

Spring 2023

Chem 243-002: Organic Chemistry I

Pier Champagne

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CHEM 243-002 – Organic Chemistry I

Spring 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.

Instructor: Dr. Pier Alexandre Champagne
Office: Tiernan Hall (TIER) 354
Email: pier.a.champagne@njit.edu

Lectures: Mondays, 1:00 – 2:20 PM KUPF 107
Thursdays, 1:00 – 2:20 PM KUPF 107

Office Hours: Tuesdays, 3:00 – 5:00 PM
Fridays, 10:00 AM – 12:00 PM
Office hours take place in my office (TIER 354). If you cannot make these scheduled times, send an email to schedule an online or face-to-face meeting.

Required material and other resources:

- Textbook: Organic Chemistry by Wade and Simek, 9th edition (2017); Pearson, Glenview, IL. ISBN #032197137X. Any prior version of the Wade textbook is similar and can be a cheaper alternative.
- iClicker Student app: iClickers will be used throughout the lectures and serve as a way to monitor engagement. The iClicker Student app (<https://student.iclicker.com/#/login>), which can be used on a mobile device or a computer, is necessary.

You need to activate the app (there is a fee) and pair it with the course in order to get your points. The tutorial on how to do this can be found on the Canvas page.

- Aktiv Learning subscription: The Aktiv Learning app (<https://account.101edu.co/signup>), which can be accessed from a mobile device or computer, will be used for graded homework and quizzes. A subscription of \$28 for the semester is required to access the material.
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.
- Molecular model kit: This is a highly suggested purchase. Molecular models will be allowed during the exams.

LEARNING OUTCOMES

After completing this course, students will be able to:

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 diastereomers
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

Throughout this course, the mechanisms of organic reactions will be emphasized through the curved-arrow formalism. 3D animations of molecules will be used to visualize important structures, their conformers and stereoisomers. The reaction mechanisms will also be visualized in 3D on www.visualizeorgchem.com, so that students can better understand how chemical reactions happen through the directional collisions of molecules.

POLICIES

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: <http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

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

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

Class attendance and iClicker participation	5%
Aktiv Learning homework and quizzes	20%
Chemistry infographic assignment	15%
Midterm exams (2)	40%
Final exam	20%

iClicker participation and answers: iClicker questions will be asked during lectures. As long as you answer the questions, you will get full credit. This is a good opportunity for you to test your understanding. You must pair the iClicker Student account with Canvas in order to allow the instructor to synchronize your grades.

Aktiv Learning homework and quizzes: For each chapter, a set of homework questions will be posted on the Aktiv Learning app. Completing the homework before the due date will provide full credit, regardless of the score. This graded homework will be worth 5% of the final grade. Additional practice problems from the textbook will be provided with each chapter's notes. These will not be collected or graded, but serve as excellent practice for the quizzes and exams. In addition, there will be five (5) graded quizzes throughout the semester, also in Aktiv Learning. These can be completed within a 24-hour period pre-determined by the instructor. In total, quizzes will be worth 15% of the grade.

Chemistry infographic assignment: Organic chemistry is everywhere around us. In this assignment, you will practice writing and presenting data for a general audience by designing an infographic that shares information about at least one organic molecule present in common products. This assignment will be worth 15% of the grade, and extra credit will be available.

Exams: There will be three exams, two midterms each covering 3-4 chapters. The final exam will cover the last chapters. All exams require mastery of most concepts from previous chapters. All exams will be worth 20%. The following exam dates are tentative and therefore possibly subject to change.

Midterm Exam I	Thursday, February 23 rd
Midterm Exam II	Thursday, March 30 th
Final exam	Thursday, May 11 th

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

A	100-90%	C	74-70%
B+	89-85%	D	69-65%
B	84-80%	F	Below 65%
C+	79-75%		

Attendance Policy: Notes will be accessible on Canvas prior to beginning each new chapter. However, they are templates and will be expanded during lectures. Therefore, only attendance will provide you with the full notes, worked problems and announcements regarding covered material.

Office hours: For the office hours listed above, I make a commitment to be 100% available to discuss with you about any problem you might have, whether related to this Organic Chemistry course or not. You are not required to book a spot, you can always walk in and I will always be ready to help. You are encouraged to come prepared with specific questions so that all students who wish to can benefit from office hours. If you cannot make it to the regularly

scheduled office hours, please send me an email so we can schedule another time slot that works.

Email Policy: All email communication should be done using the “njit.edu” domain. No chemistry questions will be answered through email.

Make-up Exam Policy: There will be **no make-up exams** during the semester. In the event that a student has a legitimate reason for missing an 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.

Phones and laptops: Phones and laptops are welcome in the classroom, as long as they are used towards the objectives of the class. Specifically, we will use iClickers and other online resources during class.

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. For further information please click [here](#).

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/studentsuccess/disability-support-services/>

Important Dates:

See: Spring 2023 Academic Calendar, Registrar <https://www.njit.edu/registrar/spring-2023-academic-calendar>

Date	Day	Event
January 17	T	First Day of Classes
January 23	M	Last Day to Add/Drop a Class Last Day for 100% Refund, Full or Partial Withdrawal
January 24	T	W Grades Posted for Course Withdrawals
March 13 -18	M-S	Spring Recess - No classes scheduled
April 3	M	Last Day to Withdraw
April 7	F	Good Friday - No classes scheduled
May 2	T	Friday Classes Meet Last Day of Classes
May 3	W	Reading Day 1
May 4	R	Reading Day 2
May 5 - 11	F - R	Final Exams
May 13	S	Final Grades Due

COURSE OUTLINE

Lecture	Chapter	Topic
1-2	1	Review of General Chemistry, Structure and Bonding
3-4	2	Polarity, Acidity, and Functional groups
5-6	3	Structure and Conformations of Alkanes
7-9	4	The Study of Chemical Reactions
11		Exam #1
10, 12-13	5	Stereochemistry
14-17	6	Alkyl Halide, Nucleophilic Substitution and Elimination
18-19	7	Structure and Synthesis of Alkenes
21		Exam #2
20, 22	8	Reactions of Alkenes
23-24	12	Infrared Spectroscopy and Mass Spectrometry
25-27	13	Nuclear Magnetic Resonance Spectroscopy
28		Review

*Template updated by Genti' Price - August, 2020
Department of Chemistry & Environmental Sciences (CES)
Course Syllabus, Spring 2023*
