

Fall 2023

CHEM 243-HM1-101: Organic Chemistry I

Yuanwei Zhang

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Organic Chemistry I: *Fall 2023 Course Syllabus*

NJIT Academic Integrity Code: All Students should be aware that the Department of Chemistry & Environmental Science (CES) takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

COURSE INFORMATION

Course Description: This course offers students the opportunity to learn the nature of carbon in organic compounds. Systematic study of the theories, principles and applications of Organic Chemistry. This course covers topics such as bonding theories and structure, conformations and stereochemistry, and functional groups like alkanes, alkenes, and alkynes. This course will also cover topics such as spectroscopy and mass spectrometry. It presents general principles of organic chemistry related to nomenclature, structure, stereochemistry, uses and synthesis.

Number of Credits: 3

Prerequisites: General Chemistry. CHEM 122 or CHEM 126 with a grade of C or better.

Course-Section and Instructors

| Course-Section | Instructor |
|----------------|---------------|
| CHEM 243 - HM1 | Yuanwei Zhang |
| CHEM 243 - 101 | Yuanwei Zhang |

Class Schedule: Tuesdays 6:00 - 8:50 PM
KUPF 211

Office Hours: Tuesdays, 3:00 - 4:00 pm

Required Textbook:

| | |
|------------------|-------------------------|
| Title | Organic Chemistry |
| Author | L. G. Wade Jr. |
| Edition | 9 th edition |
| Publisher | Prentice Hall |
| ISBN # | 032197137X |

Learning Outcomes:

1. Identify sigma and pi bonds and explain the hybridization of the molecules
2. Discuss electronegativity and bond polarity
3. Draw Lewis structures, condensed structures and structural formulas of organic compounds
4. Use VSEPR to predict the geometry and polarity of molecules
5. Discuss resonance and delocalization of charge in molecules
6. Identify various functional groups in organic molecules, particularly alkenes, alkynes, alcohols, acids, ethers, esters, aldehydes, ketones and amines
7. Explain Lewis acid-base theory
8. Explain rules of nomenclature to describe the various hydrocarbons
9. Describe structural and geometric isomerism and the role of isomerism in determining molecule structure
10. Describe types of intermolecular forces
11. Apply knowledge of intermolecular forces to describe trends in boiling points and melting points of various molecules
12. Distinguish between conformers and isomers
13. Describe key reactions of alkanes (substitution), alkenes and alkynes (addition)
14. Identify chair and boat conformations of cyclohexane and predict the stability of the different conformers
15. Recognize the steps involved in free radical reactions
16. Identify and describe the reactivity of various intermediates produced during reactions of hydrocarbons
17. Propose reaction mechanisms to describe product formation in simple alkane substitution reactions
18. Describe chirality and distinguish between R and S stereoisomers and diastereoisomers
19. Discuss and draw the products of substitution and elimination reactions of alkyl electrophiles
20. Describe substitution reactions and recognize SN1 and SN2 reactions
21. Explain E1 and E2 reactions
22. Describe various types of addition reactions in aliphatic alkenes and alkynes
23. Use infrared spectroscopy, nuclear magnetic resonance spectroscopy, ultraviolet spectroscopy, and mass spectrometry to determine the structure of organic molecules
24. Predict the expected signals in IR, NMR, UV and MS from given functional groups

POLICIES

All CES students must familiarize themselves with, and adhere to, all official university-wide student policies. CES takes these policies very seriously and enforces them strictly.

Grading Policy: The final exam will be cumulative. Before each Exam there will be a Quiz, which covers three or four chapters. Take the Quizzes seriously as they add up to 50 points. Problems in the body of the chapter are assigned and selected problems at the end of the chapter. These will not be collected. To do well in the course it is important to do these problems. Failure to take the exam in the assigned room will result in a loss of a full grade from your exam score. The final grade in this course will be determined as follows: The grade will be determined from a total of 400 points. 50 points of quizzes, 100 points for each of the midterm exam, and 150 points of the final exam. Makeup exams are not encouraged. If you must miss an exam contact the coordinator before the exam or immediately after. Makeup should be taken within the first week of the exam and before exams are given back. You must have a valid excuse and a doctor note. The final grade in this course will be determined as follows:

The final grade in this course will be determined as follows:

| | |
|-----------------|-----|
| Quizzes | 50 |
| Midterm Exam I | 100 |
| Midterm Exam II | 100 |
| Final Exam | 150 |

Your final letter grade in percentage in this course will be based on the following tentative curve:

| | | | |
|----|-----------|---|-----------|
| A | 90 - 100 | C | 70 - 74.9 |
| B+ | 85 - 89.9 | D | 60 - 70 |

| | | | |
|----|-----------|---|------|
| B | 80 - 84.9 | F | < 60 |
| C+ | 75 - 79.9 | | |

Attendance Policy: Each class is a learning experience that cannot be replicated through simply “getting the notes.”

Homework Policy: Homework is an expectation of the course.

Exams: There will be two midterm exams held in class during the semester and one comprehensive final exam. The following exam periods are tentative and therefore possibly subject to change:

| | |
|-------------------|---------------------------|
| Midterm Exam I | October 03 |
| Midterm Exam II | November 07 |
| Final Exam Period | December 17 - December 23 |

The final exam will test your knowledge of all the course material taught in the entire course.

Makeup Exam Policy: There will normally be **NO MAKE-UP QUIZZES OR EXAMS** during the semester. In the event that a student has a legitimate reason for missing a quiz or exam, the student should contact the Dean of Students office and present written verifiable proof of the reason for missing the exam, e.g., a doctor’s note, police report, court notice, etc. clearly stating the date AND time of the mitigating problem. The student must also notify the CES Department Office/Instructor that the exam will be missed so that appropriate steps can be taken to make up the grade.

ADDITIONAL RESOURCES

Chemistry Tutoring Center: Located in the Central King Building, Lower Level, Rm. G12. Hours of operation are Monday - Friday 10:00 am - 6:00 pm.

Accommodation of Disabilities: Office of Accessibility Resources and Services (*formerly known as Disability Support Services*) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please contact Chantonette Lyles, Associate Director at the Office of Accessibility Resources and Services at **973-596-5417** or via email at lyles@njit.edu. The office is located in Fenster Hall Room 260. A Letter of Accommodation Eligibility from the Office of Accessibility Resources Services office authorizing your accommodations will be required.

For further information regarding self-identification, the submission of medical documentation and additional support services provided please visit the Accessibility Resources and Services (OARS) website at:

- <http://www5.njit.edu/studentssuccess/disability-support-services/>

Course Outline

| Lecture | Section | Topic | Assignment |
|---------|---------|---|------------|
| 1 | 1 | Introduction and Review | |
| 2 | 2 | Structure and Properties of Organic Molecules | |
| 3 | 3 | Structure and Stereochemistry of Alkanes | |
| 4 | 4 | The Study of Chemical Reactions | Quiz 1 |
| 5 | | Exam 1 | |
| 6 | 5 | Stereochemistry | |
| 7 | 6 | Alkyl Halide, Nucleophilic Substitution and Elimination | |
| 8 | 7 | Structure and Synthesis of Alkenes | |
| 9 | 8 | Reactions of Alkenes | Quiz2 |
| 6 | | Exam 2 | |
| 11 | 9 | Infrared Spectroscopy and Mass Spectrometry | |
| 12-13 | 10 | Nuclear Magnetic Resonance Spectroscopy | |
| 14 | 11 | Alkynes | Quiz 3 |
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