

THE DEPARTMENT OF CHEMISTRY AND ENVIRONMENTAL SCIENCE

Chem 243 - Organic Chemistry I: Spring 2025 Course Syllabus

<u>NJIT Academic Integrity Code</u>: 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, e.g., 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, 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 - Contact Info
CHEM 243 - 102	Trevor Del Castillo (he/him) - td342@NJIT.edu

Class Schedule: Tuesday 6:00 PM - 8:50 PM Room: GITC 1100

Discussion Hours: Thursday 3:00 PM - 4:00 PM, also available by appointment

Recommended Textbook:

Title	Organic Chemistry
Author	John McMurry
Edition	10 th edition
Publisher	Openstax - https://openstax.org/details/books/organic- chemistry?Student%20resources
ISBN-13	978-1-951693-98-5

Required material and other resources:

• Aktiv Chem: A \$30 subscription can be accessed from a mobile device or computer, will be used for graded homework.

You need to pair the app with the course in order to sync your grades. The code to access the course and the guidelines to pair it are found on the Canvas page.

- A computing device with access to canvas, Aktiv Chem, and the open source Textbook.
- Molecular model kit: This is a highly suggested purchase. Molecular models will be allowed during the exams.

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. Use the curved-arrow formalism to describe the mechanisms of reactions
- 15. Identify chair and boat conformations of cyclohexane and predict the stability of the different conformers
- 16. Recognize the steps involved in free radical reactions
- 17. Identify and describe the reactivity of various intermediates produced during reactions of hydrocarbons
- 18. Propose reaction mechanisms to describe product formation in simple alkane substitution reactions
- 19. Describe chirality and distinguish between R and S stereoisomers and diastereoisomers
- 20. Discuss and draw the products of substitution and elimination reactions of alkyl electrophiles
- 21. Describe substitution reactions and recognize SN1 and SN2 reactions
- 22. Explain E1 and E2 reactions
- 23. Describe various types of addition reactions in aliphatic alkenes and alkynes
- 24. Use infrared spectroscopy, nuclear magnetic resonance spectroscopy, ultraviolet spectroscopy, and mass spectrometry to determine the structure of organic molecules
- 25. 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.

In Class Expectations: The classroom is meant to be an inclusive and respectful environment where all students can feel comfortable expressing their ideas. Therefore, please treat the classroom as a professional environment. It is the job of everyone in the classroom to be respectful, use appropriate language, and behave appropriately. Discrimination or mistreatment of any kind for any reason will not be tolerated and will be reported to the Dean of Students.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu

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. In addition, obtaining course materials such as past exams or solutions to homework and/or class assignments from external sources constitutes cheating. The official Student's Solutions Guide is exempt. Posting of course materials on external websites without the approval of the instructor violates intellectual property laws and hence strictly forbidden. Any student caught cheating on an assignment will be assessed a penalty of 20 points, in addition to a grade of zero for the given assignment.

Grading Policy: The final exam will be cumulative. Before each exam there will be a quiz, which covers three to five chapters. Take the guizzes seriously as they add up to 75 points and they will prepare you for the following exam. Homework will be assigned weekly and be due the following week, the homework will consist of selected problems which will reflect what is on the upcoming quiz and subsequent exam. Homework will be graded only for completeness. To do well in the course it is important to understand these problems. Homework may be completed in groups (learning together and teaching each other is encouraged!) but it is imperative that each individual be able to solve each of these types of problems independently. The homework will prepare you for the quizzes and in turn for the exams. Simply copying homework answers without being able to solve the problem is only a disservice to yourself. Failure to take an exam or quiz in the assigned room will result in a grade of zero for that exam/guiz score. The lowest score of the three midterm exams will be dropped (only the two highest midterm scores will count toward your final grade). The lowest score of the three guizzes will also be dropped. However, it is important that you apply yourself on each midterm exam and quiz (do not "plan" on dropping any given midterm/quiz by not preparing). This is both because you cannot be certain how you will perform in later exams and because each midterm is a critical chance to prepare for the final exam. The final grade in this course will be determined from a total of 425 points; 25 points for homework completion, 50 points for the two highest quiz grades, 200 points for the two highest midterm exam grades, and 150 points for the final exam.

