by the instructor

Course Format and Requirements:

Class time will be used for a combination of lectures, class discussions, as well as required laboratory experiments and assignments related to the course subject.

Attendance:

Attendance at lectures is vital to get a thorough understanding of the material. This course requires verbal participation in-class exercises, activities, and contributions to class discussions. Students must be present and actively involved to receive these points.

Course Assignments:

Quizzes

There will be 5 quizzes administered through the whole semester. Quizzes will always be completed in the first ten minutes of class. There will be no make-up quizzes.

Midterm Exam

The two midterm exams will be based on concepts covered in class. It will be in-class, close-book and non-cumulative. No alternate arrangements will be made.

Final Exam

The final will be cumulative and close-book. Note that the final will not be taken during the normal class times. Exact time and location for final will be announced later.

Note: All exams and quizzes are closed-books. Cheat sheets are not allowed. The only device allowed in quizzes and exams is a calculator. No other device (e.g. laptop or cell phone) is allowed.

Course Assessment:

Quizzes	15%
Midterm Exam 1	25%
Midterm Exam 2	25%
Final Exam	35%
Total	100%

**Grading Scale (percentage):**

A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
98-	93-	90-	88-	83-	80-	78-	73-	70-	68-	63-	60-	<60
100	97	92	89	87	82	79	77	72	69	67	62	

Academic Integrity:

Students are encouraged to study together, and to discuss lecture topics with one another, but all other work should be completed independently.

Students are expected to adhere to the standards of academic honesty and integrity that are described in the Chengdu University of Technology's *Academic Conduct Code*. Any work suspected of violating the standards of the *Academic Conduct Code* will be reported to the Dean's Office. Penalties for violating the *Academic Conduct Code* may include dismissal from the program. All students have an individual responsibility to know and understand the provisions of the *Academic Conduct Code*.

Special Needs or Assistance:

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.

Course Schedule:

Class 1:

Syllabus + Course Overview

Introduction to Organic Chemistry

Electronic Structure of Atoms

Class 2:

Lewis Model of Bonding

Functional Groups, Bond Angles and Shapes of Molecules

Class 3:

Polarity, Quantum Mechanics, Valence Bond and Molecular Orbital Theory

Resonance, Delocalized Systems, Bond Lengths, Bond Strengths

Class 4:

Quiz 1

Alkane Structure, Constitutional Isomerism, Nomenclature

Cycloalkanes, Conformations of Alkanes



Class 5:

Conformations of Cycloalkanes

Cis/Trans Isomerism in Cycloalkanes and Bicycloalkanes

Physical Properties of Alkanes and Cycloalkanes, Reactions, Importance

Class 6:

Chirality, Stereoisomerism, The R,S System

Acyclics with Multiple Chiral Centers, Cyclics with Multiple Chiral Centers

Class 7:

Quiz 2

Stereoisomer Terminology, Optical Activity, Biological Significance, Resolution

Arrhenius Acids and Bases, Bronsted-Lowry Acids and Bases, pKa

Class 8:

Acid-Base Equilibrium Position, Thermochemistry and Mechanisms

Molecular Structure and Acidity, Lewis Acids and Bases

Class 9:

Midterm 1

Class 10:

Alkene Structure, Nomenclature

Physical Properties of Alkenes, Naturally Occurring Alkenes

Class 11:

Reactions of Alkenes—Overview, Reactive Intermediates

Electrophilic Additions

Class 12:

Electrophilic Additions

Hydroboration—Oxidation, Oxidation

Class 13:

Quiz 3

Oxidation, Reduction

Reactants and Products with Chiral Centers, Polymerization of Alkenes

Class 14:

Alkyne Structure, Nomenclature, Properties, Acidity, Preparation

Electrophilic Addition, Alkyne Hydration, Reduction, Organic Synthesis

Class 15:

Haloalkane Structure, Nomenclature, Physical Properties, Preparation

Halogenation Mechanism



Class 16:

Quiz 4

Allylic Halogenation, Radical Autoxidation, Radical Addition of HBr to Alkenes
Nucleophilic Substitution in Haloalkanes, Mechanisms, SN1 and SN2 Reactions

Class 17:

SN1 and SN2 Reactions and Evidence for SN1 and SN2 Reactions
Several Nucleophilic Substitution Reactions

Class 18:

Beta Elimination and Mechanisms, Evidence for E1 and E2 Mechanisms
Substitution vs. Elimination, S/E Competitions, Neighboring Group Participation

Class 19:

Midterm 2

Class 20:

Structure and Nomenclature of Alcohols, Physical Properties, Acidity and Basicity
Reactions of Alcohols with Active Metals, Haloalkanes and Sulfonates

Class 21:

Dehydration of Alcohols, The Pinacol Rearrangement, Oxidation of Alcohols, Thiols
Structure of Ethers, Nomenclature, Physical Properties, Preparation, Reactions

Class 22:

Quiz 5

Silyl Ethers, Synthesis & Reactions of Epoxides, Crown Ethers, Sulfides
Electromagnetic Radiation, Molecular Spectroscopy, Infrared Spectroscopy and Interpreting

Class 23:

Nuclear Spin States and Orientation of Nuclear Spins in an Applied Magnetic Field, Nuclear
Magnetic Resonance

An NMR Spectrometer, Equivalent Hydrogens, Signal Areas, Chemical Shift

Class 24:

Signal Splitting and the (n + 1) Rule, the Origins of Signal Splitting
Stereochemistry and Topicity, ¹³C-NMR, Interpretation of NMR Spectra

Class 25:

Ultraviolet-Visible Spectroscopy
Mass Spectrometry

Final Exam (Cumulative): TBA