Category	Points possible
Homework (Aktiv Chem)	75
In Class Worksheets	100
Quizzes (3x)	75
Midterm Exam I	100
Midterm Exam II	100
Midterm Exam III	100
Final Exam	200
Total Points Possible	750

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

Your final letter grade as a percentage of total points possible in this course will be based on the following tentative curve:

А	90 - 100 %
B+	85 - 89.9 %
В	80 - 84.9 %
C+	75 - 79.9 %
С	70 - 74.9 %
D	60 - 70 %
F	< 60 %

Attendance Policy: I highly encourage you to attend all live lectures.

Student Absences for Religious Observance: NJIT is committed to supporting students observing religious holidays. Students must notify Prof. Del Castillo in writing of any conflicts between course requirements and religious observances, ideally by the end of the second week of classes and no later than two weeks before the anticipated absence.

In Class Worksheets: There will be in class works sheets. Students will work in groups to develop solutions to the problems but each student must hand in a copy of their own work. The purpose of the group work is to teach each other topics in class and to discuss problems presented in the course. It is not intended for students to copy work from other students once a solution is presented. If you formulate a solution before your teammates, become the teacher! This will reinforce your own understanding. Worksheets will be graded for each individual student. Completing the entire worksheet is highly recommended as the questions will be extremely similar to exam questions. Worksheets which are not completed in class may be completed as homework and must be submitted by Friday night. Please upload a PDF file/photo (that is legible) only. Missed worksheets due to approved absences may be completed after their due date. Late assignments will not be accepted. Each student will upload their own work in Canvas. Every student is expected to equally contribute to the group work. Each student will earn the grade for their own work.

Homework Policy: Homework assignments will be presented on Aktiv Chemistry which is linked in the class Canvas page. Aktiv Chemistry will cost \$30. 50% of the point will be awarded for attempting the problems and 50% of the points will be awarded for correctness. On time homework completion is critical to success in this course. The homework due dates will be clearly posted in Aktiv Chemistry and discussed in class. Plan timely homework completion accordingly. Late homework will receive a progressively worse penalty for each day it is late.

Exams: There will be three 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	February 18 - 6:00 pm, GITC 1100
Midterm Exam II	March 25 - 6:00 pm, GITC 1100
Midterm Exam III	April 29 - 6:00 pm, GITC 1100
Final Exam Period	May 10 - May 16

The final exam will be cumulative. Use of notes, notebooks, or textbooks will not be permitted and mobile communication devices (phones, computers, smart watches, smart glasses, headphones etc.) should remain turned off and stored in your bag for the duration of the exam period. Students are permitted to use molecular modeling kits during exams. Violations of this policy will be submitted to the Office of the Dean of Students for review. Each student is required to bring a photo ID to an exam and this will be used to confirm a student's identity during the exam period. Exam regrades must be submitted within 1 week of returning the exam with a sheet describing the error. Exams will be administered and proctored live in class. Exams will take place as scheduled and a sterile test taking environment is expected for each student.

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. The makeup exam or quiz must be completed within 1 week of the initial date of the exam.

Cell Phones/Smart Watches/Smart Glasses: All cellular phones and other electronic devices must be switched off and stored away from easy access during exams or quizzes. Students are not permitted to keep cell phones on their person during any exams. If a cell phone, smart device, or ear buds is discovered in your possession during an exam the exam will be removed and immediately graded a 0.

Textbook Problems: It is important to study outside this course in order to achieve the best results. The problems within the text book, both in chapter and at the end of the chapter, provide excellent practice for the course material. Work out the problems without the study guide and check your answers after completion to ensure optimal understanding of the material. Students are not responsible for questions related to sections not covered in the class.

How to be successful in organic chemistry: Organic chemistry is a difficult subject and it is vital to master new material as it is presented. A successful student will 1) prepare ahead of class by reading the chapter to be discussed and formulating questions to ask in lecture 2) attend and participate in lecture by answering and asking questions and 3) work after lecture on homework and book problems. Homework is a vital part of mastering organic chemistry and nothing can replace practice. Watching videos will not be enough to be successful.

There are numerous resources for practice including online resources, Aktiv Chem, the tutoring center, office hours, library resources, and other organic textbooks/workbooks. Feel free to email me or come visit during discussion hours with any questions you may have! After an exam/quiz/homework assignment is returned, correct any lapses in knowledge by working on topics that may have been answered incorrectly. Mastering organic chemistry takes time and practice so set aside committed time slots in your schedule to work on organic chemistry. Finally, always ask the "why" question when doing homework rather than simply memorizing answers.

Al usage policy: This course expects students to develop a personal understanding of and skill in the use of organic chemistry. As such, Al usage is not permitted on any assignment, graded or otherwise, throughout this course under any circumstance. If you wish to use Al in your independent study and learning activities you are encouraged to do so, with the cautionary note that Al is still not great at "understanding" chemistry.

ADDITIONAL RESOURCES

Chemistry Tutoring Center: Located in the Central King Building, Lower Level, Rm. G12. Students can get help from peer tutors on a "walk-in" basis. There is no private tutoring available, however if the center is not too busy, you may be able to get more personal attention. In this peer tutoring model, tutors are taught to encourage interaction among students to promote learning. In addition, there will be limited tutoring available online as well.

Hours of operation are between Monday - Friday 10:00 am - 6:00 pm, either virtually or in person

Mental Health and Well-being: NJIT is committed to the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact Center for Counseling and Psychological Services (c-CAPS) at https://www.njit.edu/counseling/ or by calling the c CAPS office at 973-596-3414. If you need support and information about options and resources, please also reach out to the Office of the Dean of Students at https://www.njit.edu/dos/

Accommodation of Disabilities: Office of Accessibility Resources and Services (OARS, 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 the Office of Accessibility Resources and Services at <u>OARS@NJIT.EDU</u>. The office is located in Kupfrian Hall 201. 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: https://www.njit.edu/accessibility/

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: <u>NJIT Academic Integrity Code</u>.

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Important Dates

January	20	Monday	Martin Luther King, Jr. Day
January	21	Tuesday	First Day of Classes
January	27	Monday	Last Day to Add/Drop a Class
January	27	Monday	Last Day for 100% Refund, Full or Partial Withdrawal
January	28	Tuesday	W Grades Posted for Course Withdrawals
February	3	Monday	Last Day for 90% Refund, Full or Partial Withdrawal, No Refund for Partial Withdrawal after this date
February	17	Monday	Last Day for 50% Refund, Full Withdrawal
March	10	Monday	Last Day for 25% Refund, Full Withdrawal
March	16	Sunday	Spring Recess Begins - No Classes Scheduled - University Open
March	22	Saturday	Spring Recess Ends
April	3	Thursday	Wellness Day - No Classes Scheduled - University Open
April	7	Monday	Last Day to Withdraw
April	18	Friday	Good Friday - No Classes Scheduled - University Closed
April	20	Sunday	Easter Sunday - No Classes Scheduled - University Closed
May	6	Tuesday	Thursday Classes Meet
May	7	Wednesday	Friday Classes Meet
May	7	Wednesday	Last Day of Classes
May	8	Thursday	Reading Day 1
May	9	Friday	Reading Day 2
May	10	Saturday	Final Exams Begin
May	16	Friday	Final Exams End
May	18	Sunday	Final Grades Due

Tentative Course Outline - Subject to Change

Lecture	Outcomes	Chapter	Торіс
1-2	1,2,3,4,5	1	Review of General Chemistry, Structure and Bonding
2-3	6,7,8,11,12	2	Polar Covalent Bonds; Acids and Bases
4	9,10,13,15	3	Organic Compounds: Alkanes and Their Stereochemistry
Midterm I	1-8,11,12	1,2	Midterm I – 2/18
5-6	9,10,13,15	4	Organic Compounds: Cycloalkanes and Their Stereochemistry
6-7	13,14,16,17,19	5	Stereochemistry at Tetrahedral Centers
Midterm II	9-10,13-17,19	3,4,5	Midterm II – 3/25
8-9	17,18,20,21	6	An Overview of Organic Reactions
9-10	14,20,22	7	Alkenes: Structure and Reactivity
11	13,14,23	8	Alkenes: Reactions and Synthesis
12	13,14,23	11	Reactions of Alkyl Halides: Nucleophilic Substitutions and Eliminations
13	24,25	12	Structure Determination: Mass Spectrometry and Infrared Spectroscopy
14	24,25	13	Structure Determination: Nuclear Magnetic Resonance Spectroscopy
Midterm III	13,14,18,20-23	6,7,8,11	Midterm III – 4/29

Updated by Dr. Trevor Del Castillo – January, 2025 Department of Chemistry & Environmental Sciences (CES) Course Syllabus, Spring 2025